Department of Community Sustainability
MICHIGAN STATE UNIVERSITY

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Essential Competencies of Frontline Agricultural Extension Professionals

Edited by
Murari Suvedi and P.V.K. Sasidhar

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Essential Competencies of Frontline Agricultural Extension Professionals

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2024

The Department of Community Sustainability engages with colleagues, students, stakeholders and communities to address social choices within specifi c environmental, economic and cultural contexts that advance or confl ict with sustainability goals.

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PREFACE

To serve farmers and agribusiness operators better, we need to prepare new generations of agriculture development professionals, change our extension curriculum and pedagogy and prepare competent extension professionals. To improve training of extension professionals, the editors of this manual conducted three comprehensive studies on essential competencies of extension professionals in South Asia and sub-Saharan Africa:

- Assessment of Core Competencies of Livestock Extension Professionals in India (2016): USAID – MEAS Funded Project.

  https://meas.illinois.edu/wp-content/uploads/2016/07/MEAS-EVAL-2016-Assessment-of-Core-Competencies-of-Livestock-Extension-Professionals-in-India-Sasidhar-Suvedi-July-2016.pdf

- Strengthening Agricultural Extension Training in South Asia (India, Sri Lanka and Nepal) - Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum (2020): Funded by US Department of State under Fulbright programme.

  https://www.canr.msu.edu/profiles/murari_suvedi/Strengthening%20Agricultural%20Extension%20Training%20in%20South%20Asia%20March%202021.pdf

- Strengthening Agricultural Extension Training in Nigeria, Malawi, South Africa, Uganda, and Kenya (2023): Funded by AAP-PIRA (Alliance for African Partnership - Partnerships for Innovative Research in Africa), Michigan State University.

  https://www.canr.msu.edu/csus/uploads/1.%20Strengthening%20Agricultural%20Extension%20Services%20Overall%20Report.pdf

These studies identified essential job competencies of extension professionals, assessed whether these key competencies were covered in current UG extension curriculum, determined the gaps in essential job competencies of extension professionals and recommended competency-based curriculum with 11 process skills and core competencies and 97 subcompetencies for their inclusion in the UG agricultural extension curriculum.

The key findings include that the agricultural extension curriculum at undergraduate level is weak, course contents need to be updated or revised, new learning strategies like job internship and hands-on learning are needed, extension departments and extension faculty capacity needs to be enhanced and new textbooks and training manuals are needed. To address the need, we developed this training manual focusing on **'Essential Competencies of Frontline Agricultural Extension Professionals'**.

This training manual is developed primarily to serve as an extension training resource for field- level professionals, research scholars, graduate students and extension faculty. We hope this publication would serve a useful purpose. We would be highly obliged and thankful to receive feedback on this manual for its further improvement.

- Murari Suvedi *and* **P.V.K. Sasidhar**

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Introduction to Essential Skills and Competencies of Frontline Agricultural Extension Professionals

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1.0   Learning Outcomes

- Understand the concept of extension skills and competencies.
- Identify and define important extension skills and competencies.
- Discuss the history, current issues, and challenges of extension advisory services.
- Demonstrate how competencies can be imparted and assessed in extension work.

1.1   Introduction

The global demand for food is increasing. World population will exceed 9.7 billion people by 2050, an increase of 2 billion people over the current population. According to the Food and Agriculture Organization (FAO) of the United Nations, there is a need to increase agricultural and food production by 60 percent to meet future food demand (Feed the Future, 2015). This increased demand will be driven largely by population growth, increase in per capita income and rapid urbanization.

We live in a world dominated by global forces — new scientific discoveries, changing demographics, shifts in socioeconomic characteristics, rapidly changing consumption patterns, and interdependence in global markets. Food production and distribution is subject to these changes and forces. New technologies and practices originating in research institutions, adapted by peer farmers, or advanced by agribusiness organizations are changing the agricultural sector throughout the world. Such changes, when positive, could have a bigger impact if complemented by effective agricultural extension and advisory services (EASs). A challenge for agricultural extension rests in unleashing the creativity of millions of frontline extension workers to disseminate improved technologies and approaches in ways that benefit small farmers and agribusiness operators across the world.

The world's largest population group lives in developing countries. The majority of this population is engaged in the agriculture sector for two reasons — food and employment. It has been established that application of science-based technologies is essential to increase food and fiber production. Feeding the world's growing population depends on securing and advancing the use of modern

scientific technology and approaches. However, numerous farmers in many of the developing countries continue to cultivate crops and raise livestock in the same ways that have been used in their communities for generations. These farmers are often unfamiliar with new technologies and practices. Nor do they appear to have access to inputs and markets. These farmers need education on the use of these science-based technologies as well as access to inputs, materials, and markets – this is essentially the role of agricultural extension.

1.2 Agricultural Extension and Advisory Services

Agricultural extension and advisory services (EASs) provide research-based educational and informational programs typically for rural populations engaged in agricultural production. Historically, agricultural extension was primarily responsible for technology transfer. Extension services assisted farm people through educational procedures aimed at improving farming methods and techniques, increasing production efficiency and income, and bettering standards of living. However, in recent years, EAS serves both the rural and urban populations with a wide range of programs aimed at helping to improve beneficiaries' quality of life.

The role of extension has been to help people to help themselves through educational means to improve their level of living (Maunder, 1972). Agricultural EASs consist of various activities that provide the information and services needed and demanded by farmers and other actors to assist them in developing their technical, organizational, and management skills and practices to improve their livelihoods on a sustainable basis (Sulaiman et al., 2022). The contemporary EASs involve a diversity of actors in the provision of services and support to farmers (beyond information and knowledge), such as facilitation, intermediation, advice, and brokering (Sulaiman and Davis, 2012). For the purpose of this training manual, we like the definition advanced by Christoplos (2010, p.3):

"Agricultural extension is a system that facilitates access of farmers or their organizations to new knowledge, information and technologies and promotes interaction with research, education, agribusiness, and other relevant institutions to assist them in developing their own technical, organizational and management skills and practices."

1.3 History of Agricultural Extension and Advisory Services

The beginning of agricultural EASs in Europe has been traced to the mid 19th century potato famine in Ireland, where agricultural advisors from the United Kingdom taught farmers how to grow alternative food crops. A few years later, in 1867, Oxford and Cambridge universities in England started sharing the practical knowledge generated by their faculty with neighboring communities (Swanson and Claar, 1984; Suvedi and Kaplowitz, 2016). The European potato famine (1845-51) highlighted the need for institutionalizing agricultural extension. Elsewhere, Japan created the first agricultural extension service in Asia in 1899 (Swanson and Rajalahti, 2010).

Suvedi and Kaplowitz (2016) summarized the development of EAS in the United States and indicated that the precursors of EASs were agricultural clubs and societies established after the American Revolution in the early 19th century. In 1862, the Morrill Act was passed by the U.S. Congress to provide

for the establishment of agricultural colleges and to ensure government funding for agricultural education to promote agricultural production and productivity. In 1914, the U.S. Congress passed the Smith-Lever Act establishing the Cooperative Extension Service to develop practical applications for farmers and homemakers of research conducted in the land-grant universities by providing instruction or demonstration of existing or improved practices.

Although a notable amount of literature exists on the history of extension services in many of the developed countries, this is not the case with many of the developing countries. Before 1914, most of the extension activities in Africa were conducted by missionaries who established demonstration farms alongside spreading the gospel (Jones and Garforth, 1997). Some forms of agricultural extension services existed in most of the British colonies which aimed at encouraging the rural population to improve food production.

After the end of World War II, many countries in Africa, Asia, and Latin America achieved freedom from colonialism, and many types of agricultural EASs spread in the newly independent nations. Various forms of extension services have been adapted, and agriculture EAS across the world continue to change. Axinn (1988) analyzed various extension models, and Suvedi (2011) summarized the following six prevailing models.

Technology transfer model: Most extension systems rely on technology and information that are either available or able to be derived so that farmers can use it. This form of extension relies heavily on a linear concept of technology transfer: new technology and knowledge generated by scientists/researchers/others are transmitted by extension agents to farmers to increase production and income. This is the most common agricultural extension approach followed by developing countries.

Training and visit extension model: Beginning in the late 1970s, the World Bank introduced the "training and visit" approach in about 70 countries to speed the dissemination of Green Revolution technologies to farmers. This approach assumed that extension workers were poorly trained and not up to date on the subject matter, were poorly supervised and tended not to visit farmers regularly. To address these problems, this approach introduced a system of regular training of extension staff members by subject matter specialists, regular visits by extension workers to innovative farmers, and periodic interaction between farmers, extension workers, and research scientists to facilitate the two-way flow of communication.

Farmer training model: Agricultural extension programs in many countries established farmer training centers where selected "model farmers" from surrounding villages or districts could get training on improved farming methods and techniques. It was assumed that, after the training, the model farmers would go back to their villages, adopt the new farm practices they had learned during the training, and meet with others in the village to share what they had learned. These training programs would address two issues: the inadequate number of front-line extension workers to serve a large number of farmers, and the education of youth in the field. Farmer field schools are an adaptation of this approach.

Participatory extension models: Evidence indicates that when rural people organize for their own benefit, much can be achieved. Generally, participatory extension approaches assume that local farmers have wisdom or indigenous knowledge regarding food and fiber production on their land, but their productivity and livelihood could be improved by learning more of what is known outside their locality or from applying science-based techniques through on-farm trials. Farming systems research makes the same assumption regarding the value of local knowledge and strives to create co-learning opportunities among extension workers, researchers, and farmers. Most participatory extension models are supported by international NGOs (non-governmental organizations), and field activities are managed by local NGOs.

Farmer-based extension organizations: In more developed economies, farmers' associations or cooperatives have established and managed agricultural extension programs to serve the needs of their members. Management structures and sources of financial support vary from country to country. In general, members of the group or cooperative control the functioning of the extension system. A few examples are the farmers associations of Japan, and members of farmer associations or commodity groups -- such as coffee, sugar, cotton, or rubber growers -- who pay annual dues or a small portion of their product sales to receive extension services. In other situations, participants pay part of the cost of extension programs and government sources provide matching support.

University-based extension model: Many agricultural colleges and universities offer outreach or extension services that help local communities and also create an opportunity to improve the quality and relevance of their teaching and research functions. Agricultural universities have an assumed mandate to create and test technical knowledge so that it is relevant and useful to farm people. Also, both teachers and students benefit greatly from interaction with farmers. The U.S. land-grant universities were developed to serve the people in each state with three interrelated and complementary functions: teaching, research, and extension. This concept is recognized by many agricultural colleges and universities developed through USAID assistance, and these universities have organized extension services in nearby communities.

It is fair to say that there is no single dominant agricultural extension system today. New approaches that integrate elements of many extension models are evolving constantly. In most countries, the central government provides an overall policy framework for EASs, but a variety of actors -- e.g., public organizations, civil societies, and private firms -- provide a range of services to farmers and agribusiness organizations. This has resulted in the rise of pluralistic agricultural EAS in increasing numbers of countries.

1.4   Current Issues and Challenges

Agricultural EASs across the developing world continue to change. Overall, funding from donor organizations such as the World Bank, United States Agency for International Development, and European Union is declining. As a result, agricultural EASs face a gradual reduction in

funding. Public funding of agricultural EASs continues and attempts are made to strengthen and streamline agricultural EASs. However, many of the issues have remained the same:

- Grossly inadequate and untimely release of funds.
- Weak research-extension-farmer-inputs linkages system.
- Top-down and supply-driven EASs followed.
- Poor working conditions (transportation, office space, housing, etc.).
- Poor coordination of EASs among the EASs providers.
- Frequent political interferences in extension management.
- Lack of low-cost credit that small-scale farmers can easily access.
- Barriers to integration of women farmers in agricultural EASs that are staffed predominantly by men.
- Lack of a legislated agricultural extension policy.
- Poor quality training for extension practitioners.
- Weak institutional capacity for training of extension workers.
- Lack professional expertise and adequate opportunities for extension staff members to gain practical experience.

To succeed, the agricultural EASs must (Chambers, 1997; Swanson, 2008; Christoplos, 2010; Sulaiman and Davis, 2012; Suvedi and Kaplowitz, 2016; Sulaiman et al., 2022):

- Become more decentralized, farmer-led, and market-driven.
- Change EAS's role from a supply-driven to a demand-driven system.
- Change from a top-down, technology transfer system to a bottom-up, participatory process.
- Serve the needs of female farmers, who have been neglected by traditional extension services in most developing countries.
- Learn to work in partnership with many public, not-for-profit and private- sector organizations that offer similar services to farmers and agribusiness operators.
- Ensure inclusivity and diversity to meet the educational and informational needs of women, youth, and marginalized and vulnerable groups in the community.

1.5 Developing Next Generation of Extension Workers

Human resource development is the essential first step toward the development of a sustainable food and nutrition system — from decentralized, participatory EASs planning and implementation to evaluation. Building the capacity of extension professionals at the grassroots is of paramount importance to succeed in achieving food security. Frontline extension workers play a critical role in helping farmers learn and adopt new agricultural practices. They link farmers to research communities, teach farmers how to adopt new technology, facilitate coordination of input delivery,

and link farmers to markets -- ultimately achieving local food security -- production, processing, marketing, and distribution of safe and nutritious food for all consumers. They offer an educational service known as "from farm to fork."

Despite the key role of extension workers, their training and job preparation is weak. They lack knowledge and skills required for effective delivery of agricultural EAS. Their training is inadequate for managing pluralistic, participatory, and demand-driven extension services. The authors conducted a comprehensive study on process skills and core competencies in South Asia and found that extension professionals lack adequate training in program planning and implementation, communication, use of information and communication technologies (ICTs), program monitoring and evaluation, personal and professional development, diversity and gender, marketing, brokering, and value chain development, use of various extension soft skills, nutrition education, and technical subject matter expertise. They also found that there are significant gaps in the coverage of important process skills and competencies required by extension professionals in the current agricultural extension curriculum at the undergraduate level (Sasidhar and Suvedi, 2018; Suvedi and Sasidhar, 2020).

Studies indicate that poor institutional capacity -- i.e., faculty vis-à-vis the agricultural extension curriculum -- has resulted in poor quality training of extension professionals, resulting in low quality EASs (Suvedi et al., 2023). Agricultural training institutions should revise and adopt a robust curriculum. The curriculum, which was mostly borrowed from the Western countries decades ago, needs change. It is high time for curricular transformation. Extension curriculum must be designed to address the changing socio-economic, educational, and technological contexts. Faculty members in the agricultural training institutions need refresher training to stay current on the subject matter. Agricultural training institutions must receive adequate funding and commit to prepare extension educators with required skills and competencies who are willing and able to serve the farmers in their respective countries. Specifically, the training of frontline extension workers should focus on process skills and core competencies which are essential to perform their tasks effectively.

1.6 Extension Process Skills and Competencies

There has been growing interest in competency studies in recent times due to the functional perspective of competence and the attempt to further it for human resource development (Schneider, 2019). Frontline extension workers are the main human resources for agricultural EASs. The competency of extension workers is directly related to their performance. "Competence" refers to the general capability of persons (or organizations) to perform a task or to solve an emerging problem. A higher level of competency leads to higher efficiency in services, better performance, and higher satisfaction among staff members and their clients. Seevers et al. (2007) used the term "core competency" to describe the basic knowledge, skills, attitudes, and behaviors that contribute to workers' excellence in their respective professions (e.g., agricultural extension). The terms "competencies" and "core competencies" are used interchangeably in the literature. There are many views on how core competencies can be imparted and assessed (Box 1.1).

> **Box 1.1: Some Important Views on Competencies**
>
> - Process skills and core competencies are a collection of observable dimensions – individual skills, knowledge, attitudes, behaviors, and collective processes and capabilities – necessary for individual, organizational and program success (Athey and Orth, 1999).
> - Competence is the ability to perform the roles and tasks required by one's job to the expected standard (Eraut and Boulay, 2000).
> - Competence refers to behavior a person should be able to demonstrate (Moore et al., 2002).
> - A competence is defined as the ability to meet individual or social demands successfully, or to carry out an activity or task (OECD, 2002).
> - Competence is a concept that integrates knowledge, skills, and attitudes, the application of which enables the professional to perform effectively, and to respond to contingencies, change, and the unexpected (RCVS, 2006).
> - Competency is an underlying set of personal characteristics that facilitate superior performance (Boyatzis, 2008).
> - A competency is a standard: the performance of a skill at a predetermined level of performance (Welsh et al., 2009).
> - Professional competence is seen as the generic, integrated, and internalized capability to deliver sustainable effective (worthy) performance (including problem solving, realizing innovation, and creating transformation) in a certain professional domain, job, role, organizational context, and task situation (Mulder, 2014).

The above views on competencies recognize that requirements and expectations change depending on job role and context. It also recognizes that competence develops, and that an individual may work competently at many levels, either at different stages of his or her career, or indeed from one day to the next depending on the nature of the work (RCVS, 2006). Further, being knowledgeable and/or intelligent does not indicate that a person is an effective and efficient provider of services – performance is a function of knowledge plus skills and attitudes (McClelland, 1973). Hence, extension professionals should not be judged solely on how knowledgeable they are in their technical subject area of expertise but on how skillful and able they are in delivering EASs to their clients. It should also be noted that core competency needs are contextual, and extension workers' contexts affect their competency needs and competency levels.

1.7 Extension Worker Training Curriculum

Process skills and core competencies are necessary for individual and organizational program success. These competencies are context-specific and enable functioning of individuals to be effective in a certain profession, organization, position, or role (Davis, 2015; National Food Service Management Institute [NFSMI], 2004; Mulder, 2014; Mulder, 2015). In the context of EASs, competencies of agricultural extension professionals should be judged on how knowledgeable they are in their core

areas, and how skillful and able they are in applying that knowledge when delivering EASs to clients. Agricultural EASs are transitioning from a focus on technology transfer to facilitating a range of interventions in complex contexts. An agricultural extension curriculum is expected to support this transition by imparting the required process skills and core competencies at the undergraduate level. Therefore, understanding and assessing gaps in competencies of agricultural extension professionals at regular intervals is a pathway to informing curricular modifications.

1.8 Desired Process Skills and Core Competencies and their Assessment

According to the National Research Council of the National Academies (2009), agricultural graduates should develop competency in "teamwork and working in diverse communities, working across disciplines, communication, critical thinking and analysis, ethical decision making, and leadership and management" (p. 40). Professional associations and accreditation boards also have contributed to establishment of knowledge and competency requirements for graduation in various technical and vocational fields. Food and agribusiness employers rank interpersonal skills and critical thinking twice as highly as agriculture production experience as components necessary for career success. In addition, graduates need to be knowledgeable about issues of globalization, the value of a diverse workplace, information literacy, and how their products/processes affect environmental sustainability (APLU, 2009).

Various competency and competency assessment models exist in extension (Scheer and Cochran, 2011). Those that have been applied in the American context to identify and develop competencies include the Texas Agri-Life Extension YES Model, the Michigan State University Extension Core Competency Initiative, and the 4–H PRKC model for 4–H (Fred Shimali et al., 2021). These models differ in the number of core competency areas (Harder et al., 2015), and the types of competencies or their extent may vary from country to country. For example, extension staff in developed countries may require a higher level of computer skills than those in a developing country. Similarly, staff members having multiple roles -- such as educator, grant writer, and administrator -- need different competencies than those having a single function or role. For example, county extension directors in the United States, who have diverse roles, need a different set of competencies than an extension educator in Malawi or Nigeria whose primary role is technology transfer. Core competencies, when combined with sound technical skills, form the foundation for becoming a successful educator.

Michigan State University Extension (MSUE), for example, launched its core competency development initiative in 1993. A group of campus and off-campus staff members identified essential skill sets for extension educators. MSUE supports core competency development throughout the organization. It is designed to encourage staff members to take responsibility for and be actively engaged in their professional development (MSUE, 2015).

Agricultural extension workers should be knowledgeable in the essential competencies required of a *"New Extensionist"* (Davis, 2015). To accomplish this, it is essential that extension workers clearly understand these requirements. "Skills" and "competence" are specific activities, and "competence" is the ability to carry out an activity effectively, safely, and efficiently. The most critical competencies are those that relate to skills that an extension worker is expected to perform.

While emphasizing competency development as a long-term investment for extension, Sulaiman and Davis (2012), Davis and Sulaiman (2014), Davis (2015), CRISP (2015), and Prasad et al. (2015) articulated the need to develop functional and technical competencies across three levels: the individual level, the organization level, and the enabling environment level. As key to competence development, Sandberg (2000) identified three approaches to competency assessment: work-oriented, worker-oriented, and multimethod-oriented. In this study, we followed the individual/worker-oriented approach, which aids in identifying the skills, knowledge, and abilities needed for effectiveness at work and improvement of EASs performance.

To address the challenges outlined in the previous section, the competencies required of an agricultural extension worker at the individual level may be classified into two broad categories:

a. Process Skills or Functional Competencies or Soft Skills

Example: Engaging stakeholders in program planning, implementation, and evaluation, networking with local organizations, facilitating group formation, resolving conflicts, etc.

b. Technical Skills

Example: Identifying disease-causing organism in crops, conducting a method demonstration on how to perform artificial insemination in dairy animals, etc.

Competent agricultural extension workers must possess both process and technical skills to perform their tasks well. The combination of these core competencies with technical knowledge and skills enables an agricultural extension worker to be more effective in addressing the challenges of the work.

Scholars and practitioners have proposed many areas of core competencies for agricultural extension educators (Cooper and Graham, 2001; Levine et al., 2002; Maddy et al., 2002; Scheer et al., 2006; Sulaiman and Davis, 2012; Davis and Sulaiman, 2014; CRISP, 2015; Davis, 2015; Prasad et al., 2015; Suvedi and Kaplowitz, 2016; Sasidhar and Suvedi, 2018; Suvedi and Sasidhar, 2020; Shimali et al., 2021). Suvedi et al., (2023) identified 11 essential competencies of agricultural extension professionals (Box 1.2):

Box 1.2 : Essential Competencies and Skills of Agricultural Extension Professionals

1. Program planning
2. Program implementation
3. Communication
4. Information and communication technologies (ICTs)
5. Program evaluation
6. Personal and professional development
7. Diversity and gender

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8. Marketing, brokering, and value chain development
9. Extension soft skills
10. Climate change
11. Technical subject matter expertise

Source: Suvedi et al., 2023

The above competencies and skills are briefly discussed in the following sections.

Program Planning: Planning is the most basic role of extension educators under the decentralized, pluralistic, demand-driven extension system. Developing educational programs and services with community input, establishing clear and relevant objectives, and making efficient use of resources to serve the needs of targeted audiences result in a strong impact. For agricultural extension professionals, the subcompetencies under program planning include:

- Familiarity with the vision, mission, and goals of national /state (subnational) EASs and agricultural development strategies, programs, and policies.
- Ability to conduct needs assessment and engage stakeholders to prioritize local needs.
- Ability to conduct baseline or benchmark studies.
- Ability to mobilize resources / funds to address priority needs.
- Ability to engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning.
- Familiarity with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).

Program Implementation: The extension educator is responsible for effective program execution. To be effective, s/he should be able to:

- Coordinate local extension programs and activities.
- Demonstrate teamwork skills to achieve extension results.
- Form farmers' groups and support them.
- Engage local stakeholders (e.g., NGOs, self-help groups, cooperatives) in implementing extension programs.
- Demonstrate negotiation skills to reach consensus and resolve conflicts.
- Follow participatory decision making in extension work.
- Delegate responsibilities to staff as needed.
- Engage minority groups (e.g., female farmers and youth development groups) in extension work.
- Integrate private or public-private partnerships in extension service provision.

Communication: As planners, educators, and managers of local educational programs, extension workers must possess strong communication skills. These include:

- Selecting appropriate communication methods.
- Establishing communication with various stakeholders.
- Respecting local culture while communicating with clients.
- Preparing required progress reports.
- Sharing success stories and lessons learned with stakeholders through various media.
- Using extension methods (e.g., individual, group, and mass contact methods) to disseminate information about extension activities and programs.
- Demonstrating good listening skills and listening to all clients and stakeholders.
- Demonstrating good public speaking and presentation skills.

Information and Communication Technologies (ICTs): In the information technology age, using ICTs has become a part of extension educators' daily work, so it is important that all extension educators possess abilities related to:

- Word processing (e.g., typing, editing, printing) and designing graphics.
- Data entry and analysis software such as Excel, SPSS, etc.
- Power Point for making presentations.
- Audiovisual aids such as charts, graphs, and puppet shows for teaching and learning.
- Mass media such as FM radio stations and television channels for communication.
- Computers (email, Internet) for communication.
- Mobile phone services (e.g., texting, SMS service) for communication.
- Social media (WhatsApp, Facebook, Twitter (now X), Instagram, etc.) for communication.
- ICT tools to improve access to information, knowledge, technologies, and other innovations.
- ICT tools to enhance collaboration and partnerships.
- ICT tools for collecting data, monitoring, and evaluating extension programs.

Program Evaluation: In the era of accountability, funding agencies continually ask questions about impacts of extension work, such as:

- What did you do with the money?
- Why should we continue to fund extension programs / projects?
- Are the extension programs effective?
- How will you improve or terminate ineffective extension programs / projects?

Evaluation is needed to answer accountability questions (Frechtling et al., 2002; Ghere et al., 2006). Results add to the scholarly work of learning that helps us improve programs and document the

net social value of extension programs. Sharing evaluation results with stakeholders strengthens support for our programs. Therefore, to be relevant, every extension professional should:

- Understand theories and principles of monitoring and evaluation.
- Conduct monitoring and evaluation of extension programs.
- Develop data collection instruments -- interview schedules and/or questionnaires -- for monitoring and evaluating extension programs.
- Conduct online surveys for monitoring and evaluating extension programs.
- Apply qualitative tools and techniques (e.g., focus group discussion, case study, etc.) to collect evaluation data.
- Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.
- Analyze and interpret data (qualitative and quantitative).
- Write evaluation reports.
- Share evaluation reports within their organizations and with stakeholders.
- Apply the evaluation findings in replicating/scaling-up of extension programs.

Personal and Professional Development: Personal and professional development is the ability of agricultural extension professionals to:

- Apply principles of good governance (i.e., client's participation, accountability, and transparency) in extension work.
- Show commitment to career advancement (participate in lifelong learning, in-service training, professional development events and conferences).
- Apply professional ethics in extension work -- i.e., promote research-based recommendations or technology.
- Follow organizational policies and directives for professional development.
- Demonstrate honesty and a positive attitude toward extension work.

Diversity and Gender: Agricultural extension professionals live and work in communities with people having a variety of racial backgrounds (e.g., race, caste, ethnicity, or tribe), cultures, and religions or faiths. To be effective, extension educators should be able to:

- Understand that diversity exists within and among clients and stakeholders.
- Identify the needs of small-scale farmers.
- Identify the needs of minority groups.
- Develop extension programs to benefit women farmers.
- Develop extension programs to benefit youth.
- Engage marginalized and vulnerable groups in extension programs (e.g., disabled, resource-poor farmers).
- Work with a diverse team.

Marketing, Brokering, and Value Chain Development: Every extension educator should promote extension's reputation, image, and awareness, and support its programs. S/he should engage communities, decision makers, and users of extension services and media in promoting extension. Extension staff members should:

- Have basic knowledge of agribusiness development.
- Apply brokering / advisory skills in agribusiness development.
- Have knowledge of various agricultural markets and linkages.
- Demonstrate knowledge of value chain logistics and input-output linkages in the value chain.
- Facilitate entrepreneurship development among extension clientele groups.
- Be able to link farmer producers' organizations / cooperatives / agribusiness companies with extension.

Extension Soft Skills: To be relevant, every extension professional should have soft skills and competencies, which include:

- Critical thinking.
- Problem solving.
- Time management.
- Stress management.
- Leadership.
- Teamwork.
- Flexibility.
- Self-motivation.
- Interpersonal skills.
- Positive work attitude.
- Collaboration.
- Conflict management.
- Group formation and development.
- Negotiation skills.
- Networking skills.
- Facilitation skills.
- Creativity /innovativeness.

Climate Change: Climate change and variability has been a major concern in food production. Climate change as any change in the climate over time that directly or indirectly alters the global atmospheric composition and climatic variability. Climate change is detected when the climate – the long-term pattern of climate variability, for instance, on average the climate gets warmer or cooler,

or wetter or drier, over decades. It has direct link with food production. Therefore, grassroots level extension workers should have competencies to explain the concepts of climate change, climate variability, and global warming and they should be able to:

- Understand the concepts of climate change, global warming and climate smart agriculture.
- Explain the causes and impact of climate change on agriculture.
- Discuss the global efforts to combat climate change.
- Engage in various climate smart agriculture practices for addressing climate risks.
- Apply different extension approaches to mitigate climate change and variability.

Nutrition Education: Poor diets and malnutrition in all its forms are among the greatest global social challenges of our time. Nutrition-related challenges contribute to about 45% of deaths in children under age 5 in the entire world (UNICEF, 2022). For example, in Uganda, out of the 2.2 million children under 5 years of age, 29% are stunted, 11% are underweight, and 4% are wasted (UBOS and ICF, 2017). The agriculture sector ensures that diverse foods are available, affordable, and safe for feeding the people (Fanzo, 2015; FAO, 2013). Agricultural extension workers can build farmers' capabilities to attain their full potential in production of crops and livestock for food and income security (Sala et al., 2016). Effective nutrition education can be possible only when the trainers have the right competencies to undertake such activities (Hughes et al., 2012). Agricultural extension professionals should possess the following competencies related to nutrition:

- Demonstrate basic human nutrition knowledge (e.g., food composition, balanced diet, supplements, nutritional composition of various foods, nutrition deficiency symptoms etc.).
- Understand life-cycle nutrition needs of various household members (e.g., children of various age groups, pregnant and breast-feeding mothers, elderly).
- Able to advise families on what crops and livestock to produce to ensure balanced diets.
- Advise families to improve gender relations for increased agricultural production and improved nutrition.
- Demonstrate postharvest handling technologies that conserve nutrients and keep food safe (e.g., food storage, freezing fruits and vegetables, making pickles, jams, jellies).
- Have basic knowledge about food labeling (e.g., organic foods).
- Able to advise on a healthy diet (e.g., for fitness and sports, diabetes, cancer and AIDS/HIV, heart health, kidney disease, osteoporosis, weight loss and obesity).

Note that this resource book does not cover specific competencies on nutrition education skills and competencies. Educational resources are already available in public domain, and we recommend readers to access the following online resources on nutrition skills and competencies:

Burrows, E. and Kuyper, E. (2018). Nutrition-Sensitive Extension (Module 16). Global Forum for Rural Advisory Services (GFRAS). Lindau, Switzerland. file:///Users/suvedi/Downloads/GFRAS_NELK+_M16_Nutrition_%20Manual-2.pdf

Sherman, J. (2021). Global Forum on Food Security and Nutrition (FSN Forum), Food and Agriculture Organization of the United Nations, Rome, Italy. https://www.fao.org/fsnforum/comment/8136

Technical Subject Matter Expertise: At the individual level, the technical skills and competencies for extension field workers vary by specialization. For example, an extension professional working in the livestock sector needs to have basic technical knowledge and skills in veterinary science and animal husbandry, which would differ from their counterparts in crop or home science or fisheries sectors. Accordingly, the technical subject matter competencies of extension professionals include:

- Demonstrate technical knowledge in their basic discipline (e.g., field crops / livestock/ fishery/ horticulture, climate change, etc.).
- Understand adult learning principles and have practical skills required to teach improved farming practices.
- Understand a new technology being promoted -- i.e., what it is, why it is recommended, and how it works.
- Facilitate farmers' access to inputs and services (e.g., credit, seed, fertilizers, feed, artificial insemination, etc.).
- Educate community members about various types of risks and uncertainties (e.g., due to climate change, market fluctuations, natural disasters, etc.).
- Educate community members about climate change and climate-smart agriculture.
- Refer to and make use of publications -- journals, research reports, etc.
- Generate knowledge and produce research reports / journal publications.
- Harness, document, validate, and integrate local / indigenous knowledge.
- Understand the social system under which farming takes place (e.g., rural sociology knowledge).

The above competencies are core to the extension profession. They are needed irrespective of extension position assignment, whether field crop educator, livestock educator, or nutrition educator. One of the greatest challenges is that extension staff members often do not have the appropriate and updated skills to perform effectively. Knowledge and skill levels among extension workers vary greatly, primarily because of variations in types and quality of pre- and in-service training programs for extension professionals (Suvedi and Sasidhar, 2020). In many African countries, fiscal constraints have forced public extension systems to hire staff members having few competencies or skills. Many extension organizations do not have a well-defined system of in-service training for systematic staff development.

1.9   Purpose of Training Manual

The agricultural sector is one of the major drivers of economic growth and poverty reduction in developing countries. The sector provides the major source of livelihood to smallholder farmers as well as micro-, small-, and medium-scale enterprises along the numerous agricultural value chains

well as micro-, small-, and medium-scale enterprises along the numerous agricultural value chains leading to a pathway of long-term food security, poverty eradication, and rural development. Despite the significant role of agriculture in driving the economy, poverty and food insecurity are prevalent among smallholder farmers and other value chain actors, and this has been largely attributed to low agricultural productivity that keeps the agri-food sector locked in underperformance (Fawowe, 2020; Bjornlund et al., 2020). Therefore, improving agricultural productivity is the major means to alleviate poverty and curtail food insecurity.

Agricultural EASs can play a key role in addressing complex challenges -- increasing farm productivity, linking farmers to markets, and improving food security. On the other hand, poor institutional capacity -- i.e., faculty vis-à-vis the agricultural extension curriculum -- has resulted in poor quality training of extension workers resulting in low quality EASs and low adoption of improved agricultural technologies among food systems actors (Babu et al., 2020). Further, our study (Suvedi et al., 2023) identified important skills and core competencies required by the extension workers and explored whether the undergraduate curriculum in extension education covers these job skills or core competencies. The study revealed that there are considerable gaps in the several essential skills and competencies.

This training manual is developed primarily to serve as an extension training resource for field-level professionals. Information and content included in this manual will bridge the gap between important process skills and core competencies required of extension workers and their coverage in the undergraduate agricultural extension curriculum. The secondary purpose is to provide a user-friendly handbook for agricultural extension faculty and extension and/or rural development training center staff on essential skills for field workers. The book is designed as a self-learning manual to benefit all extension faculties in agricultural universities, including extension training institute staff, graduate- and undergraduate-level students, and NGO professionals who work with farmers and farmer organizations. This training manual covers essential skills and competencies in program planning, program implementation, communication, ICTs, program evaluation, personal and professional development, gender and diversity, extension soft skills, agribusiness, marketing, and value chain development, and climate change issues in extension.

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<div align="center">CHAPTER - 2</div>

Program Planning in Extension: Skills and Competencies

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2.0 Learning Outcomes

- Define "extension program" and related terms.
- Explain the concept of extension program planning skills and competencies.
- Discuss the importance and principles of the extension program planning process.
- Formulate a sound extension program.

2.1 Introduction

Agricultural development programs are the heart and soul of extension work. Various types of agricultural extension programs promote innovative technologies and extension advisory services (EASs). Successful programs keep the beneficiaries at the center of the planning process. They involve local institutions and stakeholders in all phases of program development.

Planning is the bedrock for planned change, and most of the development we have achieved in agriculture is the result of planned change. Frontline extension workers are expected to plan extension programs to address local food and nutrition security -- i.e., production, value addition, processing, and marketing of food for a growing population. Often, extension workers are also engaged in planning programs to serve other needs of communities – e.g., organizing producer groups and cooperatives, promoting democratic norms for decision making, conserving natural resources, etc.

Planning involves three issues: studying the past, analyzing the present situation, and forecasting the future course of action. A good extension program provides a clear and concise written statement of what will be done, why, how, when, with whom, and where. To put it simply, planning is a process for developing a blueprint of our goals, methods, procedures, activities, and expected results.

The first step in a systematic attempt to promote rural and agricultural development is to identify needs of the farmers and agribusiness community. Identifying local needs is an important responsibility of all extension workers. Local needs serve as foundations of sound extension programs. Therefore, every extension worker should be able to identify local needs and explore alternative solutions to these needs.

A good understanding of the various components of an extension program is the foundation for designing and delivering effective programs. This chapter is designed to introduce these components and provide step-by-step guidelines to relevant skills and competencies needed for planning extension programs by extension educators.

Essential program planning skills and competencies are listed in Box 2.1.

Box 2.1: Extension Program Planning Skills and Competencies

Every extension professional should be:

- Familiar with the vision, mission, and goals of national /state (subnational) extension service and agricultural development strategies, programs, and policies.
- Able to conduct needs assessment and engage stakeholders to prioritize local needs.
- Able to conduct baseline or benchmark studies.
- Able to mobilize resources / funds to address priority needs.
- Able to engage local stakeholders (e.g., NGOs, cooperatives, local agro-dealers) in extension program planning.
- Familiar with administrative and financial rules of their respective organizations (to utilize human and financial resources in extension programs).

Source: Suvedi and Morford, 2003

2.2 What is Program Planning?

Before going into the details of program planning, let us look at and understand the meaning of related terms in the context of extension program development:

- **Program:** A program is a written statement which describes proposed extension activities, the problems they address, the actions proposed to address the problems, and the resources required. A program could be short-term (e.g., day-long farmers training program on cooperative marketing of farm products), medium-term (e.g., a 10-week- long television program promoting home gardens to create nutritional awareness among rural families), or long-term (e.g., promoting organic farming practices through educational training and demonstration of new crop and livestock production technologies to reduce reliance on chemical inputs).

- **Project:** A project is a short-term investment to create and develop certain facilities to increase the production of goods/services in a community. A project is usually a time- and location-specific investment activity in which financial resources are expended to create capital assets that produce benefits over an extended period.

- **Plan:** A plan is a schedule of extension work outlining various activities in a specific period. It answers the questions what, why, how, and when as well as by whom and where the extension work is to be done.

- **Program Planning:** Program planning is the process of making decisions about the direction and intensity of extension efforts to bring about desirable change among communities. A good program plan is to the extension worker what the compass is to the seaman.

- **Extension Program:** Extension program is a statement of situation, problems, objectives, solutions, calendar of work, and resources required. Let us briefly examine the terms used in this definition.

- **Situation:** "Situation" is a statement of affairs that includes the cultural, social, economic, and physical conditions in which a particular group of people find themselves at a given period. Please remember that the situation which constitutes the environment for extension program planning is continuously changing. The changing environmental aspects that are relevant to extension work are:

  - Changes in technology.
  - Changes in government policy.
  - Changes in overall economic activity, including prices, employment of labor, raw materials, etc.
  - Changes in social norms and attitudes of farmers toward farming practices, technology, etc.

- **Aim:** "Aim" is a generalized and broad statement of direction for the given extension activity. *Example:* Improvement of the economic condition of vegetable growers.

- **Goal:** "Goal" is the desired result that a person or group of people envision, plan, and commit to achieve during a given period. *Example:* Improve vegetable growers' annual income by 20 percent through direct marketing.

- **Objectives:** "Objectives" are possible outcomes that a person or a system desires. They express ends toward which extension efforts are directed. *Example:* Increase net income of vegetable growers by 20 percent within two years.

- **Problem:** "Problem" is an issue or obstacle which makes it difficult to achieve a desired goal, objective, or purpose. It refers to a situation or condition that is yet unresolved. In a broad sense, a problem exists when an individual becomes aware of a significant difference between what is (current situation) and what is desired (desired future situation) which constitutes a gap. *Example:* In the context of extension, a problem can refer to a particular social issue (say, lack of market access for farm products), which if solved would yield socio-economic benefits such as increasing profits from sale of produce, attracting youth toward agriculture, and decreasing rural-urban migration.

- **Solution:** "Solution" is a course of proposed action to change an unsatisfactory condition to one that is more satisfying. *Examples:* Satisfying condition: Eradicating hunger and malnutrition in the community. Proposed action: Promote new food crop and vegetable varieties, develop irrigation structures, and train farmers on insect, pest, and disease management to get higher yields to feed the population.

- **Calendar of Work:** "Calendar of work" is a plan of extension activities to be undertaken in a particular time sequence. *Example:* Radio farm school broadcast on first Sunday of every month in 2023.
- **Resources Required:** What human, financial, physical, time, and other resources are required to successfully implement the program? Planners attach a budget and budget narrative to the program or project.

2.3 Objectives of Program Planning

Program planning supports the sustainability of agricultural development programs by:

- Setting clear goals and objectives -- i.e., careful consideration of what is to be done and why.
- Soliciting and utilizing opinions of stakeholders on why extension work is important to them.
- Ensuring internal capacity for implementing extension initiatives.
- Establishing objectives toward which progress can be measured and evaluated.
- Developing a common understanding about the means and ends between various extension functionaries and partner organizations.
- Ensuring continuity, developing leadership, and promoting efficiency.
- Avoiding wastage of resources, promoting transparency of expenditures, and ensuring timely flow of funds.
- Having available in written form a statement for public use.

2.4 Types of Extension Programs

Extension is essentially an educational process to promote learning. Learning is a process of acquiring new understanding, knowledge, behaviors, skills, values, attitudes, and preferences. Planning is essential for active learning, to find solutions to community problems or issues, or to assess needs.

Boyle (1981) described three types of educational programs:: developmental, institutional, and informational programs.

a. Developmental Program

The goal of developmental programs is the empowerment of local people to define and solve their own problems, issues, or needs. Stakeholders and beneficiaries are involved in all phases of the program -- planning, implementation, and evaluation. The extension educator works closely with the local people to identify resources and support, implement the program, and evaluate it. His/her role is to facilitate the process of planned change.

Example: A rural or community development program with genuine participation of beneficiaries in the program's decision - making process is an example of an effective development program. Effectiveness is measured by positive change on selected indicators resulting from delivery of the program to the intended audience.

b. Institutional Program

An institutional program aims to further the growth and development of an individual's basic knowledge, skills, and abilities. The program's content is derived from the knowledge base of the institution or discipline. As program developer, an extension educator assesses learning needs, identifies instructional content areas, provides instruction, and evaluates the program.

> *Example:* Pre- and in-service training and certificate programs are examples of institutional programs. Farmer training centers are common examples of institutional programs. Effectiveness of such programs is measured by learners' perceptions of the quality of instruction, performance and test scores of participants, and number of trainees completing the training.

c. Informational Program

The primary goal in this sort of program is an exchange of information with the intended audience. As a program planner, the extension educator identifies the information needs of his/her audience and prepares information packages.

> *Example:* Print information or radio or television programs, which disseminate information through various media or channels, including information and communication technologies (ICTs). Effectiveness of such programs is measured by the extent of distribution to and the use of information by the intended audience.

An overall goal of an extension educator should be developmental – empowering the target audience with knowledge and skills. To reach and teach your audience, you can make use of existing institutions to build local capacity and use media and ICTs.

Extension programs may also be categorized as reactive or proactive.

Reactive Extension Programs

They are planned to address a specific problem, challenge, or need within a community as the need arises or is recognized.

> *Example:* For instance, if insect pests and diseases in plants (e.g., fall army work) are affecting food production in a country/region, you develop a program to address local food production by training farmers and agribusiness operators on pest management strategies for food crops. Information gathered in the extension planning phase will guide the action plan of the extension intervention.

Proactive Extension Programs

They are designed to drive change with the objective of uplifting a farming community or improving a situation. It is acting before a situation becomes a source of confrontation or crisis.

> *Example:* Organizing farmers into marketing cooperatives to sell their produce profitably. In proactive development, you resolve matters before they become an issue. Proactive development makes extension programs more stable and sustainable.

It is essential to maintain flexibility in extension programs. As an educator, you may need to switch between reactive and proactive modes depending on the situation and need.

2.5   Principles of Program Planning

Poorly planned programs often present several outputs but overlook listing outcomes. Let us differentiate between outcomes and outputs.

Outputs are the products and services delivered by the program or project to its clientele, such as number of training programs conducted, extension bulletins published and distributed, number of male and female farmers reached, and program costs. These are useful to have but not sufficient for a robust program plan.

Outcomes are the measurable results or consequences – both expected and unexpected – of a program in meeting its stated goals and objectives, such as the percentage of program participants who gain knowledge or skill because of the program. Usually, outcome-focused planning focuses on short-term impacts of a program, such as individual knowledge gain or learning, medium-term impacts on community- level changes such as establishment of a farmers' cooperative and long-term impact such as a new policy to improve local food production.

The following are a few basic principles of using outcomes - focused program planning:

- Always make decisions based on data and facts. Collect baseline or benchmark data sufficient enough for rational decision making.
- Involve the stakeholders in the planning process of extension initiatives to identify and understand the root causes of the problems you intend to address. This will help you find the best approach to overcome any potential hurdles you might encounter in the extension planning process.
- Set specific targets and goals to ensure planning covers all aspects of what you intend to achieve. Make sure the target clients know which behaviors, skills, and attitudes they will need to change for the extension program to be successful.
- Always aim for sustainable and lasting change within a community. Strive to make a significant positive impact with the proposed extension program. Always strive to minimize dependence on outside help and maximize local empowerment.
- Prepare to evaluate your progress and adjust or refine the plan continually so that the extension program will fulfill its purpose in the community it serves.

Distribute extension program benefits equitably amongst the resource- rich and resource- poor members of the community. Ensure that extension program planning adequately emphasizes the weaker sections of the community to narrow the gap between the rich and the poor; this may ultimately help reduce social disparities and social tensions. A principle is a statement of policy to guide decisions and actions in a consistent manner. To develop a program suited to address vast and varied conditions of human needs and variation is complex. Some statements of policy to guide

decisions and actions related to programming in a consistent manner are essential to develop a plan that will truly reflect the future needs of the public.

Certain basic principles make successful programs quite different from others:

- **Careful analysis of the situation** – Knowledge of the factual situation of the target group and the area is of paramount importance to program planning. Facts about the climate, the soil, rivers, streams, forests, vegetation, the land tenure system, etc., must be known.

- **Needs of the people** – Program planning should be based on the needs of the people concerned.   A program based on the felt needs of the people is mostly likely to succeed.

- **Comprehensiveness of a program** – A program should be comprehensive enough to address the problems and meet the needs of the various groups of people within the social system. It should be designed in such a way that it will include different socio-economic groups such as men, women, youth, etc.

- **Clearly stated objectives** – A well-planned program must possess clearly stated, straightforward and achievable objectives. The objectives should be easy for the people to understand and offer tips and/or guidelines for evaluation.

- **Flexibility of programs** – Programs should be flexible so they can accommodate problems that arise along the way., both long-term changes and special emergencies. Without flexibility, programs may not meet the needs of the people.   Rigidity in program planning is a clear indication of failure.

- **Democratic program planning process** – Program planning should be democratic and educational. The program should be capable of imparting knowledge and skill and, at the same time, promote changes in attitude and awareness so the beneficiaries can find solutions to their problems.

2.6   Extension Program Planning Process

The process of extension program development follows a cycle of certain stages. Successful extension program planning is a dynamic process with continual review of the situation and needs, stakeholder consultation, and resource mobilization (Suvedi and Kaplowitz, 2016). A summary of the all the steps of program development and implementation including evaluation is shown in Figure 2.1. However, this chapter will specifically focus on program planning.

2.6.1 Engage Stakeholders in Planning

This is the first step of the program planning process. It should involve a diverse set of stakeholders such as farmers, agribusiness operators, representatives of government agencies or other policymakers, community leaders, etc. Talk with each person individually and invite him/ her to serve in the advisory and/or planning committee representing the community (Refer to section 2.7.1 for more information on this step)
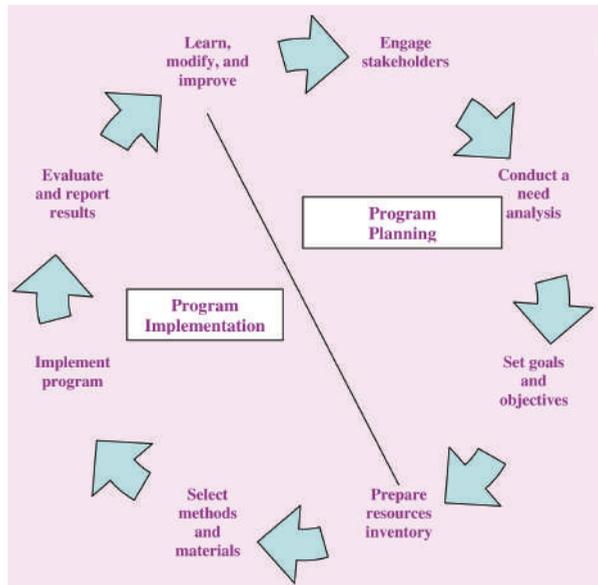
Figure 2.1: Program Development Cycle (Adapted from Suvedi and Kaplowitz, 2016).

2.6.2 Conduct a Situation/Need Analysis

A need / situation analysis is the process of critically evaluating the internal and external conditions, so you understand where the program is needed; who the program beneficiaries are; what strengths, weaknesses, opportunities, and threats exist in the community, etc. Basically, a situation analysis allows you assess the needs of stakeholders and how your organization can help address these needs. Once you develop a list of priority needs, share them with the stakeholders and your organizational representative to develop a common understanding on various roles and responsibilities. (Refer to sections 2.7.2 and 2.7.3 for more information on conducting a needs assessment.).

2.6.3 Develop Program Goals and Objectives

The next step is to devise program goals and objectives describing how participants or beneficiaries will change because of the program. This should be a democratic and participatory process involving the stakeholders. Program goals are broad; objectives are more specific and targeted. Good objectives are:

- *Specific* – Be specific and clear about what will be achieved.
- *Measurable* – Can you measure whether the objective has been met, partially met, or not met?
- *Achievable* – Is the objective achievable given the funding, staff resources, and time available?
- *Relevant* – Is it clearly linked to the need and desired result?
- *Time limited* – Does the objective contain a target date for achieving the desired result?

(Refer to section 2.7.4 for more information on developing goals and SMART objectives.)

2.6.4 Prepare Resource Inventory

This involves identifying what resources are needed to make this program successful. Resources may include:

- Human/social – program advisors, support workers, volunteers, consultants.
- Material – new information and technologies; money and what it can buy e.g.,   vehicles, computers, copy machines, notebooks, staff travel.
- Services – facilities for holding meetings and workshops, office, and storage space.
- Instructional – demonstration plots, improved seed, pesticides and other chemicals, audiovisual equipment, printed materials.

2.6.5 Select Educational Methods and Materials

The next step is to select the methods by which you can maximize the resources you have for your program. You should consult with your local stakeholders and seek advice from staff members of local cooperatives, an agricultural research station, or other organizations. Select the most effective method or combination of methods to reach and teach your audience while keeping the cost within your budget.

According to Suvedi and Kaplowitz (2016), an effective way to present the program plan is to develop a program logic model. Key elements of the program logic model are shown in Figure 2.2 below.
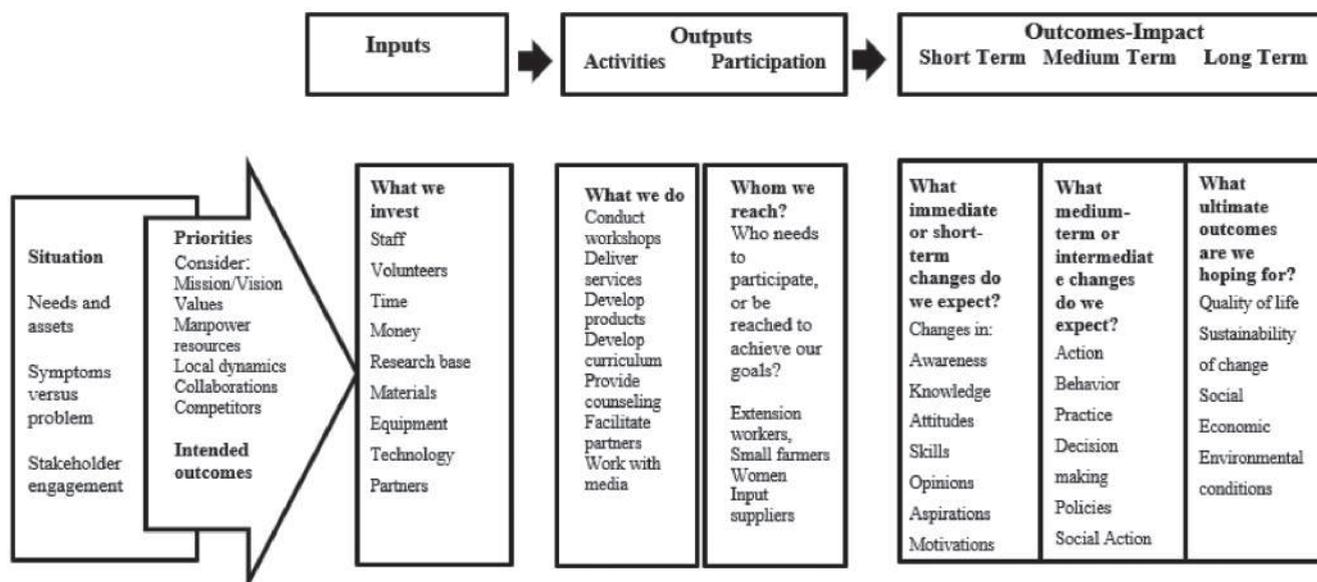
Figure 2.2: Extension Program Planning Logic Model (Adapted from Taylor-Powell and Henert, 2008; Suvedi and Kaplowitz, 2016).

2.7   Skills and Competencies Needed in Extension Program Planning

This section provides a broad overview of the skills and competencies that every extension worker should have to plan an impactful extension program. To plan and conduct extension participatory, pluralistic, and demand-driven extension programs, extension workers need the ability to:

1. Identify stakeholders and engage them in extension programs.
2. Conduct needs assessments.
3. Prioritize needs and problems.
4. Set goals and SMART objectives.
5. Acquire and allocate resources.
6. Identify market opportunities.
7. Design services based on gender analysis.
8. Develop a work plan and calendar of activities.
9. Develop a grant proposal.

2.7.1 Identify Stakeholders and Engage in Extension Programs

Identifying stakeholders and engaging them in extension programs is regarded as the first step of program planning and a vital competency tool that the extension professionals should use in the program planning process. A potential stakeholder of extension is any person or organization that shares commitment to your program and may be directly or indirectly affected by its outcomes. Stakeholders can be a valuable source of information. There are many ways to engage with stakeholders, either through face-to-face informal conversations or through more formal advisory groups. Agriculture development programs have many important stakeholders – farmers, input suppliers, credit agencies, education/training providers, marketers, processors and distributors, agricultural research professionals, and others. To successfully provide education for local people, extension workers need to coordinate among these stakeholders.

Stakeholders may be categorized as:

a. *Primary stakeholders* : The people or groups that are directly affected, either positively or negatively, by either the efforts or the actions of an agency, institution, or organization.

b. *Secondary stakeholders* : The people or groups that are indirectly affected, either positively or negatively, by the efforts or the actions of an agency, institution, or organization.

c. *Key stakeholders* : Those who are really important in what the project is trying to deliver or achieve, e.g., Ministry of Agriculture, research institutions, and donor representatives.

Why Conduct an Analysis of Stakeholders and their Interest?

1. **Diverse ideas** : Involving multiple groups brings out more and more diverse ideas than developing an effort by working with a single organization or a small group of like-minded people.

2. **Multiple perspectives** : Including various perspectives from across groups provides a holistic picture of how the project will affect the community and highlights potential pitfalls and assets.

3. **Team building** : Making all stakeholders an integral part of development process planning, implementing, and evaluating builds widespread support for the project.

4. **Credibility** : Involving and attending to the concerns of all stakeholders establishes your organization as fair, ethical, and transparent, thus increasing its credibility.

How to Conduct a Stakeholder Analysis?

Rietbergen-McCracken and Narayan (1997) advise following a four-step process to identify and analyze stakeholders, their multiple interests, their influence, and their participation in a program.

Step 1: Identify Key Stakeholders

- Assess who stands to potentially gain from the program's implementation.
- Who might be adversely affected?
- Are there vulnerable groups whose need must be addressed? If so, identify them.
- How are these groups interrelated?
- Divide stakeholders into two groups—those who will support and those who will oppose the program.

Step 2: Examine each Stakeholder's Interest and Potential Impact of the Project on these Interests

- What are the stakeholders' expectations of the project?
- What benefits are likely to accrue to each stakeholder group?
- What resources are the stakeholders able and willing to mobilize and invest?
- Do some of the interests harbored by a stakeholder conflict with project goals?

Step 3: Assess Stakeholder Influence and Importance

Each stakeholder will have some level of power that is, ability to influence others' actions and decisions. For each stakeholder or group, assess its:

- Power and status.
- Degree of organization.
- Control of strategic resources.
- Informal influence.

Step 4: Outline a Stakeholder Participation Strategy

Plan stakeholder involvement according to each stakeholder's interests, importance, and influence. As program planner, you should ensure that benefits of the program reach each stakeholder or their group. This will motivate and incentivize stakeholders and show that you appreciate their participation throughout the extension program or project.

2.7.2 Conduct a Need Assessment

Analyzing a situation is the second step of the program planning process. This could be done by conducting a need assessment. Thus, it is imperative that extension professionals develop competency in need assessment.

What are Needs?

"Need" is a condition marked by a lack of something that is considered a requisite or essential. "Need" is different from "want" in that "want" indicates a desire for something.

The various kinds of needs are felt needs, ascribed needs, and normative needs. We can classify felt needs into *expressed felt needs* (needs felt by people, revealed to and recognized by extension workers) and *unexpressed felt needs* (needs felt by people but not revealed or recognized by extension workers). Ascribed needs are those defined or identified by extension educators who are from outside the community, and they may or may not be present in the community. Normative needs are those that experts or extension workers believe people's needs to be.

What is a Need Assessment?

Need assessment is performed to identify the discrepancy or gap between the community now and where it wants to be (Witkin and Alschuld, 1995). According to Fear (1988), need assessment is an environmental monitoring process through which information is obtained that can be used to design timely, relevant, and reasonable programs.

Importance of a Needs Assessment

A strong needs assessment is crucial to develop objectives and to ascertain learning needs. When trainings are designed and implemented without farmers' inputs, recommendations given by the extension workers may be ignored because they are not relevant to local conditions or useful to the local farmers.

A good need assessment would identify the gaps that are relevant to farmers and other target audiences. It helps extension workers to focus on innovations and other programs suitable to and compatible with the intended audience/beneficiaries.

How to Conduct a Need Assessment?

Suvedi and Kaplowitz (2016) identified five steps to conduct a need assessment:

Step 1. Identify a representative area : To conduct a need assessment, sample a village that is representative of the section in which a needs assessment is planned.

Step 2. Plan the assessment : Carefully identify who will help with the survey (include farmers, researchers, extension workers). Visit the field and talk with farmers to learn what farmers perceive as problems. Visit farmers' fields to diagnose problems. Ask about the issues that affect their farming activities, such as production, inputs, and postharvest, marketing, and price issues.

Step 3. Analyze and prioritize problems : Use field observations and input from the discussions with farmers to assess and prioritize problems.

Step 4. Identify the causes of the problems : Correct solutions depend on correctly identifying the root causes of the problem. This should be done with the involvement of the farmers.

Step 5. Develop possible solutions and recommendations with the farmers : Make sure that farmers own and accept the solutions developed jointly with them. Carefully discuss options with them and see how possible solutions might or might not be compatible with their systems.

What are the Major Needs Assessment Methods?

The method of needs assessment chosen depends on the type of information needed and whether information is gathered from an individual or a group. The following are some methods suggested to carry out needs assessment (Fear, 1998; Carter and Beaulieu, 1992):

1. Nominal Group Process Approach

Purpose: This group dynamic method is designed to facilitate group- or team-based consideration of needs. It is an idea- generating strategy to gather individuals' ideas in a face-to-face, non- threating situation.

How to implement? a) If many participants are involved, divide the participants into small groups of six to 20. b) Members of the groups write their ideas on paper individually. c) Each person discusses her/his ideas, and all concerns are listed on a chart/board. d) Each idea is discussed, clarified, and evaluated by the group. e) Each person assigns priorities by silent ballot. f) Group priorities are tallied. g) The whole group discusses final group priorities.

2. Key Informant Approach

Purpose: The key informant approach is based on a brief interview or survey conducted by one or more sponsoring organizations, agencies, or associations, and administered to community residents identified as "key informants."

How to implement? a) Compile a list of "key informants" by name. b) Decide how you want to collect information from these key informants—via questionnaires, interviews, or meetings. c) Construct a brief questionnaire/interview from which you can obtain data. d) Gather data. e) Organize data. f) Interpret data. g) Schedule a meeting with key informants. Present the findings of your study to them. Discuss your interpretations and their interpretations of the data.

3. Social Networking Method

This method brings "state of the field" information to the attention of the extension educator who will assess needs. Examples are drawing information from census data and secondary sources of information such as association network and conference presentations.

4. The Delphi Technique

Purpose : It is an idea- generating strategy that does not require face-to-face interaction, although it can be used in small groups or a workshop setting.

How to implement : a) Develop a questionnaire focusing on identified issues: problems, causes, solutions, actions. The intent is for each respondent to list ideas regarding the specified issue. b) Distribute the questionnaire to an appropriate group of respondents. c) Each respondent independently generates ideas in answering the questions and returns the questionnaires. d)

Summarize the questionnaires into a feedback report and develop a second questionnaire for the same respondent group. The second questionnaire should ask respondents to prioritize or rank input from the first round. e) Distribute feedback summary and second questionnaire. f) Respondents review feedback report, independently rate priority ideas in second questionnaire, and return response. g) This process is repeated until general agreement is reached on problems, causes, solutions, and actions. h) A final summary and feedback report is prepared.

5. Participatory Rapid Rural Appraisal (PRRA)

Purpose : Participatory rapid rural appraisal (PRRA) is a popular needs assessment technique that involves a group of people investigating a situation or geographic region. It can use multiple data collection techniques to gather and analyze information in a limited but intense period of time (Andrews and Vlasin, 2000). It can also be used periodically to evaluate the status of situations and identify potential changes for improved performance. Though it is titled "rural" appraisal, it could be used in any geographic area.

How to implement : The basic PRRA involves an intense period (three to five days) of group investigation, analysis, and interpretation of a situation. A generic format includes the creation of a team; the setting of goals and procedures; systematic data collection, mostly through personal interviews; continuous group interpretation and analysis; hypothesis formation and the search to confirm or dispute the evolving conclusions; and a final pulling together of impressions and the writing of recommendations.

6. Community Forums

Purpose : A community forum is one or more open public meetings designed to encourage a broad base of citizen input. It can be a routine part of community life -- such as a "town meeting" or "the circle of elders" that meet often to deal with all aspects of the community (Andrews and Vlasin, 2000). It could also be organized by a public body such as the community governance board, or it may be organized by any organization to solicit input for specific purposes.

How to implement : The most important step in conducting a community forum is the careful consideration of what is to be accomplished and why. Once purposes and goals are clearly identified, the planning, implementation, and evaluation phases can be undertaken. Most organizations set up a steering committee based on the relevant power structure of the community. The procedures for how the forum will inform the audience and receive input should be carefully crafted. Clear presentations of the purposes of the forum and the underlying facts involved with the topic are needed to avoid misunderstandings and conflict. A tightly structured format for receiving inputs from the audience helps to maximize constructive participation. Both written and verbal feedback might be considered, and input before or after the event might be desired. Community members should be informed and should be invited to participate. During their participation, it is important to carefully record, summarize, and report comments. Once decisions are made or organizational plans decided, a media

announcement or personal letter/message might be sent out to thank those who participated and to bring closure to the process.

7. Survey Method

The survey method is useful in generating ad hoc information about a population. Mail, telephone, and internet surveys are popular in developed countries. Personal interviews, group administered and key informant surveys are frequently used in developing countries. The program evaluation section of this manual provides a brief description of survey methods.

8. Social Indicator Method

The social indicator method refers to the compilation and use of existing information (from secondary sources) to measure needs. Census information, newspaper reports/polls on community issues, and crime information data provided by service agencies are examples of social indicators.

2.7.3 Prioritize Needs and Problems

Prioritizing is a process of ascribing value or importance to each item and then putting them in descending or ascending order of importance. To begin, the facilitator should determine if one sort or more than one sort is needed. An elimination process might be required for lists of more than 12 to 15 items. Prioritizing should be done by a group of participants, not the facilitator only. Figure 3 shows the four scenarios for priority setting and recommendations for practice.

According to Sork (1979), two factors should be considered when setting priorities:

1) The Importance of the Need

This could be determined by the following factors:

- Mission relatedness—Is the need identified a good "fit" to the mandate of your organization?
- Urgency—Does the need identified call for immediate action?
- The size of the gap—Is the discrepancy between what is there now and where we want to be large or small?
- The number of people affected-- How many people have identified the need? Some needs, if addressed well, may benefit many people; others serve a limited number of families.

2) The Feasibility of Meeting the Need

According to Oakley and Garforth (1997), feasibility could be determined by the following factors:

- Acceptability—The community's willingness to make the changes needed to move from the present state to the more valued or preferred state.
- Resources required—Time, money, staff, and leadership expertise required to meet the need.
- Forces of change—What is the balance of forces working for and against the proposed change? If strong opposition exists, it is prudent to wait until greater support comes through.

- Perception of the feasibility—How do community people and stakeholders view the possibility of success?

| High need, low feasibility (Scope for project proposal) | High need, high feasibility (Priority Program) |
| Low need, Low feasibility (Abandon) | Low need, high feasibility (Adopt for appeasement reasons) |
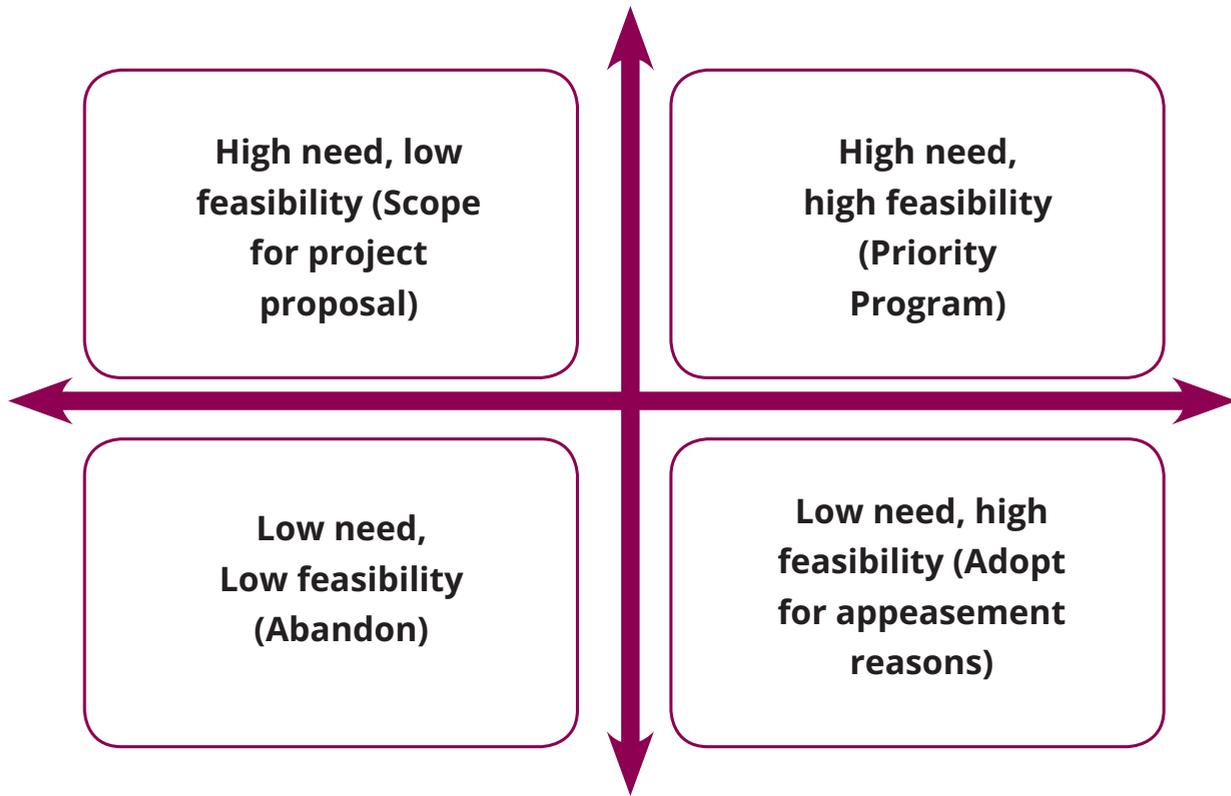
Figure 2.3: Priority Setting of Needs (Adapted from Suvedi and Kaplowitz, 2016).

Various Methods of Prioritizing Needs

According to Suvedi and Kaplowitz (2016), the following are some methods of prioritizing needs:

1. Casting Straws or Votes

- Each member gets five straws, representing five votes.
- Each member is asked to distribute the straws (votes) among the items listed. One can place all five straws on one item or distribute them among two or more items.
- Each person indicates his/her vote by marking the item (usually listed on a flipchart, blackboard, or transparency) with a stroke or dot (whatever is directed).
- The items receiving the top number of votes (symbolized by straws or strokes or dots) are selected as those with the highest priority.

2. Greatest Hits

- Present the total list of items to each member with the instruction to divide the list into three parts those with highest priority (importance, urgency, or value), moderate priority, and low priority.
- Each person makes his or her selection by placing a number or colored sticky dot on each list item.

- A tally is taken. Items in the top third of the list— those chosen most often as highest priority are identified and listed separately.

- A second discussion can follow to determine whether items with just a few "highest priority" votes will be included. How many items are are considered to be sufficient based on availability of resources?

3. Secret Ballot

- Number all items on the list.

- Each participant indicates his/her preference by writing the number of his/her preferred item secretly on a piece of paper.

- Tabulate the results of the secret ballot.

The secret ballot offers opportunity to freely express opinion about local needs without fear or hesitation in the presence of local leaders or senior officials. Often, people tend to go with the views of village chiefs or their supervisors.

2.7.4 Ability to Set Goals and Develop SMART Objectives

Once the needs and problems of the farmers have been identified through involvement of stakeholders and a robust need assessment, they should be stated in terms of goals and objectives of the extension program. Therefore, the third step of extension program planning is setting out goals and objectives. This is an essential competency that extension professionals should master.

A goal is like an objective that a person or a system plans or intends to achieve. So, goals and objectives are similar, except that objectives are more specific. Objectives state the changes in the situation or in people's behaviors that the extension program aims to bring about. The objectives may be long-term as well as short-term and must be stated clearly.

Program goals are broad and general. On the other hand, program objectives are specific, measurable, achievable with the resources we have, and relevant or clearly linked to the desired result. Further, program objectives are stated so it is clear when they will be achieved.

Example: To solve the reasons for low milk production, the objectives for a two-year extension program could be:

a. To conduct quarterly farmers' training on feeding, breeding, health care, and management practices.

b. To conduct deworming and vaccination camps every month.

c. To demonstrate fodder production technology at individual or community level.

d. To fix remunerative price for milk to encourage dairy farming.

2.7.5 Acquire and Allocate Resources

The fourth step of the program planning process is to prepare the resource inventory. This involves acquiring and allocating the resources needed to conduct the extension program successfully.

What is Resource Mobilization?

"Resource mobilization" refers to pooling resources from various sources and using them on the programs and beneficiaries that need them the most.

According to Suvedi and Kaplowitz (2016):

- Mobilizing resources fosters coordination with stakeholders and helps establish trust with clients.
- It may lead to synergy, efficiency, and effectiveness in programs, resulting in success and sustainability.
- It provides a plan with a timeline, intended results, activities to be done, and resource partners, and it outlines their share in the targeted program in supporting or benefitting from it.
- It helps allocate resources where they are needed the most.
- It prevents a piecemeal approach and minimizes resources duplication.

According to Swanson and Rajalahti (2010), there are three stages in resources mobilization:

Stage 1: Preparation

- Identify all major organizations that provide agricultural extension services and identify their basic features.
- Examine the clientele being served: farmers, lead farmers, their numbers, genders; and the providers, their areas of expertise, and the extension methods they use.
- Prepare a human resources profile of your area: technicians and experts within your office network, in research and educational centers—their number, their expertise, genders, and time that each can devote to various tasks.
- Determine the sources, allocation, and sustainability of financial resources. Determine how much can be utilized for the program.
- Assess organizational resources and support services: physical facilities, vehicles, ICTs.

Stage 2: Allocation

- Engage education and research teams from government departments or universities with lead farmers to assess human resources requirements. They can contribute toward training and demonstrations of innovations. Seek their participation.
- Find out who can contribute monetary resources and how much. Both human and monetary resources contributions create feelings of ownership of the program, which have proved to be beneficial in the long term.

- Negotiate for more resources where required, and try to cover as much as possible of the project cycle.
- Institutional development: the aim should be organizing farmers into groups—self-help groups and cooperatives, etc.—to build social capital that will work as an asset for all.
- Promote a participatory and pluralistic approach in extension services: engage yourself and stakeholders in sharing information, experience, and knowledge to promote the innovation.

Stage 3: Formalization

- Once an arrangement is made among the various stakeholders, write down details for transparency and accountability reasons.

Once the resource mobilization is done, we can develop the working plan. The working plan includes the technical content, who should do what, and the time limit within which the work will be completed. The plan of work may be seasonal, short-term, annual, or long-term.

Example: For a dairy cow development program -- prepare the following schedule of extension activities and print and distribute it to all concerned related to the above objectives.

- Every day, morning, afternoon, and evening – artificial insemination to be conducted.
- Deworming and vaccination campaign on every third Saturday.
- Persuading at least five progressive dairy farmers in five selected villages to cultivate improved fodder varieties on a pilot basis.
- Encouraging cultivation of forage crops and fodder trees, such as Subabul on the border of the farm or on bunds of the fields of all farmers.
- Conducting monthly short-term training programs of one to two days for farmers on improved dairy cow management practices.

2.7.6 Identify Market Opportunities

Markets are a driving force for change. They determine the demand for and supply of commodities and services. Extension programs are effective when they link farmers to markets and help them understand market opportunities.

How to Develop Market driven Extension?

Suvedi and Kaplowitz (2016) explain how we could develop a market-driven extension program.

Collection of Data: Extension workers should collect data on what others in the project area as well as in nearby areas are growing. Efforts should include observation for shifts in cropping patterns. Extension workers also need to be on top of information concerning market demand and supply to be able to properly support and assess decisions proposed by the farmers.

Information Dissemination: The market information collected by extension workers should be shared with farmers so they can make good management decisions. For instance, suppose onion

prices were high this year. That does not mean they will be high next year. In fact, high prices one year often lead to overproduction the following year. When the supply exceeds demand, the prices that farmers receive fall. An extension worker who understands such trends can advise farmers about the risks of growing large areas of onions the following year to protect them from low market prices.

Learn Value Chain Phases: Farmers produce crops for markets that in many ways are connected to markets that feed people located far away, even on a different continent. It is thus imperative to understand all parts of the food supply system.

Input Supply: Use of new inputs such as seeds and pesticides for growing crops. In addition to knowing what inputs are best, extension service providers need to be aware of the impact of prices and encourage collaboration between farmers and input suppliers to promote quality assurance.

Production: In addition to knowing the best technologies and production systems, extension service providers need to understand the concept of profitability and be alert to opportunities for achieving economies of scale through growth strategies (i.e., capacity expansion, replication, and modernization). Producing goods and services for big companies on contract has also proved to be lucrative in some cases, and extension workers can help negotiate the terms between farmer and company.

Marketing: Extension workers need to be alerted to changes in the marketplace and their impact on production systems and postharvest operations.

Profit: Extension service providers need to be conscious of the factors that influence the profitability of a farm business and alert to opportunities to diversify, supply farm produce at a lower price, expand the size of the business, add value to the enterprise, and differentiate the product through value addition.

2.7.7 Design Extension Services Based on Gender Analysis

"Gender analysis" is defined as "the systematic gathering and analysis of information on gender differences and social relations to identify and understand the different roles, divisions of labor, resources, constraints, needs, opportunities, and interests of various groups, including men and women, girls and boys, and transgendered persons, in a given context" (Manfre et al., 2013). The objective of a gender analysis in the agricultural extension context is to clarify how gender roles and relations create opportunities for and/or remove obstacles to achieving development objectives.

Harvard Analytical Framework

The Harvard Analytical Framework, or the Gender Roles Framework, is a simple and practical toolset to identify the types and amounts of work men and women do in a household, farm, or community (Ludgate, 2016; March et al., 1999). It helps to document the differences in the gendered access and control of resources, such as land, water, seeds, or extension information, and benefits. This information can be used by extension agents to identify areas where there is opportunity to change

gender roles and tailor programs to meet the specific needs and interests of farmers or other community members, especially women.

Data Collection for the Harvard Analytical Framework

The data is gathered through three interrelated tools: an activity profile, an access and control profile, and a list of influencing factors. Each tool contains a series of checklists of key questions every extension agent can use.

1. The Activity Profile

Inquiries are based on who does what for all relevant farm, home, and community tasks:

- Who does what?
- When?
- Where?

2. The Access and Control Profile

This clarifies and documents who has access to resources and who controls their use in relation to the tasks identified in the activity profile:

- Who has access to and control over resources (for example, land, labor, extension services)?
- Who has access to and control over benefits (education or health services)?

3. Influencing Factors

This identifies factors that shape differences between men and women:

- What are political, economic, or cultural factors affecting the gender differences identified in the above two profiles?
- What are the past and present influences?
- What are the opportunities and constraints?

Analyzing Data

Once all data have been collected, extension agents can analyze data using the following steps:

Step 1 : Analyze activity profile data by identifying which activities are done by which sex.

Step 2 : Analyze data from the access and control profile by identifying all the relevant resources available for that activity.

Step 3 : Using data on influencing factors to identify what factors lie behind the pattern of activities and access and control situations.

Step 4 : Think about what you could do to make changes and be more inclusive in extension programming of women and other underserved populations.

(See Ludgate, 2016, and March et al., 1999, for more information on the Harvard Analytical Framework)

2.7.8 Developing a Work Plan and Calendar of Work/Activities

A work plan is a detailed outline of activities and processes and a timeline for extension workers to follow to attain the stipulated extension goals.

After developing the work plan, it is also necessary to develop calendar of work/activities. Calendar of work is a plan of work arranged chronologically, according to the time when each step of work is to be done. It is a time schedule of work.

Importance of the Work Plan

- Delineates activities (what), the methods (how), the person or organizations responsible and the target groups (who), and the time (when) and place (where) that activities of the program/project will be conducted.
- Helps people keep track of their programs, activities, and progress.
- Helps determine the resources necessary for the programs.
- Increases accountability and transparency in extension work.
- Motivates staff members and helps increase stakeholder participation.
- Allows new staff members to follow the work plan and take on the tasks with ease.

Steps in Writing a Work Plan

- Identify the purpose for the work plan or the purpose of the project/program and the length of the project or program.
- Write an introduction that emphasizes why the project/program is needed.
- List the goal(s) and objectives. Follow the SMART principle discussed above when setting objectives.
- List or spell out the resources required to complete the project (human, financial, physical, time, etc.).
- Identify constraints or threats to successful completion of the program.
- Spell out who is accountable for completing each task.
- Schedule responsibilities for at least each review period.

2.7.9 Develop a Grant Proposal

Once the work plan is designed, you can put the work plan into a complete written document or a grant proposal.

A grant proposal is a document explaining a problem or local need, the reasons for those problems or needs, and how these can be addressed through a special project supported with funding from outside your extension organization. Refer to Box 2.2 for the sections that need to be included in a grant proposal.

Box 2.2: Sections of a Grant Proposal

Title page

- Include project title, name of the applicant(s), name of the agency submitted to, signature, typed name(s) and title(s) of authorized person(s) approving submission, and date of application.

Project description

- Synopsis of the project objectives, procedures, and evaluation. Put the essence of the project in approximately 250 words.
- Remember: this may be the only part in the body of the proposal that reviewers read.

Introduction

- State why this problem needs to be addressed, giving the context of time and place.
- Provide references to research, statistics, previous projects, or other documentation to support the need for the project.
- Write carefully why the project is important.

Objectives

- State the proposed goal and outcomes of the project in clear and measurable terms.
- Each objective is usually related to a need identified in the introduction section, activities in the methodology section, and activities in the evaluation section.
- Keep it clear and brief.

Methodology

- Describe why the proposed method is more useful than others, and describe the chosen method in detail.
- Describe specific activities and action steps that will be used to achieve the objectives

Monitoring and evaluation

- Provide details on how the organization and the funding source will determine whether the project has accomplished its objectives.
- List the type(s) of evaluation information to be collected, how it will be analyzed, and a plan for its dissemination and use.
- Strengthen this section by providing evaluation criteria for each objective.
- Since the 1990s, evaluation has become integral to a project, so be sure incorporate it.

Sustainability

- Discuss how the project will be sustained beyond the project time period and benefit the community over the long term.

Budget

- State the proposed projects costs in a table.
- Carefully document every item in detail.
- Divide costs into stock and flow items. Stocks are one-time expenses; flow items are repeated and varying expenses.
- Request as much money as you need to complete the project adequately (asking for too little money can be as bad as asking for too much).

Cover letter

- Along with the proposal, it is also necessary to send a cover letter on the applicants' organization letterhead.

2.8 Conclusions

Program planning is a prerequisite for any kind of extension activity to ensure what is to be done and why, identify actions to be taken, allocate resources to achieve goals, ensure continuity of the EASs, and accomplish program objectives in a cost-effective and time-effective manner. This chapter has described the key skills and competencies needed in extension program planning with focus on the basic concepts, objectives, types, and principles of program planning, the phases in extension program planning process -- i.e., identifying and engaging stakeholders in planning, conducting a situation / need analysis, prioritizing needs and problems, developing program goals and objectives, and preparing a resource inventory, selecting educational methods and materials, designing extension services based on gender analysis, developing a work plan and calendar of work/activities, and developing a grant proposal.

2.9 Self -Assessment Exercises

1. Write the essential program planning skills and competencies.
2. Define the following terms:
   a) Program planning
   b) Plan
   c) Extension program
   d) Situation
   e) Aim
   f) Goal
   g) Objectives
   h) Problem
   i) Solution
   j) Calendar of work

3. Differentiate between the following:
    a) Program and project
    b) Goal and objectives
    c) Developmental, institutional, and informational programs
    d) Reactive and proactive extension programs
    e) Primary and secondary stakeholders
4. List the objectives of program planning.
5. What are the basic principles that make programs different from one anothers?
6. Discuss the steps in extension program planning process with suitable examples.
7. Why conduct an analysis of stakeholders and their interests? Illustrate with an example.
8. How to conduct a need assessment? Illustrate with an example.
9. Why prioritize needs and problems? Describe various methods of prioritizing needs.
10. How to design extension services based on gender analysis? Demonstrate with an example.
11. Describe the major sections of an extension program grant proposal.
12. Visit the webpage of any developmental department. Study any latest extension program and write briefly about its aim, objective, goal, problem and solution.

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Program Implementation in Extension: Skills and Competencies

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3.0 Learning Outcomes

- Explain the concept of extension program implementation skills and competencies.
- Analyze the roles of stakeholders in program implementation.
- Describe the procedure for selecting local leaders in program implementation.
- Discuss the constraints in program implementation and propose solutions.
- Demonstrate knowledge and skills to build the environment and conduct the procedures in program implementation.

3.1 Introduction

In Chapter 2, we discussed the steps involved in the program planning process. After the program has been prudently planned, with the needs determined and priorities organized, the next major step is that of implementing the program (Figure 3.1). Program execution involves putting the plan of work into action in the community. Program implementation may be considered as a process by which a series of proposed activities is done in a planned manner to accomplish set objectives. A program is typically executed through a sequence of clearly defined projects, all of which are put into action for implementation.

Essential program implementation skills and competencies are listed in Box 3.1.

Box 3.1: Extension Program Implementation Skills and Competencies

The extension worker is responsible for effective program execution. To be effective, s/he should be able to:

- Coordinate local extension programs and activities.
- Demonstrate teamwork skills to achieve extension results.
- Form farmers' groups and support them.

Figure 3.1: Stages in Program Cycle

Program implementation is the longest stage of program planning and usually demands most energy, effort, and resources. When the plan is ready for implementation, all possible efforts need to be made to execute the plan according to the timetable. Program implementation involves participation of stakeholders such as local leaders, local bodies such as schools, cooperatives, and organizations such as farmer clubs, youth clubs, voluntary organizations, NGOs, and other extension agencies.

Program designs that are meticulously thought-out offer information about course of action and a schedule or series of schedules of these action steps. The advantages of clarifying action steps are that:

- It becomes easier for the implementing group to pick out team members who will carry out each activity.
- Resource needs become clear, leading to an identification of what can be locally sourced by the community and what must be marshalled from outside.

3.2 Ground Preparation for Program Implementation

To ensure successful program implementation in a community, it is essential to establish an appropriate environment for program execution ahead of time. Building an exciting and enthusiastic setting in the community where the program is to be implemented will produce a shared understanding between the minds of individuals, leading to a relationship of mutual trust and respect which will be helpful in executing the program. Environment building for program implementation is an effective strategy that facilitates participation of people in the program and encourages teamwork spirit.

3.2.1 Methods for Ground Preparation

To prepare the ground for program implementation, the following activities should be undertaken:

a) Publicize the program through mass media, publications, and individual and mass contacts to create awareness and interest among the people.

b) Communicate with the clients through use of simple and local language and nonverbal communication techniques to promote participation.

c) Conduct one or two demonstrations for a technique to be disseminated so that people realize its profitability, usefulness, and production potential. This will help to build interest to participate in the program.

d) Communicate about the positive and key features of the program in advance to build interest and increase participation. An example would be a subsidy on inputs.

e) Supply printed literature, pictorial instructional booklets, and self-explanatory material among the community members.

f) Conduct puppet, video, and drama shows.

g) Verify understanding of the target group.

h) Conduct exercises or games before starting program implementation.

i) To create a positive and interesting environment for launching the new program, get everyone involved from the beginning and help people get acquainted and understand the purpose of the event. For maximum participation of people in the program to be executed, the environment building sessions should be planned in a simple manner with specific objectives and should be comfortable for everyone involved. This technique of conducting games and exercises is useful in environment building as:

- Participants come from different backgrounds.
- People need to familiarize with each other quickly to work towards the objectives.
- The team of workers and community members is newly formed.
- The aspects of the program to be implemented are either new or unfamiliar to many people involved.

Some examples of games or exercises for environment building include:

- **Introductory sessions:** These are used to acquaint the participants with one another and ease them into conversation.
- **The little-known fact:** The participants are asked to share their name, occupation, interests, and one little known fact about themselves. This little-known fact helps to break down differences in future interactions.
- **True or false:** The participants introduce themselves and make three or four statements about themselves, one of which is false. The rest of the group tries to find out the false fact, and this helps to start interaction within the group.
- **Interviews:** The participants are divided into groups of two each. Each person interviews his or her partner for a set time while paired up. When the time is over, each person introduces their interviewee to the rest of the group.
- **Problem solvers:** The participants work in small groups on a very simple problem allotted to them for a fixed time. Once the group has analyzed the problem and identified solutions, each group then presents its analysis and solutions to the wider group. The idea of this exercise is not to solve a real problem but to "warm up" the group for further interaction or problem solving later in the event. The group members also learn about one another's styles of problem solving and interaction.
- **Team- building exercises:** These are used to bring together individuals to work cohesively towards the goals or plans. Participants discuss their hopes, fears and expectations for the program to be implemented.
- **Burning questions:** Such an exercise gives each person the opportunity to ask key questions they hope to be covered in the program to be executed.

3.2.2 Impact of Ground Preparation

Ground setting for program execution helps to:

a) Create a positive and favorable group atmosphere.
b) Help people to be at ease.
c) Remove social barriers.
d) Motivate and invigorate.
e) Familiarize people with one another.
f) Build teams.

3.3   Procedures in Program Implementation

3.3.1 Steps in Program Implementation

The three essential steps in program implementation are:

- Giving wide publicity to the program.
- Drawing up a plan of action.
- Monitoring the program during execution.

(i) Giving wide publicity to the program

A plan of action should be clear, simple, and easily comprehensible by the people so that they understand how the program will benefit them, and program execution can successfully take place. The publicity of the program can be done through:

- Distribution of printed materials such as pamphlets and folders in local languages.
- Announcements and promotions through media such as radio and television.
- Describing the program to the communities at general meetings.
- Explaining the program and discussing it in village meetings, cooperative society meetings, youth club meetings, and other group gatherings.

(ii) Drawing up a plan of action

A very crucial step in program implementation is drawing up an elaborate and systematic plan of action to execute the program. A plan of action itemizes in detail what is to be done, when, how, where, why, and by whom. It should also state the roles of various people, organizations, and institutions, and the schedule of tasks. A plan of action organized for a specific duration of time should be flexible enough to accommodate changing conditions, however. The plan of work is very important for setting the program into action -- i.e., moving it from paper to actual operation so that at the end of the year, targets are achieved. It should contain the following:

A well-developed plan for physical work: A well-thought out estimate of physical requirements of supplies, equipment and implements, labor, power, credit, and managerial and technical staff required is the basis for successful implementation.

Time plan: A time plan needs to be prepared indicating the date, the time, and the resources required for the activities to be conducted by each staff member.

Resource plan: One of the most important aspects of planning is assessing available resources needed and planning to mobilize those resources or assets. Instead of simply asking, "How much money do I have to spend?", begin by asking a series of questions: "What do I need to get the job done, what are the local assets to get the job done, what are the external resources I need to tap into (e.g., university as well as other external resources), and how can I mobilize those to enhance Extension's efforts?"

Not utilizing all available resources in an appropriate manner results in ineffective programs that do not produce desired outcomes. Spending big money on poorly thought-out materials such as flashy, glitzy handouts or videos without any substantive educational value or information not pertinent to the audience will not produce desired results, will reflect poorly on you as a professional, and will portray the organization as wasteful.

Resources include people, places, knowledge, and things that can be mobilized to make a program produce the desired outcomes. Available resources vary from community to community. Do not underestimate a community's ability to promote change by tapping into its own resources.

Equipment order plan: A list of equipment and other items to be purchased should be prepared and orders placed accordingly so that they are available for use during implementation. In other words, synchronize the purchase plan and the implementation plan.

Establish inter-linkages with other agencies, organizations and groups. Extension professionals engage in many levels of relationships: networking, cooperation, coordination, coalition, and collaboration. Table 3.1 illustrates the differences in the purpose and degree of commitment of each level in working together. As you see, many of the networks are casual, providing resources with very little personal commitment, whereas collaboration is a long-term commitment with shared visions and the development of interdependent systems to address issues and needs.

Program implementation often involves creating linkages with other individuals, organizations, or agencies to address the identified need more effectively and efficiently.

Table 3.1: Community Linkages -- Choices and Decisions

Level	Purpose	Structure	Process
Networking	• Dialog and common understanding • Clearinghouse for information • Create base of support	• Loose/flexible link • Roles loosely defined • Community action is primary link among members	• Low -key leadership • Minimal decision making • Little conflict • Informal communication
Cooperation / Alliance	• Match needs and provide coordination • Limit duplication of services • Ensure tasks are done	• Central body of people as communication hub • Semi-formal links • Roles somewhat defined • Links are advisory • Group leverages/ raises money	• Facilitative leaders • Complex decision making • Some conflict • Formal communications within the central group

Coordination / Partnership	• Share resources to address common issues • Merge resource base to create something new	• Central body of people consists of decision makers • Roles defined • Links formalized • Group develops new resources and joint budget	• Autonomous leadership but focus in on issue • Group decision making in central and subgroups • Communication is frequent and clear
Coalition	• Share ideas and be willing to pull resources from existing systems • Develop commitment for a minimum of three years	• All members involved in decision making • Roles and time defined • Links formal with written agreement • Group develops new resources and joint budget	• Shared leadership • Decision making formal with all members • Communication is common and prioritized
Collaboration	• Accomplish shared vision and impact benchmarks • Build interdependent system to address issues and opportunities	• Consensus used in shared decision making • Roles, time, and evaluation formalized • Links are formal and written in work assignments	• Leadership high, trust level high, productivity high • Ideas and decisions equally shared • Highly developed communication

Source: Community Based Collaborations-Wellness Multiplied 1994, Teresa Hogue, Oregon Center for Community Leadership

Roles of persons involved in program execution should be clearly specified: It is the community members who make the change and implement the program. Extension workers, particularly the frontline extension workers, are in place to inspire and advise the community members to act.

Extension methods used should be specific: To assist rural people to implement their programs successfully and facilitate them in adopting the desired changes, extension workers need to know and use effective extension methods. For this purpose, s/he needs to have accurate appreciation of:

- The knowledge and skills required for their effective use.
- Knowledge of people's attitudes, needs, values, and aspirations.

Factors to be considered in selecting extension methods

Essentially, the individual contact methods provide the most direct opportunities for influencing people effectively. All the other methods of group and mass procedures are attenuations or compromises made to reach more people, teach them more often, and keep down the cost per contact. Therefore, extension workers should select appropriate methods and use them in suitable combinations and proper sequence so the intended recipients of information receive it in a variety of ways appropriate to their individual differences. For example, people with little or no education and low income may respond to personal visits and result demonstration while people with better education may respond to group meetings and discussion, exhibitions, and written materials. Other factors affecting choice of teaching method include:

a) Size of audience:

- Group discussion cannot be used effectively for more than 30 participants.
- Method demonstration can be used for relatively small audience.
- Lecture can be used for large audience.

b) The teaching objective:

- Type of change intended -- i.e., is it thinking/ attitude/ action?
- Is the aim to arrive at consensus of opinion? This will require group discussion.

c) The subject matter:

The content that is taught may be reasonably simple or particularly complex. It may be familiar or unusual. The change desired may involve a new skill or a new idea. When the new practice is similar to those already being followed, news stories, radio, and newsletters will be effective; complex or strange practices will require face- to- face contacts and written materials. In the early stage of development of an extension program in an area, result demonstration, farm and home visits, and method demonstrations will be expedient. For teaching manual skills, method demonstration is useful; to promote critical thinking, discussion and meeting are useful. For public acceptance of a practice or program, support of a local leader is useful.

d) Stage of development of extension program

In the initial stages of extension, result demonstration is necessary to gain confidence.

e) Size of extension staff

In relation to the extension clientele, the bigger the number of extension workers, the greater the opportunity for use of the direct or personal contact method.

f) The availability of certain communication media

The availability of certain communication media promotes their use -- e.g., newspapers, telephone, radio.

g) The relative cost of the method

The amount to be expended on an extension teaching method may positively or negatively influence the selection of the method.

h) An extension worker's familiarity

Knowledge of and acquaintance with a given extension method influences the extension worker's decision to choose and use the method.

Some of the extension methods that can be used for program implementation include:

- **Listening and observing:** Workers should listen patiently and with an open mind to the experiences and realities of the rural people and advise them accordingly.
- **Systematic discussions:** Talking with community members as individuals or in groups can help Extension workers find out about the community's problems and their possible solutions.
- **Demonstrations:** Appropriate demonstrations planned for recommended technologies help people observe the advantages of the changed practices.
- **Group approach:** Extension workers trained in methods of working with groups -- such as talking, organizing group discussions, role playing, seminars, panel discussions, and others—can use these methods during program implementation.
- **Other methods:** These include campaigns, shows and fairs, competitions, use of audio-visual aids, special maps, and many more.

As a guide in the selection of extension methods, Van Den Ban and Hawkins (1985) provide a set of criteria to judge whether a method is well-chosen:

- Is the chosen method adapted to whether we wish to change knowledge, skills, attitude, or behavior?
- Are the educational activities clearly specified so that we know what the farmer will see, hear, discuss, and carry out?
- Are the different methods integrated in such a way that they reinforce each other?
- Does the planned time scale make it possible to carry out all of these activities well?
- When choosing learning activities, has the extension worker adequately considered the needs, skills, and means of the target group?

Combination of extension methods

As the number of methods of exposure to the extension information increases, the number of farmers changing the behavior increases.

Using the methods in proper sequence

Our extension plans of work must include methods that:

- Enable our farmers to see, hear, and do the things to be learned.
- Enable us to reach a large number of people.
- Create confidence in the audience.

iii. Monitoring the program during execution

Monitoring an ongoing program provides evidence for effecting changes in teaching methods and other extension procedures being used. Monitoring must be done with reference to the objectives set for the program.

a) The aspects which need considerable monitoring in a program include:

- Number of meetings held (e.g., cooperative societies and community leaders).
- Number of people who attended the meetings and number of times the same person attended the meetings.
- Number of implements bought and number of times they have been used to accomplish the objectives.
- Spontaneous actions taken by the community members -- e.g., the number of practices adopted by the community members without frequent pressure from the extension workers and which have become a normal routine of the community.

b) Advantages of monitoring a program

Monitoring the above-mentioned aspects will reveal the extent to which the community members have successfully gone through the education and training process and made changes. Systematic monitoring also offers information about the effectiveness of the various methods used, which will help the community members and extension workers to improve their current methods and persuade them to use the methods in solving their problems. Monitoring also provides a source of satisfaction both to the community members and the extension workers because it brings a sense of achievement.

3.3.2 Who Implements the Program?

Depending on the structure of the extension organization, implementation of the program is predominantly the responsibility of the district development officer or any extension officer who is concerned with the management of the program after it has been finalized through various stages. This requires effective delegation of authority, function, and services given to other staff members. Successful delegation requires:

i.   A good basic organization.

ii.   Courage on the part of the administrator.

iii. Faith in the associates.

iv.   Giving responsibility to each staff member.

v.   A clear understanding of the authority delegated.

vi.   Avoiding conflicting or overlapping delegation.

vii. Awareness of the delegation by all staff members concerned.

Along with extension staff, local leaders, local bodies, and various other organizations also play a role in program implementation. They should all be trained and participate in work which they are interested in. Regular staff meetings should be carried out to discuss:

- Immediate plans for the future.
- Demonstrations to be conducted.
- Priorities of the work.
- Persons to be on tour for a particular period.
- Inspections made for the work in progress.
- Other supplies/materials needed for carrying out the work.
- Equipment and cooperation needed from other departments.
- Method of doing the assigned jobs in the best way.

3.4 Role of Local Leaders in Program Implementation

Local leaders are the people that the community members choose to play a key role in program implementation. The program benefits when community members have confidence and respect for their local leaders instead of fear and hatred. What their respected leaders say and do have more relevance to the community members than what outsiders, including the extension workers, might say and do. Accordingly, extension workers must be well-trained in identifying the village leaders and work with them so that the program gets executed as planned.

3.4.1 Procedure for Selecting Local Leaders

When selecting local leaders for program implementation, extension workers must be able to explain the kind of work that the leaders will have to perform and the type of person needed for it. There is no specific means of selecting leaders, but the following ways can be taken into consideration:

i. Extension workers can ask local people or specifically the village headman, schoolteacher, or doctor to suggest persons who can likely become successful leaders in executing the program.

ii. A questionnaire method can be used by the extension workers in selection of leaders.

iii. Elections can be conducted at a public meeting.

iv. Keen observations by the extension workers would help to identify potential local leaders.

v. Through discussions on any topic, the person with sound knowledge and ability may be identified and can emerge as a valuable leader.

vi. Likewise, in a workshop setting where a large group breaks up into smaller units and each unit needs a leader, the people who take the responsibilities for those groups may be well-suited for a larger leadership role.

vii. Senior people of the community who have a lot of past experiences can be accepted as local leaders.

A good leader needs to have the five I's of leadership:

i. Initiative: Enthusiasm, confidence, and foresight needed to lead the way.

ii. Intellect: To see the real cause of a problem and find a satisfactory solution.

iii.   Industry: Energy, labor, hard work, and an unselfish desire to work for others.

iv.   Influence: The decisiveness and ability to persuade and teach others to follow his example.

v.   Integrity: The power to create trust in his leadership through his/her sense of responsibility, good moral character, and honesty

3.4.2 Classification and Role of Local Leaders

Village leaders may be classified as local leaders, organization leaders, or project or teaching leaders. Each has certain roles to perform:

Local leaders

Local leaders contribute in the following ways:

- Organize local groups.
- Teach their neighbors and friends, thereby helping in the work of extension workers.
- Serve as a source of information and technical knowledge to people so that extension work can continue in the absence of the extension worker.
- Help in improving economic and social living conditions of rural people.
- Act as a liaison between the extension worker and the people, passing on the teaching and trainings that they receive to the rural people.
- Help the people to get recognition from extension workers or senior government officials for what they are doing. The villager leaders should be informed from time to time how much their work has contributed to the success of the project and rewarded or recognized through:
  o   A home visit by the extension worker.
  o   Publication of a story of success in local newspapers.
  o   A certificate presented at a public ceremony.
  o   A badge to wear which identifies them as leaders.
- Help the villagers in identifying the needs of people -- i.e., listing out their felt and unfelt needs.
- Assist the extension workers in collection and analysis of facts, help in providing the indigenous technologies available to solve the problem, and indicate the available local resources for certain solutions.
- Persuade local people to actively participate in the program being implemented. They also encourage and improve interaction among group members.
- Help to arrange for inputs, supplies, infrastructure, seeds, credit, etc., required for conducting activities.
- Help in organizing meetings and discussions during various phases of program execution.
- Serve as initiators in a local program. They are the ones who catch new ideas first and serve the community without any incentive of profit to them.

- Influence people to cooperate towards the identified goal.
- Speak for the people they are representing, thereby acting as a spokesperson.
- Deal tactfully with people who create conflicts in the group and harmonize them to work towards achieving common goals.
- Help the group in carrying out the plans and policies, and getting things done by stimulating them.

Organization leaders

Organization leaders are needed to:

- Contact, create interest, and persuade local people to take part in projects that are being executed.
- Ensure that local people know when meetings or demonstrations are to take place.
- Help in selection of project or teaching leaders.

Project/ teaching leaders

Project/ teaching leaders are needed to:

- Teach and demonstrate for local people, the knowledge they have gained from extension workers or other reliable sources.
- Encourage friends and neighbors to adopt the practices and skills they have learned.
- Report about the progress of work to the extension worker.

3.5   Role of Stakeholders in Program Implementation

3.5.1 Role of Local Bodies (public and non-profits)

i. Youth organizations: Africa has the youngest population in the world -- 60 percent to 70% of the population is below 30 years old. The number of youths joining the labor market is estimated to be 440 million by 2030, presenting an important development challenge for African governments. Most of the African youth live in rural areas and have limited opportunities for gainful employment. However, they have untapped potential to transform the agricultural sector through innovation and entrepreneurship. In fact, there has been a growing political commitment across Africa to engage youth in agribusiness. These commitments are reflected in several initiatives, such as the adoption of the African Youth Charter (AYC) by the African Union in 2006, the declaration of the Youth Decade Plan of Action (2009 to 2018), the establishment of the Youth Desk in the New Partnership for Africa's Development (NEPAD), and the Comprehensive African Agriculture Development Program (CAADP). Pursuant to these initiatives, many African governments and development partners have developed strategies and implemented various interventions to facilitate youth engagement in agribusiness.

Youth clubs play a vibrant and vital role in program execution in rural areas. Sound, competent, and knowledgeable leaders in youth clubs facilitate speedy implementation of programs by the rural youth. Most rural youth in developing countries are engaged in agriculture and allied

activities such as dairy, poultry, beekeeping, and others. By offering projects in areas that farm youth are enthusiastic about, youth clubs encourage the adoption of new practices at a large scale. The youngsters of the local situation are then the foundation stones who largely determine the success of the project.

ii. Non-governmental and voluntary organizations: These development-oriented, small organizations provide services either directly to the rural poor or to grass- roots organizations that understand local problems and their solutions. Voluntary agencies are characterized by great commitment to people, intensity of work, continuity, and great acceptability among the community. These NGOs and voluntary organizations take up specific projects and generally work through sub-centers and clubs established in communities. Sub-center workers and club members are trained and guided for implementation of projects in the community.

The important role played by non-government organizations in program execution include:

- Help in monitoring and implementing projects in remote locations, where it is difficult to post government staff.
- Ability to persuade the farmers to adopt new techniques because they maintain close ties and good rapport with them.
- Ability to modify general plans and models to suit local needs while executing the program.
- Help to identify constraints and improve communication through use of audio-visual aids, trainings, and demonstrations.
- Help to make accessible latest technologies to support implementation of the programs even to small- scale farmers.
- Help in managing common resources of the community -- soil, water, etc. -- required for program execution.

iii. Farmer organizations: Farmers' organizations not only serve the farmers' interests in their specific objectives -- such as processing, marketing, and transport -- but also serve the interest of the community by developing qualities of leadership and organization among their members. The leadership qualities enable better implementation of projects relating to farming in a community.

A farmers' organization, by taking part in the planning and carrying out of the proposed plan of action, acts as an immediate link between the government and the village farmers. During program implementation, farmers' organizations keep their members informed of the advantages of the program being carried out and encourage their participation.

3.5.2 Role of Organizations in Program Implementation

Rural areas have several organizations at the local level that can play an important role in program planning and execution and thereby help improve rural life. These local organizations include:

- Schools.
- Village development committees.

- Cooperatives.
- Banks.
- Commercial establishments.

To play a key role in program implementation, these organizations have to maintain close contact with the extension agents and identify the areas of functional coordination. The extension organization is well- equipped with technical knowledge, guidance, implements and other inputs, financial and other resources, but proper coordination between various organizations and institutions at the grass- roots (village) level is needed to produce good results. Involvement of organizations at the local level is therefore regarded as necessary for successful implementation of extension programs. The roles they play in successful program implementation are described below:

i. Schools: School serves as a good medium for disseminating, ideas, knowledge, and skills for changing the attitudes and outlook of children as well as their parents. School teachers are generally regarded as valuable sources of information in the rural areas. They help build awareness of ongoing projects and help create a favorable climate for rural people's involvement in project implementation. The senior students at the schools, if properly informed and motivated by the extension agent, they act as carriers of change in their family. Likewise, other educational institutions in the rural areas as well help in dissemination of knowledge and thereby promote program implementation. The schools assist the communities in following ways:

- Identifying important economic and social needs.
- Gathering and spreading information required for the solution of community problems.
- Helping towards community improvement through ongoing programs by providing leadership, other facilities, and enthusiastic teacher-student workers.

ii. Village Development Committees: Village development committees (VDCs) are referred to as government at the village level. This committee/body stands as an important component of the village structure through which democratic action can be made effective. VDCs help spread new ideas and promote their acceptance among the local people during program implementation.

VDCs are responsible for various agricultural, animal husbandry, and amenity or social welfare programs. For implementation of specific projects, the extension agents must involve the VDC members at the intermediate and village levels.

iii. Cooperatives: Cooperatives are institutions organized by groups of individuals for mutual help and benefit to meet their common economic requirements and to increase agricultural production. These are very effective in bringing about improvement in rural areas as they help to meet the supply needs of ongoing programs. The most important types of cooperatives are:

- Primary societies or service cooperatives.
- Block unions.

- Cooperative marketing societies.
- Cooperative industrial and labor societies.
- Cooperative manufacturing and processing societies.
- Cooperative farming societies.
- Cane growers' cooperative societies.
- Cooperative banks.

The aim of each cooperative is to help its members to increase the scope of its activities. The cooperatives perform the following functions during program execution:

- Supply farm requirements such as improved seeds, fertilizers, insecticides, implements, and other materials to the target group.
- Provide loans for the purchase of farm requirements and other industrial and agricultural purposes.
- Provide storage and marketing facilities to its members for agricultural produce.
- Maintain agricultural implements and machinery such as plant protection equipment, threshers, cane crushers, etc.
- Provide technical guidance to the members on increasing agricultural production.

Utilization of existing cooperatives and organization of new cooperatives where needed should be done by the extension agent. To do this he/she needs to be aware of the basics of cooperative societies. This knowledge can be utilized for financing farmers who are implementing the project as well as for supply of inputs and marketing of their produce.

iv. Banks: Banks also play a key role in program implementation by making people aware about bank such as loans, credit, and other useful schemes that people can use to support the execution of the program.

The extension agent should also know about financing of relevant aspects of the projects by the banks, and bank officials should be involved in selected extension programs in which bank services are to be utilized. Bank officials must clearly explain about the various bank facilities available for farmer use and emphasize timely repayment of loans.

v. Commercial establishments: In rural areas, some farmers depend a lot on local inputs dealers, or agro-dealers. The farmers obtain not only supplies but also information and advice from them on farming practices and other allied areas. Therefore, it is important during program implementation to provide trainings to these dealers so that the villagers receive correct information and advice for implementation. The dealers must be trained on:

- Correct use of inputs, which includes comparative efficacy of inputs, dosage, training, method of application, cost, etc.
- Marketing, which includes items such as regulated market, storage, transport, grading, market information, etc.

3.5.3 Role of Extension Agencies in Program Implementation

Roles performed by the extension agencies during program implementation include:

1. Helping the target beneficiaries to become aware of their needs and change their behavior by bringing about changes in their knowledge, attitude, skills, and/or abilities.

2. Building a good rapport with the clients. The clients must accept the extension agent and his/her credibility before they will accept the innovations promoted by the program. Good environment building helps in easing the process of program implementation.

3. Assembling, relating, and analyzing all factual information collected.

4. Helping people to diagnose their problems and decide which need immediate solution.

5. Motivating the clients to accept the change or changes being introduced.

6. Assisting the clients to implement the recommendations or solutions and emphasizing getting action by the clients on proposed solutions.

7. Developing complete procedures and training staff as well as villagers.

8. Helping to stabilize change and promote continuance of the new behaviors by persuading through reinforcing messages to the clients who have adopted the new practice.

9. Striving for larger participation by the people and coordinating all efforts and resources of other agencies.

10. Helping to develop leadership among various sectors of the rural community.

11. Helping to transmit information based on agricultural research and applied experience.

12. Keeping research workers informed about the problems at the rural level to promote further research in specific areas. These agencies help to set up a feedback process to know the problems arising for further implements.

13. Helping provide inputs such as seeds, fertilizers, other raw materials, implements, and many others to the target group, and proper methods for using them.

14. Working with rural people through nonformal education and encouraging their involvement and participation in other community development activities in agriculture, animal husbandry, fisheries, forestry, and many other allied activities.

15. Helping disseminate the latest technologies to rural people and relay information on adoption of new techniques and improved practices in various sectors to researchers.

3.6 Management and Control of Programs

A program is usually implemented through a series of well-defined projects. Each project in the program has its own plan of work that answers the questions what, who, when, why, how, and by whom the work is to be done. After the programs have been thoroughly planned, it is very necessary that each one have good management and control for its proper implementation at the grass- roots level, the village.

"Control" refers to maintaining project operations to meet changing circumstances, such as markets, input, product prices, government policy changes, and so on.

The activities and processes involved in the management of a program can be divided into four categories; human management, task management, fiscal management, and risk management. All these aspects must be managed well so as to have a successful program implementation that avoids or overcomes any obstacles.

3.6.1 Human Resource Management

The number of people needed to carry out program activities can vary from a very few to many volunteers. The people or human management component of program management is essential to effective program implementation and requires extensive planning and preparation. Involving many people in the program leads to a greater impact and an expanded outreach for the program.

3.6.2 Task Management

This category of program management refers to the processes involved in doing everything you planned to do in the program. Adhering to the timeline, meeting due dates for proposals, conducting educational programs, and creating supportive educational environments are all parts of program implementation. Knowledge and skills in educational theory and methodology, meeting management, and organization and planning are essential.

3.6.3 Fiscal Management

The third category of program implementation is the management of fiscal resources. These will vary from program to program. Some may be funded through a grant or gift; others may be a part of the council budget for Extension programs. In all cases, financial accountability is essential.

3.6.4 Risk Management

The management of risk is an important category for staff to consider when implementing extension programs. Every precaution should be taken to provide a safe environment for participants, volunteers, and colleagues. Youth protection standards and risk management strategies should be strictly adhered to.

3.7   Constraints in Program Implementation

3.7.1 Constraints in Program Implementation at the Grass-roots Level

"Grass-roots level" refers to the village level, the basic level to start the program implementation. Problems may occur, such as problems of finance, cultural and traditional norms, improper marketing and storage facilities, inadequate supply of inputs, and many others. The success or failure of any program depends on a number of factors. Some of the important constraints in program implementation at the grass- roots level include:

i. Village factions: "Faction" in simple terms refers to a state of disagreement and disharmony or conflict. In some villages, people may have disagreement because of social, political, domestic, and/or religious differences. In such a difficult situation, it can be very difficult to persuade the

villagers to accept and adopt the improved practices being taught in the program. Nonetheless, if the village leaders accept the presence of factions as normal in a village and assist the members of both factions to implement the projects and fulfill their respective needs, they may use the competitive spirit of both factions and hence actually improve the odds of success in implementation of the program.

ii. Emergencies: Every so often, in spite of the effort put into program implementation, the program is not a success. It is the responsibility of the extension workers to find out the reasons for that with the village leaders. If the failure was caused by a sudden and unexpected natural disaster during implementation, the new task becomes inspiring the village leaders to think through alternative solutions to deal with the emergent situation. The extension workers can help villagers fully understand the situation and then plan suitable actions to address it.

iii. Administrative sanctions: It is very important to get administrative sanctions and approval for the various steps in program implementation. Despite well-organized plans of work and clearly allocated roles of individual members, setbacks do sometimes happen because of delays in administrative sanctions or necessary approvals for going ahead with the various steps in program implementation. When such disappointments or delays occur, the extension workers should attempt to analyze the reasons for such happenings and explain them to the villagers. At the same time, some options should be planned with the villagers to keep the program running.

iv. Technical factors: Every project of the program focuses on producing some output, and every output involves a production function, which converts the inputs applied into outputs. This production function is essentially the production process, which is technical in nature and may be biological, chemical, or mechanical. For example, milk production is a biological process, and manufacturing farm machinery involves mechanical processes.

Hence, for successful implementation of the project, it is very important to know the nature and form of technical factors involved in each project and how they can be adapted to produce the desired results so that they do not serve as obstacles to program execution. Technical staff with expertise in specific areas may be required to address the critical technical factors involved in implementation of a project.

Examples:

- A program that requires irrigation projects to be implemented will need the expertise of irrigation engineers.
- A crop production program will require the specific skills of an agronomist.
- In a livestock project, veterinary and animal husbandry specialists may be needed.
- A program with activities related to women and household aspects will need the services of a home scientist, who can apply scientific and technical knowledge of home science for projects of preservation, baking, garment manufacturing, income generation techniques, and many others.

Technicians hold a key role in examining the postharvest technologies, processing, storage, and marketing facilities that are required to implement a project, and in identifying gaps in information that need to be filled in the early stages of implementation. In a nutshell, technical factors have to be taken care of and modified to avoid their being obstacles in program execution.

3.7.2 Constraints in Program Implementation at the Program Level

i. Economic and financial factors: Successful program implementation requires knowledge of how the program benefits can be shared among its various participants. Similarly, desirable or unfavorable outcomes of the project on the society need to be flagged. Economic factors are relevant from the standpoint of the society; the financial analysis takes the standpoint of individual participants. Financial factors consider the need for investment, credit, subsidies, and other incentives for successful program implementation; whereas economic factors affect the cost of labor and other inputs.

ii. Commercial factors: Commercial factors that may be obstacles in program implementation include the preparations made for:

- Provision of inputs and credit needed to operate the project: If the inputs and credit required for the operation of the program are not available on time, they pose an obstacle in program execution. It is important to see that the program participants have access to the supplies of inputs such as fertilizers, seeds, pesticides, equipment, agriculture machinery, and cattle feed to adopt new technologies, as well as the credit to purchase these items.

- Marketing the output produced by the program: When the program has been implemented successfully and the output produced, it is crucial to carefully analyze the proposed market so that the project's output can be sold. It is imperative that an effective demand for the output is prevailing at reasonable prices and the output is sold.

To avoid these above-mentioned constraints, the organizations at village level can approach the state and central governments for facilities in their areas for conducting such extension activities.

iii. Socio-cultural factors: The socio-cultural factors affecting the implementation of a project include:

- Lack of finances and control of money by people.
- Unwillingness to take part in the program.

Differences among program participants based on:

- Religion.
- Social customs and traditions.
- Mores and taboos.
- Local employment generated by the project.
- Distribution of project benefits among the clientele of the project.
- Impact on the quality of life.

Therefore, it is important to meet the social objectives of the clientele, as program can fail because of lack of cohesion and coherence among social factors.

iv. Organizational and managerial factors: Managerial issues are paramount to good project design and implementation. Managerial concerns include not paying recognition to agricultural programs, lack of required manpower, lack of cooperation from staff, and lack of funds for meeting operational costs. Competencies of the available staff in program implementation need to be scrutinized to determine whether they can operate large-scale activities in the program. If not, arrangements may be made for staff training so that the program can be implemented, otherwise, it is a failure. Extension workers must also facilitate the learning of new skills by the farmers.

v. Personal factors: Failure in program implementation may also be due to personal factors at the participant level, including traditional and cultural norms of the villages, domestic and multiple role responsibilities of farm workers, unwillingness to take risk, and illiteracy, among others.

vi. Extension constraints: These include limited quantities of inputs supplied compared with the amounts requirements, inadequate supporting facilities and services during the execution of the program, lack of follow-up activities for the on-going program, and lack of required field staff. These constraints may arise because of inappropriate and inadequate government policies, limited coordinated services, inadequate evaluation, and recruitment policies.

vii. Other factors: Apart from the above-mentioned specific factors, there are certain other factors which act as constraints for program implementation. These include:

- Lack of meaningful objectives and goals.
- Failure to develop and implement strategies.
- Excessive reliance on experience.
- Failure to identify the limiting factors.
- Lack of organizational support.
- Resistance to change.
- Manipulation by other people.
- Lack of interest.
- Lack of time.
- Lack of trust and faith because of various past unsuccessful projects.
- Lack of knowledge and education.
- Language problem.
- Weather changes.
- Lack of proper teaching methods.

3.7.3 Suggestions to Overcome the Constraints

Some of the suggestions to overcome these constraints in program implementation at the grass-roots level include:

- Imparting skill trainings to extension workers.
- Conducting more trainings and demonstrations on topics such as computer literacy.
- Ascertaining timely availability of inputs.
- Provision of marketing and storage facilities.
- Providing timely technical guidance.
- Avoidance of political interference.
- More recruitment of extension field staff.
- Using simple and uncomplicated techniques to promote adoption.
- Encouraging people's participation in various extension program.
- Proper coordination and good linkage between universities, government organizations, non-government organizations, cooperatives, private agencies and other input supply agencies and organizations.
- Provision of non-formal education to the rural people such as information on water pollution and its control and information on food and nutrition.
- Combining traditional and electronic methods in program implementation to attract a wide range of participants, from young to aged.
- Opening information centers at the village level where internet and other required facilities can be installed carefully, so that they are of practical use in program implementation.
- Establishment of farm clinics and service centers at the village level to rectify farmers' problems quickly.

3.8 Conclusions

In this chapter we discussed how to prepare the ground for program implementation and the procedures that we may follow to implement an extension program. The chapter also presented roles of local leaders, local bodies, organizations, and extension agencies in program implementation. We further covered management and control of extension programs, constraints in program implementation, and how we can go about addressing the constraints.

3.9 Self-Assessment Exercises

1. Define the following terms:
   a) Extension program
   b) Program implementation
   c) Plan of work

d)   Calendar of work

e)   Program monitoring

2.   What does ground preparation in program implementation mean?

3.   Describe how you would go about preparing the ground for program implementation.

4.   What are the benefits of doing ground preparation for program implementation?

5.   Assuming you have been tasked to implement a program of your choice, describe the steps that you would follow to execute the program.

6.   Why is it important to establish inter-linkages during program implementation?

7.   Explain five community linkages that you would develop and the purpose for establishing them.

8.   Justify the involvement of local leaders in program implementation.

9.   Describe how you select local leaders for participation in program implementation.

10. Discuss the roles that local bodies, organizations, and extension agencies play in program implementation.

11. Describe four categories of program management that you would have to deal with during program implementation.

12. Distinguish challenges that an extension worker is likely to encounter when implementing a program at the grass-roots level and at the program level. Give constraints for each level.

13. Explain what the extension worker should do to address challenges in program implementation.

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Communication in Extension: Skills and Competencies

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4.0   Learning Outcomes

- Define the concepts related to communication skills and competencies in extension.
- Elucidate the purpose and benefits of good communication.
- Describe the barriers to effective communication and ways to enhance communication.
- Differentiate among listening patterns and how to adopt a listening style that is conducive for effective communication.
- Explain the role of communication process in diffusion and adoption of developmental innovations.
- Identify factors influencing and benefits of knowledge management.
- Demonstrate skills and principles to enhance communication with clients.

4.1   Introduction

Communication is an unavoidable element in human life and a large amount of time is spent communicating, hence there is a need to make sure that ideas and information are put in a way that everyone involved can understand. Thinking about what to say, working out the best way of saying it, finding the right words, making sure the other person understands, and understanding the feedback are all vital skills and competencies in communication. For the extension profession, gaining communication skills and competencies is necessary to enable extension workers to share information, ideas or facts which will lead to effective decision-making and problem-solving.

Essential communication skills and competencies in extension are listed in Box 4.1.

Box 4.1: Extension Communication Skills and Competencies

As planners, educators, and managers of local educational programs, extension workers must possess strong communication skills. These include:

- Selecting appropriate communication methods.
- Establishing communication with various stakeholders.
- Respecting local culture while communicating with clients.
- Preparing required progress reports.
- Sharing success stories and lessons learned with stakeholders through various media.
- Using extension methods (e.g., individual, group, and mass contact methods) to disseminate information about extension activities and programs.
- Demonstrating good listening skills and listening to all clients and stakeholders.
- Demonstrating good public speaking and presentation skills.

Source: Suvedi and Kaplowitz, 2016

This chapter describes the communication media and tools available to extension workers to support their role in stimulating the flow of knowledge and distinguish between the various communication media and tools; techniques for writing for media; preparation of progress reports; and organizing extension campaigns. It also discusses effective communication with local leaders; diffusion of innovation theory and its implication for extension work; effective presentation skills; and components of basic skills in teaching / training.

Communication is the process by which two or more people exchange ideas, facts, feelings, or impressions in ways that each gains a common understanding of the meaning, intent, and use of messages. It is a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior. Also, it is the process by which information, feelings or ideas are transferred from the sender to the receiver through a channel with the intention of changing the receiver's perception. Communication can also be seen as exchanging knowledge through information. To communicate knowledge, the sender must turn it into information. Once the information reaches the receiver, it needs to be turned back into knowledge and interpreted. Communication is an important process used by people to exchange experiences and ideas, and is a vital trigger for altering various kinds of knowledge and perceptions. The function of communication, according to Scheidel (1976), is: "We communicate primarily to represent and support self-identity, to establish social contact, to influence others to feel, think and act as we want."

For good communication, you need more than good information -- you also need to use the following:

a. Eyes – see other's facial expressions, make eye contact.
b. Ears – be attentive by concentrating on what is being said, be impartial and don't form an opinion, just listen.
c. Mouth – reflect back, acknowledge the reaction that they are having and summarize what has been said.
d. Mind -- to soak it all in.
e. Heart -- Listen with sensitivity and compassion.

A skill is a learned ability that brings about predetermined results with maximum certainty usually with a minimum outlay of time and/or energy. It is a developed or acquired ability to do work well. It also denotes expertise that has been developed through training, experience, or practice.

Competency is the capability to apply or use a set of related knowledge, skills, and abilities required to successfully perform critical work functions or tasks in a defined work setting. It is a combination of skills, knowledge, attributes, and behaviors that enables an individual to perform a task or an activity successfully within a given job. They are skills, knowledge, and capabilities that individuals should have possessed when completing assigned tasks or achieving the goals.

Communication skills are learned abilities that enable people to understand or convey messages properly -- to convey information to others so that messages are understood and outcomes delivered. Also, it is the ability to effectively achieve one's communicative goals or the proficiency with which one engages in communication behavior.

4.1.1 Communication Skills

There are six specific communication skills that we can use in any situation with anyone. They include:

    a.   Affirming.

    b.   Open- ended questions.

    c.   Active listening.

    d.   Nonverbal messages.

    e.   Express thoughts and feelings.

    f.   Communicate without making the other feel "wrong."

Affirming is a positive confirmation. When you affirm something that someone has done or said, you are providing them with support and encouragement. This is unbelievably simple, yet most of us forget to do it! Some examples of affirming statements are:

- "That's good."
- "I'm glad you asked that."
- "You've come to the right place."
- "That's a great question."
- "You're on the right track."
- "You really seem to have given this a lot of thought."

Open-ended questions are questions that can't be answered by "yes" or "no." Why are they useful? We get much more information from people through them.

Active listening is using your eyes, ears, mouth, heart, and body language to listen. This is especially important if someone is showing some strong feelings, such as sadness, shock, anger, relief, frustration, grief, etc.

Nonverbal messages are conveyed through:

- Posture -- let your body show that you are interested by sitting up and leaning toward the speaker.
- Facial expression -- remember that feelings are reflected in facial expressions.
- Gestures -- your body language reveals a lot about how you interpret a message, so be aware of when you send signals that might cause the speaker to believe that you are angry, in a hurry, bored, etc. However, it is also important to remember that different cultures have different styles of body language. For example, in many cultures it is rude to make eye contact with someone who is older than you.

Expressing thoughts and feelings can be done by:

- Being open and honest – this will help build trust.
- Speaking clearly -- don't mumble, and don't talk too quietly. If you don't know the word for something, describe what you mean so that you and the client can have a shared understanding of your concern or question.
- Making the distinction between facts, beliefs, and feelings.

Communicate without making others feel "wrong" by:

- Expressing concerns non-judgmentally -- state your questions or concerns without blaming the other person or people. For example, you might be angry that your client stood you up three times in a row. Rather than talk about her being irresponsible, you can ask her what stopped her from showing up.
- Use "I" statements. Rather than say, "You didn't explain that very well," say, "I didn't understand what you just said. Please explain it again."

Communication competence refers to the knowledge of effective and appropriate communication patterns and the ability to use and adapt that knowledge in various contexts. It is considered as a person's ability to choose communication behavior which is suitable to achieve the aim of the social relation. It can also be defined as the ability to interact well with others, and the term "well" refers to accuracy, clarity, comprehensibility, coherence, expertise, effectiveness, and appropriateness.

4.2   Principles and Strategies for Effective Communication

4.2.1 Principles of Effective Communication

In the effective communication process, the communicator and communicant not only perform linear communication but are also expected to perform circular communication.

Communication is the message conveyed to the communicant (recipient) by the communicator (source) through certain channels directly/indirectly for the purpose of giving impact/ effect to the communicant as desired by the communicator. It goes through five stages: interpretation, encryption, delivery, acceptance, and feedback. To have smooth communication, it is necessary to use the principles of effective communication:

i. Clarity of idea: The message or idea must be as clear as possible, without ambiguity and devoid of doubt. The message can be conveyed properly only if it has been clearly formulated in the mind of the communicator.

ii. Completeness: The message to be communicated must be adequate and complete; otherwise, it will be misunderstood by the receiver.

iii. Consistency: The message to be communicated should be consistent with plans, policies, programs, and goals of the profession. The message should not conflict with previous communications.

iv. Flexibility: A communicator should be able to adapt to changing needs of the audience, depending on the situation. A communication system that cannot absorb changes according to the needs of the audience is worthless.

v. Appropriate language: Communication should always be in simple language. Minimize use of technical words and words multiple meanings.

vi. Attention: The purpose of communication is that the receiver of information should clearly understand its meaning. Merely transferring information is not communication -- the receiver should understand it. This is possible only when the receiver takes interest in the message and listens to it attentively.

vii. Timeliness: Messages should reach the receiver whenever they are needed. Hence, the message should be sent before the actual need, keeping in mind the time required for communication. Late messages may be useless.

viii. Courtesy: Being courteous shows the sender's respect for the receiver. Everyone wants to be appreciated and respected, so both the sender and receiver of the message should be sincere, polite, judicious, reflective, and enthusiastic.

ix. Consideration/empathy: Consideration involves taking note of an audience's viewpoints, background, mindset, education level, requirements, emotions, and problems, and modifying words to suit the audience's needs and maintain their self-respect. Empathy is the ability to put yourself in situations or conditions faced by others. To empathize means putting yourself in the role of a good listener, even before anyone else listens to you, and making an effort to feel what the clients are perceiving.

x. Feedback: It is essential for the sender of the message to know about the success of the message -- whether the receiver has understood the message. Feedback is easily obtained in face-to-face communication with the help of the facial reactions of the receiver. In written communication, the sender can get the feedback by using appropriate means such as an email or a text message.

xi. Conciseness: Conciseness means communicating what you want to convey in the fewest possible words.

xii. Concreteness: Being concrete means being particular and clear rather than fuzzy and general so messages are not misinterpreted.

xiii. Correctness/accuracy: Messages should be grammatically correct, and the communication must convey true fact.

xiv. Coherency: Communication often takes place across multiple tools/formats and over a period of time. It's important that communication remains logical, well-planned, and self-reinforcing, connected with the main topic, and often linked to work values and principles.

4.2.2 Effective Communication Strategies

The followings are strategies for effective communication:

- Making appropriate eye contact. Like many nonverbal cues, this is culturally specific; in some cultures, direct eye contact is a sign of disrespect.
- Use attentive body language: sit slightly forward with a relaxed, easy posture.
- Be aware of your gestures.
- Stay on the topic.
- Don't be phony -- be yourself.
- Be culturally sensitive.
- Focus on the other person.
- Determine what the other person already knows, then fill in the gaps.
- Smile or nod.
- Let the other person speak – avoid monopolizing the conversation.
- Establish rapport.
- Arrange for privacy, if appropriate.
- Create an atmosphere free of distractions and interruptions.
- Be warm and enthusiastic.
- Show interest.
- Look bright and alert.
- Ask open-ended questions.
- Use active listening.

4.2.3 Helpful Communication Techniques

Table 4.1: Helpful Communication Techniques

Using silence	Silently count to five before speaking.
Accepting	Yes. Um Humm. I follow what you said.
Giving recognition	It is difficult to talk with someone you don't know. Hello, Jane, we've talked before.

Offering self	I'll be here until 3 p.m.
	I'm interested in what you have to say.
Giving broad openings	Is there something you'd like to talk about?
	Where would you like to begin?
Offering general leads	Go on.
	And then?
	Tell me about it.
Placing the event in time or in sequence	What seemed to lead up to...........?
	Was this before or after..........?
	When did this happen?
Making observations	Your voice sounds shaky when you talk about....
	It makes me feel uncomfortable when you .....
Encouraging descriptions	Tell me when you feel anxious.
	What is happening?
	What does he do when he "gets ugly"?
Encouraging comparison	Was this something like.....?
	Have you had similar experiences?
Restating (especially useful when you can't identify the feeling)	My lawyer doesn't believe me when I say he hit me when I was pregnant.
	Your lawyer doesn't believe your story.
Focusing	This point seems worth looking into.
Exploring	Tell me more about ....
	Will you describe that more fully?
Giving information	This line is answered 24 hours a day.
	My purpose in being here is ....
Seeking clarification	I'm not sure I follow.
	What would you say is the main point of what you've said?

4.3 Types, Core Skills, and Competencies in Communication

4.3.1 Different Types of Communication

i. Verbal communication: Communication through language. This refers to the form of communication in which a message is transmitted by words spoken or written. Verbal communication is divided into:

a. **Oral/spoken:** This includes face-to-face conversations, speeches, telephonic conversation, video, radio, television, and voice over the internet. Examples of spoken communication that can be used in extension activities include conversations, interviews, counseling, meetings, conferences, teaching, and so on. In oral communication, communication is influenced by pitch, volume, speed, and clarity of speaking.

b. **Written communication:** In written communication, written signs or symbols are used to communicate. A written message may be printed or handwritten. It is transmitted through letter writing, reports, memos, bulletins, job descriptions, employee manuals, electronic mail, internet websites, proposals, telegrams, faxes, postcards, contracts, advertisements, and brochures. A message in written communication is influenced by the vocabulary and grammar used, punctuation, writing style, precision, and clarity of the language.

ii. Nonverbal: This is communication other than spoken or written language. In other words, it is talking without speaking a word. Nonverbal communication includes facial expressions, body movements, and gestures. More powerful messages are usually conveyed through nonverbal cues than through words themselves Seventy percent to 90 percent of our communication is nonverbal. Examples of nonverbal communication include body language (e.g., folded arms), eye contact, facial expression, muscle tension (are neck or jaw muscles taut, fists clenched?), posture, mannerisms (e.g., fiddling with hair, biting nails), and proxemics (how close we stand when talking). In the U.S., for instance, people generally stand between 18 inches and 2 feet from each other; they get uncomfortable if that boundary is violated. Proxemics vary from culture to culture.

iii. Paraverbal: This is communicating not by what you say but how you say it. Examples of paraverbal communication include:

a. Voice qualities/voice tone (is voice flat or monotone?).

b. Rate of speech (how fast or slow one talks).

c. Cadence/rhythm of voice.

d. Volume.

e. Inflection.

Communication is also classified based on style and purpose as:

i. Informal communication: This is done without certain rules, conventions, and principles. It is casual speech or conversation by people. In informal communication, use of slang words and foul language is not restricted.

ii. Formal communication: In formal communication, certain rules, conventions, and principles are followed while communicating messages. It occurs in formal and official or professional settings, corporate meetings, conferences, and so on.

4.3.2 Core Skills and Competencies in Communication

A. Basic or core communication skills are:

i. Listening: Listening can be defined as the active process of receiving, constructing meaning from, and responding to spoken and/or nonverbal messages. Listening involves the ability to retain information, as well as to react empathetically and/ or appreciatively to spoken and/or nonverbal messages. (Remember that non-word languages can make use of sounds that can be rightly interpreted if one listens attentively.) A good extension worker must be a good listener. A good listener faces the speaker, keeps his/her mind open, minimizes distractions, engages himself to the message, and asks questions, or provides answers to questions. Active listening is a way of listening that focuses entirely on what the other person is saying and confirms understanding of both the content of the message and the emotions and feelings underlying the message to ensure that understanding is accurate. Active listening is not:

- Quickly agreeing with the client before they finish speaking.
- Passing judgment.
- Asking follow-up questions that are for your own information.
- Reassuring the client that the situation is "not that bad".
- Giving advice either from your personal experience or from professionals.

Active listening strategies:

- Focus on the other person.
- Use attentive body language: sit slightly forward with a relaxed, easy posture.
- Use verbal cues such as "um-hmmm," "sure," "ah," and "yes."
- Ask open-ended questions.
- Use focused questions to get a more definitive answer than you would with an open-ended question.

ii. Speaking: Speaking can be described as the process of making intelligible sounds through the mouth to pass on or share meaning. Mastery of the speaking skill can create winning situations for the speaker in these speaking situations and beyond: professional presentations, group discussions, job interviews, public speaking, conversations, dialogues, debates, and negotiation. In extension work, speaking skill is necessary because ideas, feelings or practices have to be thoroughly and clearly communicated to clients and stakeholders.

iii. Reading: Reading may involve skimming, scanning, and extensive or intensive studying of documents. It builds confidence, improves knowledge, increases vocabulary, and promotes development of other skills. Extension workers can become knowledgeable only through reading and practice. A good extension worker must be a voracious reader to be able to stay up to date while providing solutions to the clients' needs.

iv. Writing: Writing could be defined simply as the use of symbols to convey meaning. Writing is the only communication skill that requires the use of your wrist and eyes simultaneously. This skill can be improved by minding one's vocabulary, spelling and grammar; proofreading and editing; being concise and using simple sentences; and presenting ideas in a logical progression. Extension workers need good writing skills because ideas or practices are often communicated through writing for various print media, in emails and memos, and many other forms.

B. Core competencies in communication are:

i. Eloquence and oratory: Extension workers should be able to speak fluently and clearly before sizable groups, even under pressure.

ii. Self-confident: Extension workers are expected to speak with confidence and respond to interruptions and questions without losing composure.

iii. Style and diversity: Extension workers should understand the various styles and diversities in communication used by people of various religious/cultural beliefs or traditions.

iv. Focus dialogue: Extension workers should be able to focus dialogue with stakeholders and audiences and reduce digression in conversation. They should demonstrate receptivity to ideas and ask creative questions to drive broadly collaborative thinking.

v. Articulate thoughts: Extension workers should be able to express ideas effectively using oral, written, visual, and non-verbal communication skills.

vi. Affirmative listening: Extension workers should listen with sincere intention to learn and act while communicating with stakeholders or audiences.

vii. Balanced temperament: Extension workers should be slow to anger while communicating with audiences and able to demonstrate equanimity in the face of provocation during conversation.

viii. Ethical competence: Extension workers should speak and behave in accord with the audience values and with commonly accepted norms of decency in communication.

ix. Teamwork: Extension staff should work collaboratively with stakeholders, engage in conversation with civility, and assume shared responsibility while working with others toward a common goal.

x. Competency in use of modern communication technology: Extension workers are expected to effectively utilize appropriate software and hardware technology for communication. Examples are use of standard software tools such as email, word processing, spreadsheets, e-surveys and presentation software as well as phones, iPads and laptops for social media and direct messages. Extension workers are also expected to have competence in the utilization of multiple communications media and methods.

4.3.3 Strategies for Developing Communication Skills and Competencies
    i.   Practice public speaking.
    ii.   Ask for feedback from audiences, clients, and stakeholders.

iii.   Practice active listening.

iv.   Manage your emotions.

v.   Practice nonverbal communication.

vi.   Develop a filter (i.e., select appropriate messages for an audience).

vii.   Read loudly.

viii.   Use technologies for communication.

ix.   Proofread online and written communication to avoid errors.

x.   Build your vocabulary.

4.3.4 Criteria for Assessing Communication Competencies

i. Adaptability/flexibility: This is the ability of extension workers or communicators to change behaviors and goals to meet the needs of audiences during interactions.

ii. Conversational involvement: This can be assessed according to three factors:

    a.   Responsiveness (knowing what to say, know roles, interact).

    b.   Perceptiveness (be aware of how others perceive you).

    c.   Attentiveness (listen carefully).

iii. Conversational management: This involves how communicators regulate their interactions, adapt and control social situations, control the interaction ebb and flow, and how smoothly the interaction proceeds as well as how topics proceed and change during conversation.

iv. Empathy: Communication competence is assessed by the ability of the communicator to demonstrate understanding and share emotional reactions to the situation.

v. Effectiveness: Communication competence is assessed on the basis of whether objectives or goals of conversation are achieved.

vi. Appropriateness: This is also a fundamental criterion for determining competence. Communication is assessed on the basis of its appropriateness to a given situation or targeted audience.

4.4   Communication Models

Models of communication simplify the processes of communication by providing a visual representation of the scenario. Communication models help you to understand how communication works, how information is transmitted, and how this information is received and interpreted. Some models explain communication in more detail than others, but even the most complex model still doesn't re-create what we experience in even a moment of a communication encounter. Communication models are valuable because they allow communicators (e.g., extension workers) to understand concepts and steps within the process of communication, and define and apply communication concepts. A communication model helps us to understand the communication process by breaking down the parts of the communication process. A good understanding of how communication functions help people think more deliberately through their communication encounters, learn from previous ones,

and help them better prepare for future communication. In this section we will discuss three of the most common communication models.

4.4.1 Three Models of Communication

Linear communication model

The linear communication model shows the communication process starting from the communicator and ending at the communicant. The linear (or transmission) model of communication describes communication as a linear, one-way process in which a sender intentionally transmits a message to a receiver. This model focuses on the sender and message within a communication encounter. Although the receiver is included in the model, this role is viewed as more of a target or end point rather than part of an ongoing process. It is presumed that the receiver either successfully receives and understands the message or does not. This sender-oriented or transmission model is one of the simplest and earliest used communication models. You can see an example of this in Figure 4.1.
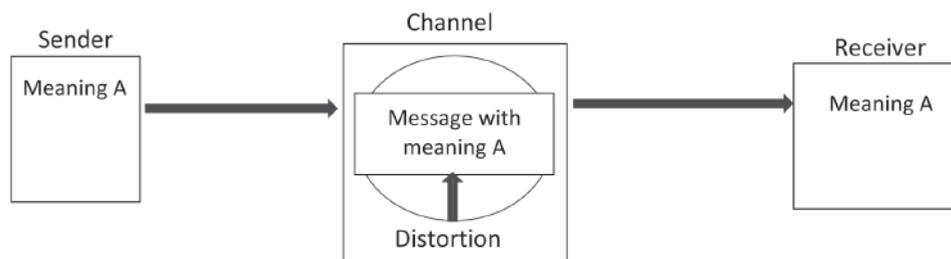
Figure 4.1: The Linear/Sender-Oriented Transmission Model of Communication
(Adapted from GFRAS New Extensionist Learning Kit, 2016)

In this model, the sender (the information source) composes a message (information that needs to be communicated) and transmits it through a channel (communication device such as a telephone) to a receiver. In theory, the sender and receiver will then have identical information unless something interferes with the message being carried through the channel (noise or distortion).

However, as earlier mentioned, this communication model is a major oversimplification of the communication process. Even if nothing interferes with the transmission of the message, differences in pre-existing knowledge between the sender and the receiver mean that they rarely end up with the exact same meaning and information. Extension agents and farmers will always interpret information differently, despite all efforts to communicate effectively.

Interactive Model of Communication

The interactive/interaction model of communication is also called the two-way process of communication. It describes communication as a process in which participants alternate positions as sender and receiver and generate meaning by sending messages and receiving feedback within physical and psychological contexts. Rather than illustrating communication as a linear, one-way process, the interactive model incorporates feedback, which makes communication a more interactive or two-way process (Figure 4.2). The inclusion of a feedback loop also leads to a more

complex understanding of the roles of participants in a communication encounter. Physical context includes the environmental factors (size, layout, temperature etc.), while psychological context includes the mental and emotional factors (stress, anxiety, emotion, etc.) in a communication encounter. For effective communication to take place in this model, the sender must consider the frame of reference of the receiver. Agricultural extension agents would therefore have to investigate the different perspectives of the farmers in detail to get their intended message across.
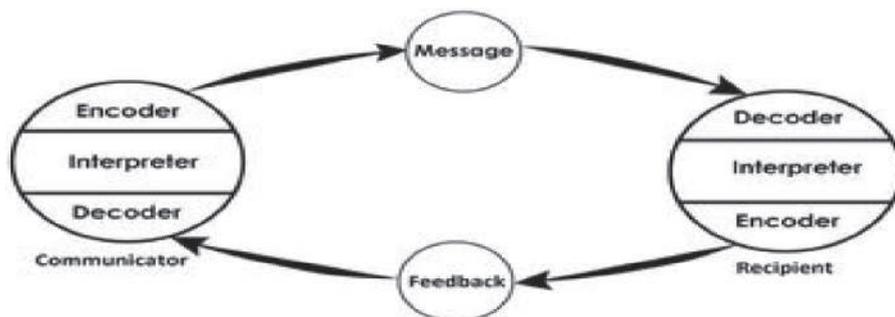
Figure 4.2: Interactive Model of Communication (Schramm, 1954)

Transactional Model of Communication

The transaction model of communication describes communication as a process in which communicators generate social realities within social, relational, and cultural contexts. In this model, people don't just communicate to exchange messages -- they communicate to create relationships, form intercultural alliances, shape self-concepts, and engage with others in dialogue to create communities. The model presents a more complex understanding of context because it views communication as a force that shapes our realities before and after specific interactions (Figure 4.3). This model considers the influence of previous and other simultaneous communications within the wider environment of the sender and receiver. For instance, extension agents are usually not the only people communicating with farmers; they also meet other people (other farmers, religious leaders, family members, local elders, traders) who influence them. Secondly, this model recognizes that the wider political and social environment of the sender and receiver will affect their interpretation of messages.
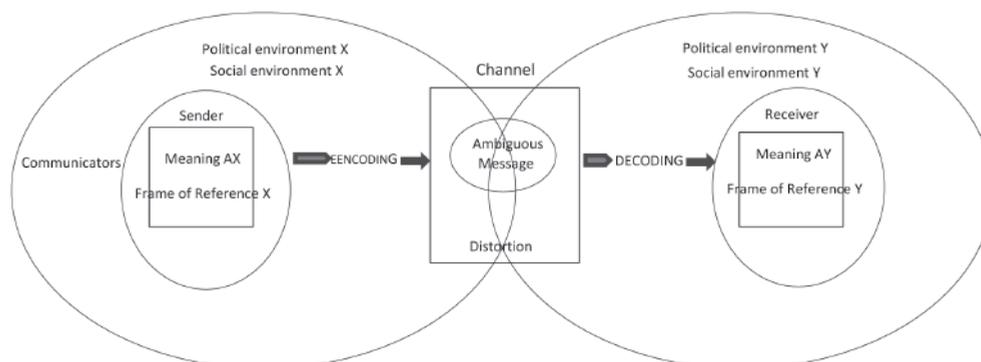
Figure 4.3: The Transactional/Social Network or Negotiation Communication Model
(Adapted from GFRAS New Extensionist Learning Kit, 2016)

4.4.2 Concept of Feedback

Feedback is the receiver's reaction to a message. In other words, it is the sender's way of determining the effectiveness of his message. The direction of the communication process is reversed during feedback, and the original sender becomes the receiver while the original receiver becomes the sender. This makes communication a two-way process.

In feedback, the receiver may use the same channel for feedback as the sender used for the original message, especially in face-to-face conversation, or the receiver may use a different channel. In face-to-face conversation, feedback is more easily perceived and includes such reactions as yawning, dozing, clapping of hands, frowning, or direct verbal responses (Figure 4.4).

The most positive feedback in any extension program is the adoption of a recommended practice. For example, if livestock farmers accept the battery-cage system of poultry keeping after a vigorous campaign for the adoption of such a practice, this is all the feedback a communicator requires to confirm a successful communication.
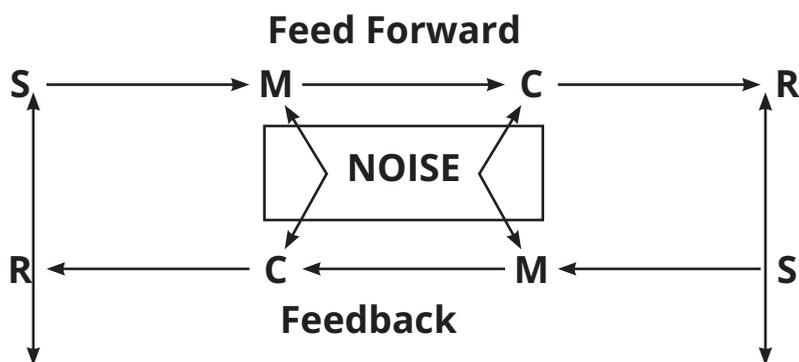
Figure 4.4: The Concept of Feedback

Feedback provides opportunities for eliminating miscommunication. The message source is thus in a better position to know how successful his/her message is. He/she is then better able to adjust the delivery strategy.

4.4.3 Concept of Noise

Both formal and informal communication channels are subject to "noise", which limits effective message transmission. Noise is anything introduced into a message which makes it difficult to comprehend. Two types of noise are primarily recognized:

1. Channel noise.

2. Semantic noise.

Channel noise includes any disturbances that interfere with fidelity (clarity) of the physical transmission of a message. In mass communication, examples include: static on radio; smeared ink in the newspaper; rolling screen in TV; illegible handwriting. In interpersonal communication, someone speaking in a room over another conversation, banging a door while people are talking and listening, "crosstalk" on the telephone, and so on are all channel noise.

Semantic noise tends to be caused by a discrepancy between the message sender and the receiver. It results in wrong interpretation of messages. Examples of semantic noise include:

- Situations where the message sender "speaks above" the receiver by using words that are very difficult to understand., That is, when an extension agent, for instance, uses expressions that are above the level of education and understanding of the client. Closely related to this are instances in which the subject matter being discussed is again above the level of understanding of the audience (clientele).

- Situations in which the words used by a sender are misunderstood or are perceived as different from what the receiver associates them with.

- Cultural differences between sender and receiver. Examples include intonation, eye movement, facial expression, hand and other body movements.

- Examples in which the sentence structure confuses the receiver's ability to understand its meaning.

4.4.4 Problems that Prevent Effective Communication

Extension agents need to be able to identify possible problems/barriers that prevent a message or innovation from reaching the farmers. It is important to note that although communication is central to all human interactions, effective communication is inherently difficult to achieve. This is mainly because communication involves the interaction of at least two individuals and can only be achieved indirectly. The complexity of communication lies in the fact that the things that people want to transmit to each other-- such as information, ideas, emotions, and skills --are mental constructs that have no concrete meaning and thus are not transmittable. Rather, they must be transformed into representative symbols such as words, gestures, and pictures, which can be observed and transmitted. Hence, only the people involved in the communicative act can give meaning to the arbitrary symbols. It is clear, however, that receivers and senders of messages rarely attach the same meaning to a given set of symbols.

Communication Barriers are problems or limitations that prevent the flow of information from a sender to the intended receiver. GFRAS (2016) enumerated several possible problems that may prevent the effective communication of extension messages:

1. The message never reaches the target audience. This problem frequently occurs because of the communication medium chosen. For instance, the extension agents broadcast a message on television in an area where very few people have access to television.

2. The message reaches the target audience, but they do not pay attention. This is often attributed to information overload or fatigue. Innovative messages designed without considering the educational background of the audience can lead to confusion or message overload. The target audience's attention can also waver when they are distracted by other concerns or physical needs that are not being met. For example, a hungry farmer will not pay attention and will therefore not be able to completely implement a demonstrated innovation. Lastly,

if the relationship between the communicating parties is strained (conflict or a lack of trust), the audience may choose to ignore a message.

3. The message is not understood or correctly interpreted because of a problem with the message content. When extension agents design messages without considering the pre-existing knowledge of the target audience, they may use concepts, language, or terminology that the audience is not familiar with.

4. The audience disagrees with the message. If you fail to consider the target audience's interests, aspirations, beliefs, or culture, they may doubt the validity or integrity of your message.

5. The audience ignores the message. Even if they agree with the message, some people may choose to ignore it. This may simply be due to a shortage of starting material --, for example, a farmer may lack the capital or labor to implement a change, even if he/she thinks it sounds like a good idea. Ignoring the message may also be connected to the audience's priorities, interests, or pressures from the wider social or political environment.

6. The audience abandons the advice contained in the message. Even if the advice communicated is initially followed, some people may stop after a while because, according to their experience or a change in circumstances, the innovation no longer suits or benefits them.

Other Barriers Include:

- Physical barriers (e.g., noise, distractions, poor listening, bad equipment).
- Semantic barriers (e.g., complexity of language and its understanding).
- Physiological barriers (e.g., ill health, poor eyesight, hearing difficulties, etc.).
- Socio-psychological barriers (e.g., individual's attitude, emotion, poor retention, failure to listen, etc.).
- Syntactic barriers.
- Cultural barriers.
- Religious barriers.
- Distortion of information.
- Accent/style of information presentation.
- Time pressure.
- Hearing only part of the message.
- Listening with a particular mindset/prejudice.
- Making assumptions.
- Failure to wait for feedback/response.
- Lack of sensitivity to emotions.
- Finishing a person's sentence for him/her.

- Not acknowledging a person's experience, emotions, feelings, desires.
- Jumping from topic to topic.

4.5   Communication Media and Tools

4.5.1 Different Forms of Communication Media and Tools

Communication media use a combination of different kinds of communication channels to transmit information. To communicate effectively with farmers, extension agents need to make use of several communication media and tools because they serve different purposes. The choice of communication media, for example, depends on whether a situation calls for communication of explicit knowledge (written down in books, made visible, described, and easily captured in language -- mainly acquired through formal learning in schools or universities), sharing of tacit knowledge, or converting tacit knowledge (gained through enculturation and experiences within a specific socio-cultural environment -- mostly gained through practical experience and non-formal learning) into explicit knowledge. Today, a wide variety of communication media are available, and they can be roughly divided into mass media and interpersonal media.

The wide variety of communication media available can be roughly divided into written, visual, verbal, tactile, and olfactory communication. Written communication can be used to communicate explicit knowledge and suits the information intermediary and knowledge translator roles well. Examples of written media include newspaper articles, leaflets, technical notes, guides, brochures, and factsheets. Verbal communication can be used to communicate explicit and implicit knowledge to groups or individuals. Verbal communication media can be more or less interactive depending on whether you use interpersonal or mass media. Examples of verbal communication includes presentations to groups, group discussions, multi-stakeholder platforms, interactive theatre, one-on-one discussions, and rural radio. Visual communication is particularly useful for explaining complex ideas because it is easier to communicate some knowledge through images than words. Examples of visual communication include training videos, participatory videos, television shows, and posters. Tactile and olfactory communication enhances experiential learning through the use of other senses. Farmers can see the effect of treatments on plants and animals. Examples of tactile learning include field visits and field schools.

4.5.2 Mass Media and Interpersonal Media

i. Mass Media: Mass media include newspapers, radio, and television. The sender can reach a large number of people over a long distance without direct interaction. Therefore, traditional mass media are asynchronous (when communicating parties are involved in the communication process at different times and cannot respond to each other immediately). This is the type of communication that takes place between one or more people who are communicating with a large and geographically widely dispersed audience simultaneously through the use of technology.

ii. Interpersonal Communication: Using Interpersonal media is a more direct, synchronous (when communicating parties are involved in the communication process at the same time and can react to each other immediately) process with the sender engaging with the audience directly and

actively. This is the type of communication that takes place between two or three people. It is usually done face-to-face. The face-to-face communication between two people is also known as dyadic communication. An example is the conversation you have with your friend, your dad, mum, and so on. It can also be done with phones or through internet platforms such as websites, social media such as Twitter (now X), Instagram, WhatsApp, etc.

Both mass media and interpersonal media have merits and limitations. Depending on the situation, one may be better than the other. If an extension agent wants to communicate a message in an area where literacy rates are low, written mass media would not attract the attention of the target audience, and therefore the message may be ignored. In this instance, it would be better to use interpersonal media such as group demonstrations. On the other hand, if an extension agent wants to communicate a message to a community that has a good literacy rate but struggles to schedule a meeting with all the key role players, written mass media would be better suited. Table 4.2 shows the main merits and limitations of mass and interpersonal media.

Table 4.2: Comparison of the Main Merits and Limitations of Mass and Interpersonal Media

Mass Media	Interpersonal Media
High potential to reach a large target audience	Limited potential to reach a large target audience
Relatively high potential to attract attention to an issue	Relatively low potential to attract attention to an issue
Asynchronous communication	Synchronous communication
Relatively non-specific message	Relatively specific, tailor-made message
Differential spatial flexibility (The possibility to adjust the physical environment in which a message is delivered to the preferences of a specific target audience.)	High spatial flexibility
Differential time flexibility (The time that the message is received by an audience can be adjusted to suit the preference of the audience.)	Time flexibility within limits
Relatively low cost	Relatively high cost
High storage capacity (The ability to store a message and send it again at a later stage)	Low storage capacity
Low potential to stimulate experiential learning	High potential to stimulate experiential learning
Low potential to develop personal relationship with target audience	High potential to develop personal relationship with target audience

(Source: GFRAS New Extensionist Learning Kit, 2016)

Some of the factors that should be considered before choosing media for communication include: (i) Reliability of the communication media; (ii) Availability of the media; (iii) Cost of the media, and (iv) Speed of the media.

4.5.3 Techniques for Writing for Media

As indicated in the previous section, there are four major forms of mass media: radio, television, print, and digital/online. Although they are forms of mass media and seem interlinked, they possess distinct qualities and different writing styles. This section presents techniques/skills required for writing for the various forms of media.

A.   Radio: Radio is one of the oldest media of mass communication. and as such, it appeals to different age groups. The basic elements of radio are words, sound effects, and music. With the help of these elements, the listener creates his/her own pictures. There are fundamental skills needed to write for radio. For radio talks and scripts, it is important to note that spoken language is different from written language. In the spoken word, people have only one chance to communicate with the listener. The listener must be able to take in instantly the meaning and central idea of the story being told. When one is writing for speaking, it is important to write as though the writer is talking; the writer should hear the words as he writes them.

The following are basic techniques for writing radio talks and scripts:

1.   *Formulate a story idea*. Outline the characters, plot, setting, conflict, and resolution.

2.   *Write a narrative of the story*. Put the "meat" of the story on the bones of the outline. Always keep the limitations of radio in mind since it is written for listeners, not viewers.

3.   *Divide the narrative into scenes*, with good descriptions of setting, character, and sound effects.

4.   *Write the dialogue based on the narrative*. Let the characters and sound effects give the listener a clear picture of the action in their mind.

5.   Put the story into radio script format. This includes:

   a.   *Write a page heading*. This is used to specify what program or episode that is being worked on and what page the writer is on in the script. It should be placed across the top of the page.

   b.   *Write a scene heading*. This specifies the scene number, the scene's location, and the time of day.

   c.   *Include script cues*. A listener retains mainly three things from a radio drama: dialogue, music, and sound effects. Each of these audio components is identified as a "cue" because it happens at a given time in the script, and the director may have to instruct someone ("cue them") to produce it.

   d.   *Insert music cues*. Varying emotions can be achieved through the choice of music. Clearly written instructions regarding music cues will greatly assist the cast and crew in influencing the mood of a given scene.

   e.   *Include the dialogue cues*. This helps the director and the actors prepare themselves for proper timing and execution.

f.   *Insert the sound effect cues*. Sound effects help to establish the scene or depict action. Sound effect cues are always underlined.

g.   *Compose production notes*. Engineers, cast, or crew require specific instructions that are handled as production notes, comments from the writer on how to coordinate cues or achieve particular effects. These need to be clear and precise.

6.   *Edit the radio talk and script* after letting it sit for a few hours or days. Read the script aloud and review if there are possibilities of improvement. Ensure that sentences are simple and short and that the flow of the script conveys the message. A fresh set of eyes will help the writer catch any mistakes in grammar or plot. Consider having a third party scrutinize the script.

7.   *Present the script* to the producer or editor and make revisions as necessary.

B.   Television: Writing for television requires the skill to create a balance between pictures and words. Hence, it is important to decide on the needs and style of the television script beforehand. There are different forms of television scripts can be news, news stories, and feature stories.

The following are techniques for writing a television script:

1. *Lead writing*

Since readers may not have time to read an entire article, the lead of a story, typically the first full paragraph, should contain all pertinent information in the article. By reading the lead paragraph, the reader should find the basic who, what, where, when of a story -- a summary of the story. This goes along with the inverted pyramid model of an article, in which the most important information comes first, with the body of the article providing more detailed facts and analysis as well as secondary facts that may be cut out if necessary. A feature story may begin with a snappy introduction to capture the reader's attention, but for a news story, a simple opening providing basic facts can be just as effective.

2. *Interviewing*

A news writer should research the subject as well as the person to be interviewed beforehand so that the writer will be prepared. A basic knowledge of the topic to be written about will show that the writer is professional and competent. The interview will run much more smoothly, and the subject will be more willing to provide information if he/she thinks the writer is well informed. In addition, knowing something about your source helps you prepares additional questions to ask during the interview. Take notes and stay attentive to the source during the interview and/or record the interview. makes it easier to get accurate quotes without writing furiously throughout the interview.

3. *Quotes*

Using quotes is one of the most important and essential parts of news writing, news stories, and feature stories. It is important not to simply tell the reader what has happened but to illuminate the facts by providing quotes from multiple sources, including witnesses and experts on the subject of your article. When using quotes, the following points should be kept in mind:

a. Balance quotes so they are not all one-sided.

b. Do not quote facts, simply state them. If it is known that the national deficit is 4 billion U.S. dollars, it is unnecessary to quote the secretary of the treasury when he mentions this in a speech.

c. Keep quotes in context. Do not misrepresent sources used. For obvious ethical reasons, it is not proper to pick and choose pieces of what a source says in an interview to create one's own story. It is the job of the writer to provide the clearest and most accurate story possible.

d. Do not introduce quotes by summarizing them.

e. Do use quotes to illuminate the information provided beforehand.

f. Remember to introduce the sources used. For example, "The Federal Government will boost local rice production by increasing small scale rice farmers' access to credit facilities," said the Minister of Agriculture, Mr. Johnson Brown. The writer should not assume that the reader would know who the source is, even if it is a public official.

4. *AP style*

When writing news, news, stories and feature articles, it is important to use the recommended Associated Press style for better write-ups. Below are some examples:

The meeting will be held at 8 PM.

– When writing out times, use a.m. and p.m. -- note that they are lower cased and have periods.

– The extension agent will visit the farmers on Tuesday, May 15th.

– When writing dates, use only numerals, do not add "th," "nd," or "st". Also, do not write out the numbers, such as third or first.

5. *Headlines*

The headline of a story needs to capture the reader's attention as well as reveal the substance of the article. Typically, the first thing readers do when they pick up a newspaper is to scan the headlines. The headline of a news story needs to be concise, specific, and informative. It also needs to be in the present tense and contain active verbs. No periods come at the end of a headline, and only the first word and any proper nouns should be capitalized. Semicolons and commas may be used. When placing a quote in a headline, use single quotes instead of double quotes. A few examples may suffice, thus:

Bad

President held meeting

(Too vague and in the past tense)

Good

President Biden addresses the National Assembly members about high food prices.

C. *Print media:* Print media such as newspapers, journals, and magazines are the oldest forms of mass communication. The contents are generally presented in a linear fashion, and important information is provided to readers in short, simple words and sentences. Generally, the techniques for writing print media are as follows:

1. Once a topic is chosen, and all possible sources have been listed, it is time to use them. People can also be sources. Appointments should be arranged with those who interest the writer, and questions prepared concerning the article. Do not forget to take notes.

2. Write headings that are both informative and catchy.

3. Create a motivating topic sentence.

4. Show, not tell – this is the golden rule of all writers.

5. The writer should stay firmly on the writing goal and not get carried away from the research and topic while writing.

6. No matter how narrow, the topic still must have several subtopics that will be developed in the body paragraphs.

7. Think about illustrations. Usually, professional photos are obtained from agencies such as AP (Associated Press). But the subscription costs quite a lot. At the same time, illustrations are a good way to get attention.

8. Inexperienced writers sometimes feel tired after writing few paragraphs. This is not the proper time for challenges. When tired, the writer should put the article aside, and have some rest so as not to write a poor article.

9. When the writer finishes writing, it is important to put it aside for some time so that the mind can cool off a little, and he can take an independent look at the work. It is necessary to ask family members/friends/anyone whose opinion is valued to read the article and give feedback.

10. A writer also must be flexible, especially an inexperienced one. If a qualified person tells the writer that some things must be rewritten, then it should be done. It will help one to develop one's own intuition for correct writing, after learning. Do not be offended by criticism.

The final step is to submit the material to a publication. The article should be sent to an editor. In the cover letter to the publication, the writer should explain his/her familiarity with the newspaper, magazine, or journal. It shows that some research was done, and that the writing most likely corresponds to the demands of the newspaper, magazine, or journal.

D. *Digital/online media***:** Digital/online media – Facebook, Twitter (X), Instagram, WhatsApp, and blogs -- are recent forms of mass communication that are constantly changing and have completely changed the way information is consumed. The digital/online media have distinct writing styles with their own dynamics, concepts, and techniques. Basically, the contents of

digital/online media are intended to engage the younger generation. Writing for digital/online media requires understanding the needs and preferences of online users. The techniques for writing digital/online media are:

1. Clear and concise: Digital content is not the same as print content. People encounter and read it differently – they scan it, so it should be written differently. A simple and direct style works best. Make sentences and paragraphs short -- three to five short sentences at most. It should be divided into smaller and organized chunks with subheadings. Leave breaks between paragraphs. Use active verbs and write in present tense. Avoid the passive voice, as it complicates the sentence. When reading through the draft online content, eliminate any unnecessary words to make the copy crisper, more concise, and easier for users to digest.

2. Keep it short: Language is most powerful then. Write using a maximum of 25 words per sentence, one sentence per paragraph, four to six words per headline. Online space is practically unlimited, but very long stories are generally not suitable for online readers tend to prefer short stories -- no longer than 800 words.

3. Legibility: For ease of reading, minimize use of boldface, italics and all capital letters. Avoid underlining to highlight texts -- it will make the text look hyperlinked and confuse the readers.

4. Headlines and subheads: Headlines should be concise and catchy, communicate the right information, and attract readers. Subheads should be concise and to the point, short (preferably three to seven words) and give readers a clear indication of what comes next. They also help to break blocks of text into manageable chunks.

5. Most important points: Present these early on the page. There is immense competition for attention in cyber space. Readers tend not to dig for key messages buried at the end of a page or story -- they go elsewhere.

6. Bullet points and lists: This is another effective way of breaking up a long story to facilitate reading, attract attention, and make absorbing the information easier. Digital audiences frequently scan online content for highlights. Bullet points can be used in the body of a story or at the beginning to highlight the most important points in a report.

7. Know your audience: The prerequisite for good online content is a detailed understanding of the target audience. For example, content crafted for extension professionals may be different from that created for policymakers or farmers.

8. Spelling and grammar: Poor spelling and grammar undermine the credibility of the online message. Check for errors and, if possible, have someone else review the message. A fresh set of eyes can often see errors that the writer reads right over.

9. Develop visual sense: Attractive and rich graphics easily grab the attention of readers. Such graphics –pictures and diagrams, tags and captions – enhance the story and help build the narrative.

10. Write to be visible: Learn about tools that can be used to increase the visibility of online content or websites so that they can reach a wider audience. Search engine optimization (SEO) helps drive organic search traffic to a webpage. Although key words are important, bear in mind that Google and other search engines place a high value on contents that are informative, relevant, and useful.

4.5.4 Preparing Progress Reports

A progress report is a document written by extension workers to update the progress of their various tasks to other stakeholders. A progress report is a formal, documented, and structured way of keeping the government or supervisors/line managers informed of the progress of field activities. Furthermore, progress reports document important information and records pertaining to extension programs in the community. A progress report helps in documenting the progress and challenges faced in carrying out extension activities.

When should a progress report be written?

A progress report could be put together at many times, depending on the goal of the report. The types of progress reports are:

1. *Daily report*. These progress reports are short and concise. They provide a quick overview of daily tasks achieved, any challenges encountered, and progress made towards larger goals.

2. *Weekly report*. This type of report is a bit more detailed and includes information on what the extension field workers hoped to achieve in the week, what they actually achieved, and why it was (or was not) achieved.

3. *Monthly report*. This is a detailed report indicating the extension workers' progress towards reaching goals. It is best delivered as an overview of all extension activities within the month.

4. *Quarterly progress report*. This type of progress report does not need to go into a significant amount of depth on specific tasks but is more targeted towards analyzing whether quarterly goals were reached, and the reasons for not reaching the set goals.

5. *Annual report*. This is the final report of the year, and it gives details of what the extension worker achieved across the year. It includes lessons learned, challenges encountered, and changes expected during the next period.

How to Write a Progress Report

The following steps will help an extension worker to ensure that progress reports are as legible as possible.

1. Keep the report simple and concise. Use short, clear sentences, and proofread any report before submitting it.

2. Think about the subject of the report in breadth and length. Also, make a note of all the information that will go into the report.

3. Put down all contents on paper, assess the content, and decide what ought to be included. Then, consider how the information will be organized and structured in the report.

4. The progress report should be written in the following structure:

    a. The first part introduces the purpose of the report, stating why the report is being written.

    b. The second part, the main substance, describes how people were brought into the program.

List the methods were used and which one(s) worked well in establishing rapport. A comparative analysis among methods might be useful. Include a paragraph on challenges encountered also. c. The third part has concluding remarks, which contain reflection from the writer on what could have been improved.

Table 4.3: Format for Preparing a Monthly Progress Report for Field Extension Workers.

Top of the report: Indicate the period (e.g., 1 May 2021 to 31 May 2021	• Name of the state • Name of the town community • Name of the reporting officer • Names of the blocks and circles visited • Number of working hours
Section I: Plan of the month	• Plan for the month • Work assigned by the block supervisor
Section II: Tasks accomplished	• Include the plans. • List the tasks that are partially completed. • List the completed tasks.
Section III: Observations	• How do people interact in meetings? • Which innovation received wide acceptance? • Why was it more liked than others? • Who were most keen to adopt?
Section IV: Issues and challenges	• In the field: those faced with the community • Administrative: those faced with funding agency, government, and non-governmental organizations, etc.
Section V: Analysis	• Include tasks done, who were early adopters and why? Which farms resisted adoption and why? • List other observations from the field.
Section VI: Self-introspection	• What did you do that you could improve on?
Section VII: Planning	• Plan the tasks for next month.

(Adapted from Suvedi and Kaplowitz, 2016)

4.5.5 Techniques for Organizing Extension Campaigns

An extension campaign is a coordinated effort to inform many farmers in a relatively short period of time about an agricultural topic of widespread concern or interest. The aim is to achieve quick, large-scale change in farmer behavior and practices through carefully choreographed efforts by various organizations using a variety of communication channels. Extension campaigns require careful planning and work best when there is widespread consultation and multi-sector involvement.

Some of the techniques for organizing extension campaigns are:

- Define the topic and common goal; focus on practical needs of farmers. Draw up a schedule of activities, the expected end point of the campaign, and the deadline for assessing outcomes.
- Engage in consultations with stakeholders and community leaders as well as opinion leaders.
- Assess strengths of cross-sector networks to identify the roles of public, private, and civil society partners – the most effective campaigns depend on broad alliances.
- Involve representatives from all sectors (including mass media) in planning activities; identify the key people and organizations that can make change happen.
- Identify communication channels that maximize information flow. Prepare guidelines on different ways to deliver messages: plant health rallies, radio programs, mobile phones (texting), social media, farmer meetings, and so on.
- Define and validate the key messages to be conveyed. Design suitable formats (e.g., text messages, fact sheets, posters) for disseminating messages. For print media, ensure you have enough copies to distribute to target audiences.
- Compare knowledge, attitudes, and practices before and after the campaign. Carefully consider what data you really need and who will coordinate data collection and analysis.
- Cost all actions, identify funds, and confirm partner contributions.
- Ensure that results and lessons learned are published and shared with all participants.

4.6   Effective Communication with Community Leaders

A leader is a person who influences a group of people towards the achievement of a goal. Community leaders are very important stakeholders of an extension program in the community. They interact frequently with the community, so they could motivate and organize people in the community to participate in extension programs. Therefore, fostering strong lines of communication with community leaders is very important to achieving a set of goals of the community. Extension educators should communicate effectively with community leaders so that they can acquire the requisite skills, abilities and attitudes needed to carry out extension education and other communication responsibilities.

For communicating effectively with community leaders, extension workers should:

- Build trust with community leaders.
- Maintain engagement meeting with them.

- Encourage two-way conversations and open dialogue.
- Promote collaboration and teamwork with them.
- Keep them informed of the extension activities in the community.
- Communicate any upcoming changes effectively and in a timely manner.
- Align with and respect the culture of the community.

4.7 Diffusion of Innovation Theory – Implication for Extension Communication

4.7.1 Adoption Process

Diffusion scholars have long recognized that an individual's decision about an innovation is not an instantaneous act. Rather, it is a process that occurs over time and consists of a series of actions. The traditional view of the innovation decision process, called the "adoption process," was postulated by a committee of rural sociologists in 1955. The adoption process is the mental decision-making behavior, through which an adoption unit (an individual or group) passes from becoming aware of an innovation to deciding to adopt or reject it. Although the process is concerned with the behavior of one adoption unit, the behavior, generally occurs within a community context and tends to be affected by situations occurring within the community. In general, acceptance of a new idea is a complex process involving a sequence of thoughts and practices. Quite often the speed with which a new idea is accepted (or rejected) is a function of past experiences in similar situations. Usually, decisions are made after contacts, over time, with several communication channels.

Communication research suggests that diffusion of innovation and its adoption vary depending on the socio-cultural context of the community, characteristics of the decision making unit or the target audience, and perceived attributes of the innovation (Rogers, 2003). In all cases, it is important to ascertain why an innovation is or is not adopted. However, as noted by Suvedi and Kaplowitz (2016), most people hesitate to adopt a new idea or practice even if they are aware of it because of:

- Uncertainty about possible benefits or unwillingness to take risk.
- Inadequate knowledge about the new practice or innovation.
- Concern about the trustworthiness or credibility of the information source.
- Lack of resources to acquire the inputs required for adoption of the new idea or innovation.
- Lack of a market in which to sell new products.
- Social norms, values and beliefs that do not support adoption of the new idea or innovation.

4.7.2 Diffusion of Innovation

We have noted that the adoption process is a mental decision-making process. The diffusion process, on the other hand, is concerned with the spread of an innovation within a social system. Indeed, the concept of diffusion is closely related to dissemination of an idea or practice within a specified social system. Rogers and Shoemaker (1971) have described diffusion as a "specialized communication"

which is a process by which innovations spread to members of a social system. They recognized four elements that are essential in the diffusion process:

a.   An innovation.

b.   Which is communicated through certain channels.

c.   Over time.

d.   Among members of a social system.

It appears, therefore, that the most important distinguishing factor between adoption and diffusion processes are that the former (adoption) functions as a form of intrapersonal communication, and the latter (diffusion) operates largely through interpersonal communication process. Adoption and diffusion are, thus, closely related concepts because there will be no diffusion of innovation without adoption.

The diffusion process is concerned with the use of the various channels of communication to achieve maximum audience participation at each level / stage of the adoption process. At the knowledge stage, for example, it is noted that mass media, including folk media (music, socio-drama, etc.) are most effective in making people aware of an innovation. Maximum use is, therefore, made of these media to enable higher socio-economic status members of a social system be aware of the innovation. Among people of lower socio-economic status, however, neighbors, and friends tend to be more important creators of awareness of new ideas, although, as rural communities continue to modernize, the role of mass media in raising awareness is likely to grow. The influence of the various media channels in the diffusion process vis-a-vis the stages in the adoption process is presented in Table 4.4.

Table 4.4: Rank order of Information Sources by Stages in the Adoption Process and Influence in the Diffusion Process

Rank	Knowledge	Persuasion	Decision	Confirmation
1.	Mass media: radio, TV, newspapers, magazines	Mass media	Friends & neighbors	Friends & neighbors
2.	Agric. agencies, especially extension	Dealers & sales agents	Dealers & sales agents	Dealers & sales agents
3.	Friends & neighbors, mostly other farmers	Agricultural agencies	Agricultural agencies	Agricultural agencies
4.	Dealers & sales agents	Friends & neighborss	Mass media	Mass media

To effectively promote an innovation to intended users, the extension worker must understand the theory of communication and the innovation decision process - how an innovation or new product is spread within a social system, and how communication about it gains momentum. The innovation decision process involves several steps: an individual passes from first knowledge of an innovation

to forming an attitude toward the innovation to a decision to adopt or reject it (Maunder, 1972; Rogers, 2003). If the decision is to accept it, the next step is implementation of the new idea, and then confirmation of this decision. An innovation decision process modified after Rogers (2003) is shown in Figure 4.5. This model consists of four main stages:

1. **Knowledge** — a person (or decision making unit) becomes aware of an innovation and gains some understanding of how it functions.

2. **Persuasion** — a person (or decision making unit) forms a favorable or unfavorable attitude toward the innovation.

3. **Decision** — a person (or decision making unit) chooses to adopt or reject the innovation.

4. **Confirmation** — a person (or decision making unit) evaluates the results of an innovation decision already made.
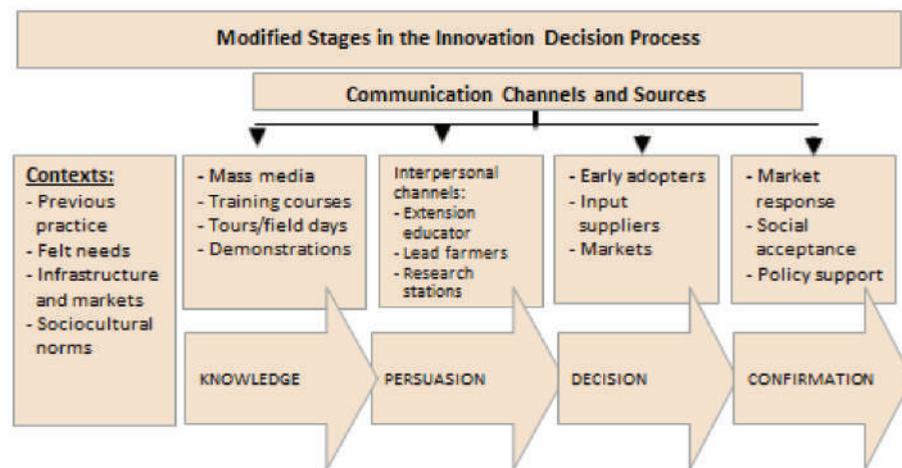
Figure 4.5: Communication Channels During Innovation Decision
(Adapted after Rogers, 2003; Suvedi & Kaplowitz, 2016)

Knowledge Stage: Socioeconomic characteristics, personality traits, and communication behavior of the members of a social system may influence the knowledge of a new idea or innovation. Generally, those who are first to learn about a new idea or innovation are better educated; have travelled outside their communities; use mass media such as radio, TV or internet for information; and have higher social status and wider social networks than those who hear about it later.

Persuasion Stage: After becoming aware of or knowledgeable about a new idea or innovation, people become psychologically involved with the innovation and seek additional information about its attributes, such as:

- **Relative advantage:** What are the cost and economic return of adopting the innovation, compared with current practice? Cost of inputs, the conditions under which inputs may be obtained, and the likely market situations (in the case of agricultural and other technical inputs) are important variables that determine the relative advantage of one innovation over another.

- **Compatibility:** Is the innovation compatible with existing practice or culture? To what extent to does an innovation fit into the adopter's situation, which includes his views about what ought to be, what he does, and how he does it. For instance, enforcing the water closet toilet system in the rural areas without considering the availability of running tap water or toilet tissues would be unattainable and incompatible with existing practices.

- **Complexity:** How complex is the innovation? Simple practices are adopted more quickly than complex ones. Any new idea may be classified on the complexity-simplicity continuum. Some innovations are clear in their meaning to potential adopters; others are not. Thus, the more complex an innovation is, the slower will be its rate of adoption and, by implication, the rate of diffusion. This is not to say that proven practices that are somewhat complex to apply should be ignored completely. What is necessary is that practitioners such as extension agents need to understand where recommended practices will complicate a potential adopter's operations.

- **Trialability:** Can the innovation or technology be tried out or experimented with or adopted on a limited basis before its full adoption? New ideas that can be tried on the instalment plan are generally adopted more rapidly than innovations that are not divisible. Some innovations are more difficult to divide for trial than are others. The personal trying out of an innovation is a way to give meaning to an innovation, to find out how it works under one's own conditions. This trial is a means to dispel uncertainty about the new idea. Innovations that do not permit this would, therefore, be more difficult to diffuse through a social system.

- **Observability:** Can people readily observe the results or benefits of adopting the innovation? The degree to which the results are visible is important for its adoption. In agriculture, method and result demonstrations have been used to provide observable information about the potentials of a new practice. Innovations in which the software aspect (that is, the information base for the tool) is dominant possess less observability and usually have relatively slower rates of adoption.

Decision Stage: In this stage, on the basis of personal assessment of the various attributes of the new idea or innovation, a person decides whether to adopt or reject the innovation or new technology.

Confirmation Stage: The last stage in the innovation decision process is confirmation. If the new idea or innovation adopted is felt to be beneficial, adoption could be continued. Otherwise, it could be discontinued. Similarly, if the decision was not to adopt the new idea or innovation previously, the person may adopt it later after observing results at a neighbor's farm, or s/he could continue to reject it.

In addition to these five perceived attributes of an innovation (relative advantage, compatibility, complexity, trialability, and observability), other variables such as the type of innovation decision; the nature of communication channels diffusing the innovation at various stages in the innovation

decision process; the nature of the social system in which the innovation is diffusing; and the extent of the change agent's promotion efforts in diffusing the innovation affect an innovation's rate of adoption.

The type of innovation decision is related to an innovation's rate of adoption. Innovations adopted by individuals are generally adopted more rapidly than innovations adopted by an organization. The more persons involved in making an innovation decision, the slower the rate of adoption. One means of speeding the rate of adoption of an innovation is to attempt to alter the unit of decision so that fewer individuals are involved.

Communication channels play an important role in the innovation decision process. The communication channels used to diffuse an innovation also may influence the innovation's rate of adoption. Interpersonal channels (e.g., face to face meetings, telephone conversations) require a long time or many staff members to reach a large audience, and rate of adoption is slow. Also, if an inappropriate communication channel is used, such as mass media channels for complex new ideas, a slower rate of adoption results. Group channels such as farmers' training classes, study tours, and farmer field schools can reach more people more quickly, but they may not reach all the members of the social system. Mass media channels - radio, television, newspapers – can reach a large audience with the same message in a relatively short time. Note that certain communication channels are effective at different stages of the innovation decision process. Mass media are useful in creating awareness about an innovation (knowledge stage). Interpersonal channels are relatively more important at the persuasion or decision stage of the innovation decision process (Rogers, 2003).

The nature of the social system, such as the norms of the system and the degree to which the communication network structure is highly interconnected, also affects an innovation's rate of adoption.

It is also affected by the extent of the change agent's promotion efforts. The relationship between rate of adoption and the change agent's efforts, however, may not be direct and linear. The greatest response to change agent effort occurs when opinion leaders adopt the innovation. The innovation will then continue to spread with little promotion by change agents after a critical mass of adopters is reached.

Extension workers should recognize that adoption of new ideas and technologies happens in stages. Some people adopt the new idea or technology early, some adopt late, and others do not adopt it at all. In general, a few people will try the innovation at first, then if it seems to have benefits a larger number will try it, though a few may never accept the new idea. Those who first adopt an innovation are generally classified as more innovative than others. An examination (over time) of the socio-economic characteristics of innovative groups indicated that:

1. They tend to become more aware of the innovation relatively early because they are exposed more to communication networks that promote the innovation.

2. They tend to require less time to reach a decision.

The implication from the above characteristics is that this group would be well educated and scientific in orientation, and might possess the ability to deal with abstractions. Depending on when (how early/late) people adopt a new technology, diffusion and adoption scholars such as Maunder (1972) and Rogers (2003) have classified adopters into five categories:

1. **Innovators:** Those who are first to try out a new technology are called innovators. Their interest in new ideas leads them out of a local circle of peer networks and into more cosmopolitan social relationships. Being an innovator has several prerequisites. Control of substantial financial resources is helpful to absorb the possible loss from an unprofitable innovation. The ability to understand and apply complex technical knowledge is also needed. Innovators are risk takers and adventurous, eager to try new ideas and, therefore, the first to adopt an innovation. Innovators represent about 2.5 percent of a total population.

2. **Early adopters:** The next to adopt a new technology are called early adopters. Early adopters are a more integrated part of the local social system than are innovators. This adopter category, more than any other, has the greatest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information about an innovation. The early adopters are considered by many as "the individual to check with" before using a new idea. They make up about 13.5% of the population.

3. **Early majority:** These people adopt new ideas only after intense thought and deliberation. The early majority interact frequently with their peers but seldom hold positions of opinion leadership in a system. Their innovation decision period is relatively longer than that of the innovator and the early adopter. They make up about 34% of the population, and they take the overall adoption rate up to around 50 percent.

4. **Late majority:** Skeptical in nature, they adopt new ideas on the basis of either economic necessity or social pressure. In essence, innovations are approached by this group with skepticism and caution, and they do not adopt until most others in their system have done so. Like the early majority, the late majority makes up 34% of the population. They bring the overall adoption rate to around 85 percent.

5. **Laggards:** Those who join last – or never -- are called laggards. They are the traditionalists, rooted in the old practices, and they base their decisions on what was done previously. They are always suspicious of new ideas, innovators, and change agents. The laggards are the least risk takers, have very small farms relative to others, have low levels of education, and have relatively low incomes. Quite often they are least exposed to sources of information. Laggards make up about 16 percent of the population.

In general, innovators and earlier adopters have more formal education, higher social status (larger farms, higher income), greater exposure to mass media, greater exposure to interpersonal channels of communication, greater extension agent contact, greater social participation (e.g., community leader, farmer association leader) and more contact with persons outside their community than later adopters. However, it should be noted that individuals do not occupy permanent positions in

the characterization of the adopter categories for all innovations. For instance, an individual who falls into the category of laggard in innovation A may become an innovator for innovation B.

Suvedi and Kaplowitz (2016) note that an adoption process is situated within a social system, so social factors such as culture, taboos, norms, and values influence the adoption rate. Innovations that are complex and require significant investment for adoption tend to be adopted slowly. The presence of innovative opinion leaders whom others look to for direction also affects the adoption rate. So, for an extension worker, working with opinion leaders in a village enhances the possible rate of adoption. Each adopter category possesses unique characteristics and requires different strategies to influence adoption. It is important that extension workers recognize individuals in each of these adopter categories to achieve successful adoption of innovations.

Rate of adoption is the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea in a specified period, such as each year. So, the rate of adoption is a numerical indicator of the steepness of the adoption curve for an innovation. Suvedi and Kaplowitz (2016) noted that many extension services and development projects use the rate of adoption -- i.e., the speed at which target beneficiaries adopt an innovation-- as a criterion for evaluating the effectiveness of agricultural extension. It should be noted, however, that the rate of adoption varies with the attributes of the innovation or technology being promoted or disseminated. Achieving 100 percent adoption may not be a realistic goal. Experience suggests that 30 percent to 40 percent adoption signals that it's time to move out of a village and/or move on to the next innovation/technology because the new idea or innovation will then continue to spread through peer pressure or social networks.

4.7.3 Inhibitors of the Adoption/Diffusion Process

Generally, the deficiency or absence of factors which facilitate the adoption of innovation will inhibit it.

1. Inadequate knowledge or information concerning an innovation. This will most likely hinder adoption and, consequently, diffusion. Inadequate knowledge could relate to lack of awareness of the existence of the innovation or insufficient knowledge about how the innovation operates. For instance, nutrition studies indicate that milk processed from soybean is nutritionally as good as animal milk. If members of a social system lack information about processing techniques, the innovation is unlikely to be adopted. Similarly, an extension agent who lacks adequate skill in teaching clients how to process the milk would not encourage its adoption.

2. Perceived attributes of an innovation can hinder or facilitate the adoption / diffusion of an innovation. There is a definite distinction between the actual attributes of an innovation and the potential adopter's perception of these attributes. Perceived attributes of an innovation include its relative advantage vis-à-vis the technology or practice it intends to replace; its compatibility with existing situations within the framework of the social system; its complexity, that is, the relative ease of understanding the innovation; its trialability -- in other words, can the innovation be tried initially on a small scale to enable final acceptance? And its observability

-- that is, are the results / effects of the innovation's adoption easily seen? If the attributes of an innovation are negative or unsatisfactory, adoption / diffusion will likely not take place.

3. Use of wrong communication channels. Adoption / diffusion studies show that mass media channels tend to be more effective for less complex innovations such as inoculations, while interpersonal channels (face-to-face interactions, training workshops, meetings, etc.) are more effective for complex innovations. In the Nigerian situation, radio appears to be the most used mass media channel for agricultural information delivery because of its versatility. The use of the print media channel in largely illiterate social systems would hinder adoption / diffusion. Newspapers, for instance, have not been known to be important channels for presenting technological agricultural information in Nigeria. Their use in such information delivery will not encourage adoption / diffusion.

4. Channel credibility. The credibility of a communication channel is directly related to whether an innovation is adopted by a target group. Channel creditability, therefore, affects audience beliefs and attitude. People like to listen to and accept what those they like say. When channel credibility is lacking, adoption / diffusion processes will be quite minimal. Thus, agricultural information communicated through non-credible channels would tend to be ignored by farmers.

5. Incompatible client needs. If change messages are incompatible with clients' needs, adoption / diffusion is unlikely. The extension agent should tune in to his / her clients' felt needs. Asking farmers to apply more fertilizers for higher rice yields would be incompatible with their needs if what they need is processing mills for earlier harvests.

6. Apathetic change agent effort would hinder the adoption and, consequently, the diffusion of an innovation. If the extension agent is not personally in background gardening for instance, it is unlikely that he/she would enthusiastically teach clients how to grow background vegetables. Farmers are smart people and would easily recognize the least sign of apathy or deceit from the change agent. Some extension agents are more agency- oriented than farmer- oriented. In situations where they are agency-oriented, they tend to communicate agency-initiated innovations, which quite often conflict with client needs. Unenthusiastic approaches to client needs would hinder innovation adoption / diffusion.

7. Nature of the social system. Innovation decisions that depend on collective action are more slowly adopted; thus, the greater the number of people involved in making innovation decisions, the less likely the adoption of that innovation. Therefore, the adoption / diffusion of an innovation within a social system can be inhibited if too many people must participate in the decision-making process.

8. Diffusion may also be hindered if the wrong person (farmer) begins it, or the innovation goes against existing norms, and the extension agent does not engage in situation-specific analysis of each factor. In other words, the agent must analyze each situation afresh, independent of an earlier one.

In general, mass media channels are more important for creating awareness and interest in an innovation, while interpersonal channels are more appropriate at the other stages of the adoption/ diffusion process. Inappropriate use of these channels would hinder adoption and the consequent diffusion of any innovation. Diffusion of innovations is greatest when the target group is involved in the initiation, planning, action, and evaluation phases of the program. Research strongly indicates that innovations are accepted more rapidly where an active diffusion system is operating. Cross-cultural studies also indicate that the most important single variable, among an entire system of variables relating to the rate of acceptance of technological and social change, is the stage of development of the media system within the country.

4.7.4 Lessons for Extension Workers

When you work with an extension program for technology transfer:

- Use mass media for raising awareness of the innovation or new technology.
- During the persuasion stage, interpersonal channels are effective, so maintain as much personal contact with farmers as possible.
- Find out if your district or village has innovator farmers (early adopters, opinion leaders), and work with them to disseminate the innovation or new technology.
- Set up method and result demonstrations of new practices at innovators and early adopters' farms.
- Meet with early adopters regularly.
- Hold meetings with farmers' groups, women's groups, and youths.
- Work with local organizations (e.g., farmer associations, mothers' groups, etc.).
- Always be professional – tell the truth, demonstrate what you want the farmers to do, document what changes are taking place, and report what you accomplish.

4.8   Effective Presentation Skills

Communication is effective when the message sent by a source or sender reaches the receiver and they reach a mutual understanding. However, communication is ineffective if the message is unclear or misunderstood. Effective presentations minimize the potential for miscommunication between the sender and the receiver.

4.8.1 Elements of Effective Presentation

According to Morgan (2000), major elements of presentations such as public speaking include the following:

Determine your audience.

Who are the members of your audience?

What are they interested to hear?

What is their background?

Whom do they represent?

What is their educational level?

How long have most of the members been with this group?

The knowledge about the members of your audience will allow you to modify the presentation according to their needs or interests. For example, progressive farmers react differently than traditional farmers when adopting new varieties or improved inputs.

Preparation is essential

Decide on your presentation topic.

What is your message?

How can you convey it clearly and simply?

Write down your thoughts and read them carefully. Make bullet points; include related success stories to inspire your audience.

What is the medium?

Are you speaking to individuals, an organized group, or a large mixed audience?

Are you presenting messages at a mall, fair, trade show, conference, or professional meeting?

Are you writing for a newspaper or magazine?

Your message must suit the medium. This tool focuses on how to make effective presentations in a group setting. According to Bell and Shire (2012), a presentation consists of three parts: opening, body, and conclusion.

Opening

i.   Welcome everyone and ask if everyone can hear you well.

ii.   Grab the audience's attention and get them focused on the topic of the presentation by asking a question, citing a relevant quote from a well known person, telling a short story, or using visual aids.

iii.   Provide an overview of the presentation. Clearly state the purpose of your presentation and why the presentation or the topic is important.

Body

During the presentation, you need to:

i.   Create an informal atmosphere. Provide for and encourage audience participation.

ii.   Establish your credibility early. Know the topic; write down the main points. Prepare an outline, if possible. Prepare PowerPoint slides or other audio-visual materials to support your content. Make sure visuals are clear and accurate.

iii.   Organize your material in a logical sequence for easy comprehension.

iv.   Identify the stories, data, and/or illustrations to support each point.

v.   Use eye contact to establish rapport.

vi.   Avoid using technical jargon as much as possible.

Summarize every point before moving to the next point.

Conclusion

Stay focused on points you want people to carry away with them:

i.   Review the key messages you covered and spell out their relevance.

ii.   End the presentation with a positive summary: how the innovation will benefit the audience, why change is necessary, and how your audience can be the agents of change.

4.8.2 Tips for Good Presentation

According to Suvedi and Kaplowitz (2016) point out the dos and don'ts of a good presenter:

a.   **Present clearly:** Key points make your message easy to follow. A long, rambling speech will be hard for the audience to follow, and learning will be weak.

b.   **Use eye contact:** This makes the audience attentive and enables the presenter to see if the audience is losing interest, at which point you bring in an anecdote or maybe stop to ask a question.

c.   **Stand erect, walk around, and move your hands:** If you slouch and look tired, the audience's interest drops. If you look alert and excited about your topic, the audience is likely to respond in the same way.

d.   **Speak enthusiastically and clearly:** To deliver a "loud and clear" presentation, project your voice so everyone can hear, and pause briefly at the end of every sentence. Mumbling will cause the audience to lose interest and miss the key points.

e.   **Use appropriate anecdotes and humor:** A long speech gets monotonous and is easy for listeners to tune out of. Using real world examples and funny stories keeps the audience listening because they can relate better to real situations than to abstract concepts.

f.   **Present logically:** Organize the points you want to make in a logical manner and present them so that it's clear how the various points connect as part of an overall theme. This keeps the presentation focused and the audience attentive.

g.   **Use visual aids:** Visual aids that are easy and clear to read help the audience follow the presentation and clarify important points and concepts. In PowerPoint visuals, use large font sizes (sizes 28 to 32).

h.   **Dress appropriately:** Wear bright and clean clothes to support the impression of professionalism and energy that you want to convey.

4.9   Components of Basic Skills in Teaching/Training

Communication in training is a process of delivering communication conditioned for training purposes. The training process is essentially a communication process -- delivering messages containing

training materials. In this regard the training is expected to use a transactional/ social network / circular model of communication, which is a process that not only starts from the communicator and ends at the communicant but also pays attention to the feedback from the communicant to make the communication effective.

Effective communication in training is expected to use verbal and non-verbal communication. Verbal communication is communication using verbal symbols/ words. Non-verbal communication uses gestures, body language, facial expressions, and eye contact. It could also be done with the use of objects such as clothes, haircuts, and so forth.

Non-verbal communication will help the trainer to become an interesting speaker. Verbal communication has to be supported by means of intonation, emphasis, sound quality, style of speech, and emotion. It also uses gestures, body language, facial expressions, and eye contact, and is supported by the use of objects such as clothes, haircuts, and so forth.

Training is essentially a learning process that contains three elements: inputs (raw materials to be processed), process (activity to process inputs), and outputs (results that have been processed). Inputs of the training are the participants before starting the training; the training process is the interaction between the components of teaching and learning, which are the objectives, materials, methods, participants, facilities and assessment. The outputs of the training are the participants after finishing the training.

A process is considered good if the output quality is better than the input quality. The learning process or training is a behavioral change that occurs as the result of the experience. This means it can only be called a learning process if a person is showing different behavior afterward. He/she needs to prove new knowledge of facts or do something which he couldn't do previously. Thus, the learning process takes someone from one capability or competence status to the other. Some basic skills necessary for success in teaching / training include:

i. Introducing a subject matter

Introducing the lesson well is a skill and an art. A good introduction will engage the audience, tell them what to expect from the lesson, and provide a framework with which each can work.

Components: Maximum utilization of the previous knowledge of the subject matter, using the appropriate device, maintenance of continuity, relevance of verbal and nonverbal behavior.

ii. Explaining the subject matter

Explanation is an activity which shows the relationships among various concepts, ideas, events, or phenomena. An extension educator should be able to explain or describe the how, the why, and sometimes the what of a concept, phenomenon, event, action, or condition. To promote understanding, s/he attempts to relate a new set of facts to a familiar set of facts.

Components: Clarity, continuity, relevance to content, using beginning and concluding statements, covering essential points.

iii. Illustrating with examples

The skill of illustrating with examples provides a sense of authority to extension educators. A specific example can help the grasp the content of the lesson quickly.

Components: Simple, relevant, and interesting examples, appropriate media, use of inductive, deductive approach.

iv. Asking probing questions

The success of teaching depends upon the skill of asking probing questions. To test learners' knowledge and understanding. Questions should be meaningful, clear, relevant, precise, specific, grammatically correct, simple, and straightforward.

Components: Prompting, seeking further information, redirecting, focusing, increasing critical awareness.

v. Use of teaching materials

Proper use of teaching materials can enrich teaching and may make it memorable. The effective use of teaching materials leads to clarity in the understanding of concepts and reinforcement of the idea which is being verbally presented. Skillful use of materials helps the extension educator to convey a holistic picture of the content, add variety to the lesson and draw the attention of the learners to the key concepts.

Components: Legible, neat, and adequate with reference to content covered.

vi. Stimulus variation

Stimulus variation can be defined as changes in the instructor's behavior to attract and hold the learners' attention.

Components: Body movements, gestures, change in speech pattern, change in interaction style, pausing, focusing, and oral-visual switching.

vii. Managing the audience

This refers to the wide variety of skills and techniques that instructors use to keep learners/audience organized, orderly, focused, attentive, on task, and academically productive during communication.

Components: Calling learners by name, clarity of direction, checking non-attending behavior, maintaining eye contact, stopping inappropriate behavior immediately.

4.9.1 Knowledge Management

Knowledge is the understanding, awareness, or cognition that is created through study, observation, experience, and research. It is a valuable resource and asset which may be explicit (knowledge and information that can be easily coded), implicit (knowledge that explains how best to implement explicit knowledge), or tacit (intuitive). Both individuals and organizations find it difficult and even impossible to deliver quality and economical products and services without a pool of knowledge. Knowledge drives other organizational resources (such as capital, labor, land, etc.), and its active management is important to an organization's success.

Knowledge management has received considerable attention in management circles because of its capability to provide organizations with strategic outcomes related to profitability, competitiveness, and capacity development. In agricultural extension, it is still an emerging concept that involves knowledge acquisition, creation, refinement, storage, transfer, sharing, and utilization. Knowledge management also refers to all the process relating to creating, sharing, organizing, analysing, using and managing knowledge and information in an organization. It is the management of information resources, services, systems, and technologies, including learning processes using various tools through activities such as information acquisition/creation, information retrieval and storage, data mining, classification and cataloguing, and information use in t information handling institutions or centers. It is further defined as the systematic and integrative process of coordination, throughout an organization, of the activities of acquisition, creation, storage, exchange, development and deployment of knowledge, valuable information, and the experiences of individuals and groups in pursuit of organizational objectives.

The primary focus of knowledge management is the development of a knowledge-friendly culture in a social environment that must be supported by appropriate methods and technologies. In other words, the aim of knowledge management in an organization is to facilitate the creation of new knowledge and to guide the way in which its employees share and use knowledge. This is done in formalized organizations to motivate employees to share knowledge and promote their personal and organizational objectives. The extent to which an organization can create organizational value depends on its ability to manage knowledge, which also increases organizational competition.

In extension organizations, knowledge management among staff members is necessary as it emphasizes how to integrate and distribute resources to improve organizational performance and increase competitive advantage. Proper understanding of clienteles' needs is a result of proper knowledge management, which ultimately plays a key role in building clientele relationships. When knowledge is freely disseminated and distributed in an extension organization, its potential values emerge; if knowledge is properly used in an extension organization and new knowledge is vastly created, it not only increases productivity but also promotes creativity. Knowledge is needed as an important resource for the implementation of human capital (ability of an organization to create value using experience, learning, skills, training, and creativity of its employees) to improve innovation. Knowledge management practices also affect the financial and non-financial performance of the extension organization.

In general, extension organizations may either use technologies or an informal approach to knowledge management. Technologies can be used to increase people's efficiency and improve the flow of information in the organization. A kind of synergy between technological and behavioural capabilities is necessary to make knowledge management effective. This involves the know-how accumulated through experience combined with knowing information or knowing where information can be found. The increasing preoccupation that extension organizations have with knowledge

management indicates the attempt to recognize individual knowledge, to filter and separate the most relevant knowledge, and to organize that knowledge into databases such that clients or users can easily access them. The principle behind knowledge management is that knowledge is not an end in itself. As far as information and knowledge flow can be captured, organized, and made accessible for reuse, there exists the potential for subsequent creation of new knowledge.

The many examples of enabling technologies for knowledge management include intelligent agents, push- and -pull technologies, information search and retrieval engines, online analytical processing, data mining, document management systems (PDFs, images, and word processing files), relational data management systems, the internet, performance support systems, decision support systems, electronic publishing, and multimedia interoperability. Intranet technologies are also seen as current knowledge management enabling tools because they have been proven useful for an organization looking to catalog, grow, and refine its information repository. In addition to intranets, the improvement of other technologies such as extranets, groupware, videoconferencing and webcasting, workflow tools, data warehousing, e-mail, bulletin boards, news groups, discussion boards, and several technology vendors plays a pivotal role in facilitating the management of knowledge.

4.9.2 Steps in Knowledge Management

An effective knowledge management system typically goes through three main steps:

i. Knowledge creation: During this step, organizations identify and document any existing or new knowledge that they want to circulate across the organization. It also involves promoting the generation of new knowledge for continual learning.

ii. Knowledge storage: During this stage, an information technology system is typically used to host organizational knowledge for distribution. It also involves capturing and organizing knowledge in a knowledge management system. Information may need to be formatted in a particular way to meet the requirements of that repository.

iii. Knowledge sharing: In this final stage, processes to share knowledge are communicated broadly across the organization. This also involves improving processes and technology to provide easy access to knowledge by people who can benefit from it. The rate in which information spreads will vary depending on organizational culture. Organizations that encourage and reward this behavior will certainly have a competitive advantage over others.

4.9.3 Factors Influencing Knowledge Management

Factors that influence knowledge management and its effectiveness include:

1. Organizational structure: This structure allocates work roles and controls and integrates work activities. In highly formalized organizations, explicit rules and procedures may impede the self-belief and the flexibility required for internal creativity. In less formalized organizations, occupational behaviors are less structured, and the staff are free to deal with demands related to their duties.

2. Organizational strategy: Taking advantage of appropriate strategies and using knowledge management are essential for an organization to survive in the world of competition. The concept of strategy is based on three elements: competitive advantage, distinct capabilities, and strategic coordination.

3. Technology: Technology involves all the knowledge, goods, processes, tools, methods, and systems used to produce goods and offer services. The IT infrastructure supports the transformation of tacit knowledge into explicit knowledge. It also allows explicit knowledge to be stored and recorded in official documents to facilitate knowledge retrieval.

4. Organizational culture: This is a collection of traits that distinguishes one group, organization, or nation from others. Organizational culture can be viewed as a continuous process of identity building/rebuilding in and around the organization.

5. Leadership: Leadership involves communicating between the leader and the follower to achieve the desired results. Leadership directly influences the knowledge- sharing climate and behavior, interpersonal trust, and learning in an organization.

6. Trust: Trust is the basis for creating commitment among members of an organization for knowledge management. It depends on two factors: measures taken to strengthen trust within organizations and employees' perception of how knowledge sharing leads to personal advantages. Trust positively and significantly influences knowledge sharing and affective and normative organizational commitment. Interpersonal trust directly influences knowledge sharing behavior and indirectly influences organizational learning through knowledge- sharing behavior. Knowledge sharing partially mediates the relation between trust and affective organizational commitment. Trust is an essential component of successful and efficient teamwork.

4.9.4 Benefits of Knowledge Management

Knowledge management aims to provide efficient, effective, and rapid use of information and to save knowledge and information. In addition, it provides the following benefits:

1. It encourages collaboration and idea generation.

Knowledge management requires collaboration of stakeholders and promotes sharing of innovative ideas in an organization. This does not only improve the quality of information but also improves decision making.

2. It encourages fast decision making.

An organization that has knowledge transparency across the entire organization ensures that everyone is working with the same information and toward the same goals. It unites all employees, making sure they have all the information they need to make the best decisions possible.

3. It reduces duplication of efforts.

Knowledge management provides the organization with operational efficiency, and saves time and efforts of workers through division of labor and documentation of past information.

4. It leverages on existing expertise.

A formalized knowledge management system usually enables an organization to take advantage of its team members' existing skills and expertise, and this will help other members leverage on these people skills and expertise to build competency in a new area.

5. It improves digital transformation of information.

An organization increases the pace of digitalization of information for easy access and retrieval. This is done using a variety of information and data processing tools (e.g., computers).

6. It improves efficient access to knowledge and information.

A knowledge management system aims to create a single, reliable source where everyone can go to find the information they need without conducting multiple searches in several sources or constantly interrupting essential personnel with repeat questions. A great knowledge management tool gives room for operational efficiency, saves service and time, and drives more revenue for the organization.

7. It improves quality of information and data.

Knowledge management improves quality of information and data by refining, filtering, and separating unimportant information from important facts.

8. It provides security for intellectual property.

A well-formalized knowledge management system keeps information and data in a safe and easily accessible platform.

9. It improves communication in organization.

A well-formalized knowledge management process improves communication by being easy, accessible and reusable. It also facilitates deliberations of issues among people.

10. It discourages information silos in organization.

Good knowledge management removes the risk of information silos and encourages a culture of transparency and communication. An information silo occurs when information is known to only one person or team. Others then do not have the information they need to collaborate effectively. Managing knowledge effectively ensures everyone has access to the knowledge they need to work in alignment with organization goals and stay productive.

4.9.5 Challenges of Knowledge Management

The key to any successful knowledge management system is recognizing its limitations. Some of the common challenges include:

1. Finding ways to efficiently capture and record people's knowledge (especially tacit knowledge).
2. Making information and resources easier to find.
3. Motivating people to share, reuse, and apply knowledge consistently.
4. Choosing and implementing appropriate knowledge management technology.

5. Integrating knowledge management into existing processes and information systems.

6. Choosing overly complicated knowledge management tools, necessitating the need for costly training.

7. Lacking expertise and using knowledge management tools incorrectly can waste time and money, reducing operational efficiency.

8. Underutilizing the knowledge management system essentially renders it useless.

9. Poor organizational structure in the knowledge management activities.

10. Lack of leadership participation in knowledge management activities.

11. Low awareness of the benefits of knowledge management.

4.10 Conclusions

The communication of knowledge is one of the major aspects of agricultural extension. To function effectively, extension educators need communication skills and competencies. In this module, you have learned specific communication skills necessary for effective communication as well as three basic models of communication (linear, interactive, and transactional). Using the appropriate communication model will greatly enhance the success of an innovation strategy. Even if the correct communication model is used, problems still may occur that prevent the successful communication of knowledge. You have learned about some of the main problems that could prevent effective communication in the extension environment and about the importance of being aware of these problems.

The way knowledge is communicated also depends on the situation. In the agricultural extension environment, your communication style will vary depending on the level of complexity of a particular innovation. Extension agents should also be aware that situations will require them to perform different innovation intermediary roles. Finally, extension agents should strive to communicate the latest up-to-date information to farmers.

4.11 Self-Assessment Exercises

1. In your understanding, explain the following concepts:
    a. Communication
    b. Communication skills
    c. Communication competency

2. Identify six principles for effective communication.

3. Communication is one of the pillars of the extension profession. Based on this premise:
    a. List at least four communication skills that extension workers should possess.
    b. Mention five communication competencies for extension work.
    c. Identify six strategies for developing communication skills and competencies for extension work.
    d. Mention three criteria for assessing communication skills and competencies.

4. Explain three models of communication that could help extension educators understand processes of communication.

5. What are the problems that militate against effective communication?

6. With specific examples:

   a. Identify communication media and tools that could be useful for extension work.

   b. List factors that extension personnel should consider when choosing communication media.

7. Discuss five techniques each for preparing print media stories, television news, radio scripts, and digital/online media.

8. List six techniques for organizing extension campaigns.

9. As an extension educator, identify four techniques for communicating with community leaders.

10. Outline five steps for preparing a progress report.

11. Mention four teaching skills and components for extension work.

4.12 References

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ICTs in Extension: Skills and Competencies

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5.0   Learning Outcomes

- Explain the concept of ICTs as a core skill for extension professionals.
- Describe the evolution of ICTs over time.
- Delineate the purpose and major functions of ICTs.
- Explain various ICT alternatives to face-to-face extension delivery.
- Discuss the advantages and disadvantages of ICTs.
- Apply the key ICT tools (both synchronous and asynchronous) in extension work.

5.1   Introduction

The compelling need for current agricultural information by farmers in the era of climate change, globalization, and liberalization leading to agri-preneurship makes the use of conventional communication channels less effective. One way to address this is through the adoption of information and communication technologies (ICTs) by both researchers and extension workers to transmit the relevant information to farmers in the most effective and efficient way. Therefore, to be relevant, every extension professional should possess or acquire ICT skills and competencies (Box 5.1).

Box 5.1: ICT Skills and Competencies for Extension Professionals

In the information technology age, using ICTs has become a part of extension educators' daily work, so it is important that all extension educators possess abilities related to:

- Word processing (e.g., typing, editing, printing) and designing graphics.
- Data entry and analysis software such as Excel, SPSS, etc.

- Power Point for making presentations.
- Audio-visual aids such as charts, graphs, and puppet shows for teaching and learning.
- Mass media such as FM radio stations and television channels for communication.
- Computers (email, internet) for communication.
- Mobile phone services (e.g., texting, SMS service) for communication.
- Social media (WhatsApp, Facebook, Twitter [X], Instagram, etc.) for communication.
- ICT tools to improve access to information, knowledge, technologies, and other innovations.
- ICT tools to enhance collaboration and partnerships.
- ICT tools for collecting data, monitoring, and evaluating extension programs.

Source: Suvedi et al., 2023

5.1.1 Meaning and Evolution of ICTs

The Academy for Educational Development and Warnock International (2003) define ICTs as the combination of hardware, software, and the means of production that enable the exchange, processing, and management of information and knowledge. ICTs include devices for information processing, communications, and design as well as the network services that transmit communication services and content (UNCTAD, 2011). ICT also describes tools and processes to access, retrieve, store, organize, manipulate, produce, present, and exchange information by electronic and other automated means (Durojaiye et al., 2013). These include hardware, software, and telecommunications in the forms of personal computers, scanners, digital cameras, handhelds/PDAs (personal digital assistants), phones, faxes, modems, CD and DVD players and recorders, digitalized video, radio and television, and programs such as database systems and multimedia applications (Okeke et al., 2015).

According to Agwu et al. (2008), agricultural extension, which depends largely on information exchange between and among farmers and a broad range of other actors, has been identified as one area in which ICTs can have a particularly significant impact. ICT was adopted to augment extension work by reducing the barrier of remote/long distance between extension agents and farmers so that even farmers in the farthest and remotest rural villages can get agricultural information, and minimizing the overhead cost incurred by extension agents due to travelling (Durojaiye et al., 2013). ICTs promote and distribute new and existing farming information and knowledge within the agricultural sector. Such information is essential for facilitating agricultural and rural development and bringing about social and economic changes (Oladele, 2015).

5.1.2 Need for ICTs Skill and Competencies in Agricultural Extension

The attraction of ICTs to extension services is the high speed and low cost with which information can be communicated to people over a wide area. However, ICTs cannot do all the jobs of an extension agent. They cannot offer personal advice and support, teach practical skills, or answer questions

immediately. Their low cost suggests that they should be used for the tasks to which they are well-suited. These tasks include the following Spreading awareness of new ideas and creating interest in farming innovations. It is a cost-efficient method to improve smallholders' knowledge of current agricultural practices and markets.

i. Giving timely warnings about possible pest and disease outbreaks and urgent advice on what action to take.

ii. Multiplying the impact of extension activities. A demonstration will be attended by only a small number of farmers, but the results will reach many more if they are reported on the radio.

iii. Sharing experiences with other individuals and communities. The success of a village in establishing a local tree plantation might stimulate other villages to do the same if it is broadcast over the radio or recorded as videos. Farmers are also often interested in hearing about the problems of other farmers and how they have overcome them.

iv. Answering questions and advising on problems common to many farmers.

v. Reinforcing or repeating information and advice. Information heard at a meeting or passed on by an extension agent can soon be forgotten. It will be remembered more easily if it is reinforced using ICTs.

vi. Using a variety of sources that are credible to farmers. ICTs can connect farmers with successful farmers from other areas, respected political figures, and agricultural specialists.

5.1.3 Purpose and Major Functions of ICTs in Agricultural Extension

ICTs perform the following important functions in agricultural extension:

i. Spot exchanges: Spot exchanges help farmers to find buyers at right price and arbitrate the price level effectively. In effect, it breaks down barriers of communication, which farmers face in finding the optimal price and its buyer. Combined with an operational feature exchange, it can integrate speculation and other aspects of trading, making the price discovery transparent to the individual farmer.

ii. Strengthening linkage: ICTs have a possibility of strengthening the weak linkages between extension, research, and farmers.

iii. Early warning system for disaster management: ICTs provide actionable and real-time information to governments and communities on disaster prevention and management. They also increase the efficiency of responding efforts during emergencies and provide the people with timely advice on risk mitigation procedures.

iv. Financial inclusion and risk management: ICTs facilitate rural and smallholder farmers' accessing financial services enable them to find affordable insurance schemes, and act as a tool for better risk management. ICT tools will empower farmers by providing information regarding financial services.

v.   Capacity building and empowerment: ICTs serve as vital education tools for the development of local communities. They broaden the reach of women, youth, and other beneficiaries, and open the doors for new business opportunities to enhance livelihoods and incomes.

vi. Environmentally sustainable agriculture: Budget-friendly mobile phones, the internet, and other services to disseminate information provide rural farmers with improved access to climate-smart solutions and the appropriate knowledge to use them.

vii. Enhanced market access: ICT-enabled market information services enhance farmers' access to nearby markets and their awareness of current consumer demands through the transfer of information from the traders. ICTs also foster networking among the agricultural stakeholders, which facilitates increased market access for inputs and product marketing and trade.

The major functions of ICTs in agricultural extension are summarised in Table 5.1.

5.1.4 Philosophy and Principles of ICTs for Better Extension Services

According to Saravanan et al. (2015), the guiding principles of ICTs for better extension services include:

i.   **Relevant content:** Contextualized or farmer-specific, needs-based, timely, and quality content are the major aims of ICT-based extension and advisory services. It is important to realize that ICTs are tools and act as a vehicle to disseminate content; they do not generate content (Barber et al., 2016). People make use of the services provided only when the content is of interest to them. This is more probable when services are timely, specific, contextualized, and targeted. ICTs can expand the reach of extension, but a high adoption rate requires farmers to engage with information/service providers in determining relevance and developing content (Francis and Addom, 2014).

ii. **Appropriate tools:** Among a variety of ICTs, choose the formats, channels, tools, devices, and applications that best match the purpose, content, and clientele. According to Barber et al. (2016), ICT achieves impact only when the mode used corresponds to the interest and capacity of the user group. Web portals, e-learning and text-based SMS messages are only useful for literate farmers, whereas video, voice-based advisory services and community radio are more suitable for illiterate people. The tools selected must match the purpose, content, and clientele.

iii. **Integration of methods, actors, and services:** ICT- based services alone are not enough. Integrating ICTs with other conventional extension methods (such as farmer field schools, participatory extension, and demonstrations) and pluralistic actors (public, private, and farmer-based organizations) along the value chain will create synergy in extension service. To get better outcomes, ICTs need to be integrated with conventional extension approaches for a reasonably long period (at least five years).

Table 5.1: Major Functions of ICT Tools

Functions	ICTs — Television		Radio		Mobile phones		Computer / smart phone without internet			Computer/smart phone with internet				
	TV broadcast	Video with DVD	Radio broadcast	Community radio	Text	Voice	Decision support systems	Video	Animation	Websites	Video conference	Mobile apps	e-learning	Social media
Awareness creation														
Information dissemination	*****		*****	*****	*****	*****	***	*****	*****	*****	***	*****	***	*****
Promotional	***		***	*	***	***	*	***	***	***	***	*		***
Advisory	*****		***	*****	***	*****	*****	***	*****	***	***	*****		*****
Knowledge sharing	*****		***	***	***	***	***	***	***	*****	*	*****		*****
Technology transfer	*		***	*****			*****	*****	***	*****		***		*****
Training	*							***			*****		*****	
Facilitate market access	*		*	***	*****	*				***		*****		*****
Credit and banking access	*****				*****					***		*****		*****
Input linking	*****		*	***	*****	***				*****		*****		***
Mass advisory	***		*****	*****	***			*	***	***		*****		*****
Business planning	*											***		
Monitoring and evaluation	*****									*****		*****		
Linking and partnerships	*****			*****	*					*****		*		*****
Collect and respond to farmers' feedback				*****		*****				*****	***	*****	***	***

Note: ***** appropriate; *** moderately appropriate; *less appropriate (Source: Saravanan et al., 2015)

iv. **Information PLUS:** To persuade the clientele, show and tell. ICT-based information alone is not enough and needs to be combined with field demonstrations, exposure visits, group discussions, and other conventional methods. Not just advisory information but a complete resource package across the agricultural value chain needs to be provided.

v. **Human element:** Development of ICT "champions" to create a legacy of promoting continuous leaders and followers is important for continued commitment of the extension stakeholders to use ICTs.

vi. **Institutionalizing ICTs:** There has been an assumption that with the "right" technological investment, extension agencies will achieve new objectives and become more sustainable. However, innovations within ICT must be adapted to prevalent constraints, such as institutional structures and human and financial capital constraints, to be scaled up and successfully implemented (Christoplos, 2010).

5.1.5 Strengthening the Delivery of Extension through ICTs

To successfully improve extension systems with ICTs, the following context conditions must be met:

1) The success of ICTs depends on people knowing how to use devices and navigate the internet/ ICT literacy. For example, hosting web portals and e-learning platforms requires advanced technical knowledge and computer skills. The same applies for app-development.

2) ICTs achieve impact only when the mode used corresponds to the interest and capacity of the user group.

The steps for implementation of successful ICT interventions and ICT tools are summarized in Box 5.2 and Table 5.2, respectively.

Box 5.2: Successful Implementation of ICT

In the information technology age, using ICTs has become a part of extension educators' daily work, so it is important that all extension educators possess abilities related to:

1. The first action of the organization /ministry/agency that is going to use ICT-based extension should be an assessment of the needs of the target community.

2. To adapt, monitor, and evaluate ICT- enabled services, it is important to conduct benchmark surveys before introduction. Benchmark surveys also help to get a good overview of the actual situation.

3. Based on the needs assessment and benchmark surveys, localized and customized content needs to be developed.

4. ICT tools need to be selected and developed that correspond to the needs.

5. The target audience should be sensitized on the presence of the services and how to access them.

6. The newly developed ICT-based services are introduced and used in extension.

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7. To ensure sustainability of the services, search for partnerships with stakeholders in the target area or seek for integration of the services in the public agricultural extension system.

8. Monitoring and adaptation / modifications are important, especially in the beginning of the project whenever the project does not correspond to the needs of the audience.

9. Finally, conduct an impact assessment to determine the degree of success of the project.

Table 5.2: Information Communication Technology and Tools

Extension function	Radio	TV & video	Cell phones	Feature & smart devices	Computer & internet
Identifying farmers' problems and opportunities – What do they need and want?					
Diagnose problems	Some potential if dealing with general problems or if capacity for interaction and expertise is available.	Visuals are very helpful as "seeing is believing." Even better if combined with ways to receive feedback.	Some potential if farmers can call or text in and sufficient expertise is available.	Additional potential to a simple cell phone as it enables web or app access to special diagnostic tools.	Good, comprehensive diagnostic tools are available.
Collect information	Some potential if capacity for interaction exists.		Can use for data collection.	Good for data collection with GPS.	Some potential if internet is available.
Promoting behaviour change – What is practical and relevant to meet the needs?					
Raise aware of general opportunities or needs; persuade farmers to try something new	Very good, especially with persuasive programming.	Visuals are usually very helpful as "seeing is believing".	Is an option if users are registered to receive such messages (SMS)?	Is an option if users are registered to receive such messages (SMS, email).	Is an option if users are registered to receive such messages (email)?
Provide specific information needed for change. What is involved? What are the benefits? Demonstrate or train?	Some potential, but limited information delivered. Can be enhanced with call in.	Good option as "seeing is believing".	Potential if farmers can call or text in and sufficient expertise is available.	Additional potential to a simple cell phone as it enables web access and plays videos.	Good option for intermediaries to seek information and videos.

Facilitate access to credit and inputs	Can be used to inform of available services, but one-way communication.	Can be used to inform of available services, but one-way communication.	Mobile banking and negotiate directly with the suppliers.	Mobile banking and negotiate directly with the suppliers.	Mobile banking and negotiate directly with the suppliers.
Link farmers to markets	Good for providing general price reports.		Access to price information (call in, subscription).	Can bring potential buyers and producers together; access price information.	Can bring potential buyers and producers together; price info.
Collect feedback – How can each step be improved?					
Collect and respond to farmer feedback	Good if producers can call or text and sufficient expertise is available.	Good if producers can call or text and sufficient expertise is available.	Some potential if farmers can call or text in and sufficient expertise is available.	Good option for intermediaries to seek information (if optimized for smart devices).	Good option for intermediaries to seek information.
Assist with business planning	Some potential	Some potential		Simple farm management apps; record keeping.	farm management tools; record keeping

5.2   Synchronous and Asynchronous Communication

Synchronous communication refers to communication exchanges that occur in real time, where participants can engage in direct, immediate interactions with one another. Examples of synchronous communication include face-to-face discussions, phone calls, video conferences, and instant messaging. Asynchronous communication, on the other hand, refers to communication exchanges that occur on a delayed basis, without direct, immediate interaction between participants. Examples of asynchronous communication include email, text messages, memos, and discussion forums. In asynchronous communication, participants engage at different times, with delays in the response time, and may differ in their ability to fully interact with the sender.

5.2.1 Synchronous ICT Tools

Telephone

Overview: A caller leaves a message for a recipient; phone call helps feedback discussions between farmers and extension practitioners; and creates a place where farmers can answer each other's questions.

Elements required: Size, screen resolution, weight, ease-of-use, cost.

Cost involved: Pay up-front to buy the phone, pay for a monthly plan.

Advantages: Telephone utilized by people with low literacy skills. Farmers who utilized cell phones reported greater maize yields leading to increased profits and decreased costs and time invested in farming (Quandt et al., 2020)

Disadvantages: Not all farmers have access to phones.

Best practice guidelines: One-on-one phone call, tele-conference call

Monitoring and evaluation: Difficult to evaluate the effectiveness of phone use.

Radio

Overview: Radio is a one-way communication tool that allows extension practitioners to broadcast messages to their audience. It is one of the oldest communication technologies, and it is still helping extension practitioners today.

Elements required: Voice recorder.

Cost involved: Community radio stations may charge a small fee. National radio stations are likely to charge much more. Develop your proposal and talk to various radio broadcasters to find out which one will be most cost effective.

Advantages: Low-cost opportunity to broadcast your message to a large audience with little lead-time. No literacy skills are required, and you can broadcast your program in local dialects. Radio works best when it is integrated with other extension approaches, such as farmer visits and farmer field schools.

Disadvantages: Need to build good relationship with the radio station manager. Many farmers have portable radios; replacing the batteries can become expensive.

Best practice guidelines: Speak clearly. Audio quality is extremely important. Reduce background noise as much as possible.

Monitoring and evaluation: Promote an event using radio only and see how many people arrive at your event or express interest in it, or ask at your next event who listens to the radio program and check whether they recall a recent segment

Web Meetings

Overview: Web meetings allow both audio and video communication using webcams, and both the presenter and participants' faces can be seen. The presenter can also display certain information to the participants, such as a presentation or document. There are many web-meeting platforms (such as Zoom, WebEx, Teams, Skype, and Messenger video).

Elements required: Can attend or host a web meeting using a cell phone, tablet, or computer with access to the internet.

Using an external webcam and an audio headset gives clear video and audio.

Cost involved: Only mobile data required to attend the web meeting. A free plan from Zoom allows up to 100 attendees to join for up to 40 minutes. To hold a meeting for a longer time or for more attendees, you need to sign up for a paid plan.

Advantages: Meetings can be recorded and made available to those who could not attend. No need of physical presence.

Disadvantages: Not everyone has access to this technology, so need to use multiple communication methods to reach target audience.

Best practice guidelines: Prepare, practice, and present.

Monitoring and evaluation: In a quick post-event survey, the question types are usually limited, so it is better to send a separate digital survey.

Online Polling

Overview: An *online poll* is a survey in which participants communicate responses via the internet. There are a variety of question types, such as multiple-choice questions, open questions, and clickable images.

Elements required: A cell phone or a computer with a web browser and access to the internet.

Cost involved: With a free plan, limited questions. For maximum questions and maximum number of participants, have to sign up for a paid plan.

Advantages: Online polls maintain attention of the audience during presentation. Based on the insights received from the audience, presenter can adjust his presentation according to audience needs.

Disadvantages: Not everyone has access to technology.

Best practice guidelines: Go to the poll website to create online polls; to have explainer videos for both organizers and attendees; to include various type of questions: multiple-choice questions, word clouds, and a map for people to indicate where they are located. Audience does not need to sign in or download an app to respond.

Monitoring and evaluation: Poll software allows you to examine the number of people who voted on which aspect. Evaluation can be done by downloading the final poll results for inclusion in reports.

5.2.2. Asynchronous ICT Tools

Social Media

Overview: Group of applications where users can interact and share content. Examples include Face book, Twitter (X), Instagram, Pinterest, Snapchat, and TikTok.

Elements required: Cell phone or a computer able to browse the internet can access social media.

Cost involved: Social media apps are free to download and use.

Advantages: An affordable method of communication for extension practitioners.

It is convenient to post to social media, as you can do it almost anywhere and at any time.

Disadvantages: High dissemination of fake news, misinformation can occur.

Best practice guidelines: Social media strategy before you start to use includes:

Identify target audience and key messages. Make posts. Add comments.

Monitoring and evaluation: Social media help to track various metrics in real time such as number of people who have liked or shared your posts.

Direct Messaging

Overview: Many people use short message service (SMS) text messages on their cell phones. Can send longer messages. Services such as Eco Farmer and Esoko use SMS technology to deliver current market prices, weather forecasts and extension messages across Africa. Smartphones have special direct messaging apps such as WhatsApp and Messenger.

Elements required: Cell phone and app.

Cost involved: Small cost per message sent. No cost to send the message in WhatsApp and Messenger beyond data costs.

Advantages: During emergency times such as flood and drought, direct messaging is very useful. It raises awareness or reminds farmers to attend events.

Disadvantages: Some target audiences or members may not have mobile phones. Difficult to cover every audience.

Best practice guidelines: It is important to send a message at the right time. Talk to your farmers and find out what works best for them. Avoid sending long text messages because they are difficult to read.

Monitoring and evaluation: Promote an event using direct messages and see how many people attend your event.

Mobile Apps

Overview: Mobile apps aim to improve farming production for crops and livestock and link farmers to advisors in their local area.

Elements required: Cell phone with access to internet.

Cost involved: Most apps are either free or cheap, though some complex ones have monthly subscription fees.

Advantages: Apps are becoming more and more common as more people get access to smartphones.

They are usually easy to use and can include text, photos, and videos to spread information.

Disadvantages: Some people in target audience may not have cell phones.

Best practice guidelines: Apps need to be updated by the developers to make sure they are compatible with the latest phones and software updates.

Monitoring and evaluation: App development platforms can usually gather usage data so you can determine who uses the app and how often they do so.

Short Videos

Overview: Videos can raise awareness, educate, and change behavior. They are particularly useful to share your message with a geographically dispersed audience. The format of videos can range from simple voice-overs of PowerPoint presentations to explanatory videos using animation (such as Powtoon) or a presenter discussing a topic with cutaway shots.

Elements required: Expensive video cameras. Sophisticated microphones, lighting, and tripod stand.

Cost involved: If you hire a video production company to create your video, it will usually be very expensive, but the result will look good. If you do it yourself, it will cost far less, but it may not look quite as good.

Advantages: Videos can be watched and easily understood by those with low literacy skills. They can be watched repeatedly if the concepts are difficult to grasp. Videos can save you from repeating the same message over and over again to different people. You could ask your farmers to watch the video first when they have time and then visit them to discuss it further.

Disadvantages: While not everyone has the equipment to create and watch videos, the price is steadily declining, so that may improve the situation soon. If your video relies on footage of a seasonal activity, such as a crop fruiting, you may have to wait for that to happen to capture it on video.

Best practice guidelines: Involve farmers in designing and scripting the video. Create a storyboard. Script the storyboard. Keep videos short. Use common language.

Monitoring and evaluation: When you upload your video to your platform, such as YouTube, you can monitor the number of unique views and the average amount of the video that is viewed before the video is stopped. You can survey the audience members after they have watched the video to determine what they learned and if they plan to change their farming practices as a result.

Podcasts

Overview: Podcasts are audio recordings that can be downloaded to a smartphone or other device to be listened to later.

Elements required: Smartphone, pocket casts, digital audio recorder, microphone, audacity.

Cost involved: Subscribing to a podcast is usually free. To broadcast a podcast, you may need to subscribe to a podcast hosting site such as Pod bean.

Advantages: Podcasts can be listened to and understood by those with low literacy skills. They can be listened to repeatedly if the concepts are difficult to grasp. They can save you from repeating the same message over and over again to different people. You could ask your farmers to listen to your podcast first when they have time and then visit them to discuss it further. Podcasts are simpler and cheaper to create than videos. It is relatively easy to allow a group of up to 50 people to listen to a podcast by setting up an MP3 player connected to an external speaker.

Disadvantages: Not everyone has the equipment to create and listen to podcasts. However, the price is steadily declining, so that should improve the situation soon.

Best practice guidelines: Audio quality is very important. Create an outline. Involve farmers.

Monitoring and evaluation: When you upload your podcast to the hosting site, you can monitor the number of people who have downloaded each episode. You could also survey your target audience after they have listened to your podcast to determine what they learned and if they plan to change their farming practices as a result. Not everyone has the equipment to create and listen to podcasts.

Blogs

Overview: Blogs are specialized websites that publish articles and allow readers to leave comments. This allows a two-way interaction and discussion about the topic.

Elements required: Smartphone or computer devices with access to the internet.

Cost involved: Reading blogs is usually free.

Advantages: Blogs share thoughts and ideas with the world, enable two-way conversation with your readers, and allow a rich collection of information about certain topics to build over time. Blogs are easier and quicker to create than videos or podcasts.

Disadvantages: Not everyone has the equipment to create or read blogs.

Best practice guidelines: Use short, simple sentences, and communicate your message clearly. Encourage readers to respond by including a question toward the end of your blog post.

Monitoring and evaluation: A blog platform usually records the number of views and downloads for each blog post, so you can track your performance.

Online Document Collaboration

Overview: People can collaborate online with anyone virtually anywhere in the world. This has led to increased use of online tools for collaborative writing, such as Google Docs and Office 365. These programs allow multiple people to work on the same document at the same time. They are generally accessed through a web browser on your computer but are also accessible through apps on your cell phone or tablet.

Elements required: Anyone with a computer able to browse the internet or a cell phone with internet connectivity can collaborate online.

Cost involved: There is no cost to use Google Docs, but there is a small monthly charge to use Office 365. There is the cost for the data used to access the online document.

Advantages: Online collaboration lets you work on the same document with people anywhere else in the world. You can see the changes that have been made and who made them. This is more efficient than emailing one document back and forth among collaborators.

Disadvantages: Not everyone has access to a computer or cell phone, which limits whom you can collaborate with.

Best practice guidelines: With Google Docs, you can dictate your material and its voice recognition converts words to text, which is helpful for users with low literacy levels or who have trouble typing.

Monitoring and evaluation: The number of online documents created in each stage of evaluation will help you judge the effectiveness of the technology.

E – Surveys

Overview: Instead of using a word processor or typewriter to type and format your survey, you can use an online survey program (such as Survey Monkey or Google Forms) to do it much more easily.

Elements required: Computer connected to the internet can create and use e-surveys.

Cost involved: Google Forms is free; Survey Monkey has a free option limited to ten questions and 40 responses per survey. If you need more functions, you need to purchase a paid plan.

Advantages: An e-survey reduces the time it takes to create and distribute a survey from over six weeks to just six days. Online surveys are a quick and easy way to receive feedback or other information.

Disadvantages: Not everyone has access to a computer or cell phone, or the required literacy skills, which limits the people you could use this with.

Best practice guidelines: Start with questions that are easy to answer, such as multiple choice, and progress to more difficult questions, such as open- ended questions. Avoid questions with yes/no answers and use rating scales of five or seven units, These provide feedback that is more meaningful. It is a good idea to send a follow- up reminder about a week after sending the initial request to participate.

Monitoring and evaluation: To evaluate the effectiveness of your online surveys, consider the response rate.

E - Bulletin

Overview: Instead of producing physical newsletters and brochures, people are increasingly using e-bulletins, which are like newspapers, e-leaflets, digital news journals, and digital magazines. E-bulletins can be created by sending an email to the subscribers.

Elements required: You will need a computer with a web browser able to access the internet.

Cost involved: Free prepaid plan allows you to send your message to up to 2,000 recipients and up to 10,000 messages per month. If you need to exceed those limits or access more functions, upgrade to a paid plan.

Advantages: E-bulletins allow you to focus on creating good content. Your contacts can subscribe and leave your list on their own, so you do not need to spend time managing the list.

In-built analytics show you how many people opened your message, and which links they clicked on. There are many template designs to choose from, and you can customize them with your branding (such as your logo and colors). You can divide your audience into smaller groups and send customized messages to each group according to their interests.

Disadvantages: Preparing an e-bulletin is a tedious process, and not everyone is familiar with preparing e-bulletins.

Best practice guidelines: It is a good idea to use a double opt-in process, where the potential subscribers receive an email with a link to confirm that they do want to subscribe to an e-bulletin.

Monitoring and evaluation: The e-bulletin software automatically monitors the delivery of your messages, providing statistics about the open rate and links clicked.

5.3 ICT Skills and Competencies for Extension Work

ICTs play a critical role in facilitating rapid, efficient, and cost-effective knowledge transfer, information management, and communication to the farming community. Muriithi et al. (2009) stated that ICTs have provided humans with a possible pathway of access to agricultural information. A World Bank report on ICTs for development indicated that connectivity, whether through the internet or mobile phones, is increasingly bringing market information, financial services, and health services to remote areas, and is helping to change people's lives in unprecedented ways (World Bank, 2009). ICTs and mobile-enabled agricultural services act as instruments to deliver extension services and help to create awareness among farmers (Mittal et al., 2010). ICTs have shown potential to improve extension and advisory services. Because of the changing nature of our fast developing world, extension professionals will need to be competent in ICT tools such as website development, direct customer assistance technologies (such as use of voice-over-IP), electronic management of science-based information, technical applications (such as geographical information system and nanotechnology), and delivery of research-based extension information and educational programming through such means as e-extension, distance learning, and internet.. For extension to be effective there will be a need to educate the users -- including the managers and the public -- on how to use technology and the World Wide Web (Hamernik and Crosby, 2015). Computer literacy is a stepping-stone to efficient and effective use of ICT tools. The changing nature of agricultural extension practice in our changing world demands that extension workers acquire computer skills so they can use the internet freely, check and send emails and google for recent developments, make presentations using Power Point, explain information received, and exchange information, among others (Godson Ibeji et al., 2020).

The term "ICT skills" describes the abilities required to effectively use the ICT components listed above.

Major ICT Skills

- The ability to switch on a computer, log in, and connect to the appropriate platforms and programs.
- Using ICT hardware to scan, print, and copy documents.
- Using a digital camera to capture photographs or video footage.
- Editing images using computer software (such as Adobe Photoshop).
- Using popular software packages, such as Microsoft Office, to create, edit, and save documents.
- Using a search engine (such as Google or Bing) to find information.
- Browsing and posting on social media accounts (such as Facebook, Twitter [X], or LinkedIn).
- Using computers and the internet safely. For example, keeping personal information private, and avoiding viruses, identity theft, and other online threats.
- Having a working knowledge of the languages used in coding and programming, such as HTML, CSS, and JavaScript.
- Sending and receiving information using data-sharing applications and cloud storage systems; for example, Google Drive or Dropbox.

Other ICT Skills

In this digital era, extension officials also require the following skills and competencies for effective facilitation of transfer of technology:

- Social media management.
- Online collaboration.
- Data management and queries.
- Desktop publishing.
- Word processing.

A. Social Media Management

Some jobs require you to use social media. The more you know about the benefits and limits to social media, the more you can use it in valuable ways at work. Social media management is the ongoing process of creating and scheduling content designed to grow and nurture an audience across social media platforms. This includes:

- Social media content strategy.
- Online reputation management.

- Community management and programming.
- Paid social media strategy and execution.
- Team member management and development.

The following social media platforms will be very effective for transfer of technology:

- Facebook.
- LinkedIn.
- YouTube.
- Twitter (X).
- Reddit.
- Social media groups.

B. Online Collaboration

Online collaboration is a broad category that refers to any means of sharing information with your co-workers (or supervisors or clients) online. This includes adding a meeting to a shared online calendar, providing feedback on a document through a web-based document application, and holding an online video conference with colleagues using:

- Video conferencing software.
- Skype.
- GoToMeeting.
- Instant messaging.
- Google Docs.
- File sharing.
- Drop Box Pro
- Slack.
- Zoom.

C. Data Management and Queries

From researchers to administrative assistants to teachers, almost everyone needs to be able to develop and manage data using spreadsheets. Furthermore, they have to be able to analyze that data and recognize trends and patterns. Fluency in programs such as Microsoft Excel is critical in today's job market. Other tools include:

- Filters.
- SQL.
- NoSQL.
- MySQL.
- Quantitative analysis.

D. Desktop Publishing

Desktop publishing involves the creation of materials that need to be printed and distributed, such as fliers, brochures, and newsletters. Because you can create so much using desktop publishing software, many jobs require you to have some basic skills in this field. People with a creative, artistic eye might be particularly good at desktop publishing, but anyone can get better with practice using:

- MS Publisher.
- MS PowerPoint.
- MS Word.
- Printer settings.
- Adobe Creative Suite.
- QuarkXPress.

E. Word Processing

In this day and age, it is expected that job candidates know how to use word processing technology. Candidates need to be able to type on a keyboard, take notes, transcribe interviews, produce written documents (including business letters, meeting minutes, reports, etc.) using a computer processor and programs such as:

- MS Word.
- Libre Office Writer.

5.4   Social Media in Agricultural Extension

Social media, the most recent form of digital communication, are present on a global scale, and we can love it, we can hate it, but we cannot ignore it anymore. The millennials have made social media an inseparable part of their lives that connects them with the rest of the world. Accessing news through social media by using mobile devices is also gaining popularity (Italie, 2015). Merriam-Webster (2015) defines social media as forms of electronic communication through which users can create online communities to share information, ideas, personal messages, and other content. Social media are web-based tools of electronic communication that allow users to interact, create, share, retrieve, and exchange information and ideas in any form (i.e., text, pictures, video, etc.) that can be discussed, archived, and used by anyone in virtual communities and networks.

Mobile internet and smart phone penetration have gone up significantly in rural areas, accounting for half of all internet users by 2020 (Jain and Sanghi, 2016). Localized and focused information communication technologies (ICTs) use can help farmers to improve productivity and double their income (Wani et al., 2017). WhatsApp, a leading smartphone application, is rapidly gaining popularity among Indians, particularly in remote areas. It has been suggested that agricultural and allied development agencies use it to expand the scope and reach of agricultural extension. It provides a flexible method of communication, in terms of both time and location.

Types of Social Media

- Blogs, micro blogs (Twitter [X]).
- Conversational threads, social photos, social networking (Facebook, LinkedIn).
- Video sharing (YouTube).

Types of Social Media Users

a) **Versatile user** (updated profile, sends public and private messages, shares links, and comments on discussion threads, mostly in social media for professional activities).

b) **Expert communicator** (logs in several times a day, actively engaged in all social media/networking activities, stays updated and interacts very frequently both professionally and personally).

c) **Introvert** (Only updates profile and mostly communicates through private messages).

d) **Novel user** (updates profile, actively seeks out information, spends time tagging photos, logs in between 1 and 5 hours a week).

Types of Social Media Platforms

The various types of social media platforms with examples and their description are summarized in Table 5.3

Table 5.3: Types of Social Media Platforms

Type of platform	Examples	Description
Social networking sites	Facebook, Google+	Users create personal profiles & networks with friends, colleagues, and peers.
Blogs and vlogs	Blogger, Word press	Mostly personal web logs but are increasingly being used by corporate houses to reach their clients. Media richness is high in blogs but not so much in vlogs.
Micro-blogs	Twitter (X), Insta-gram	Similar to blogs but have character restriction (140 for Twitter). They allow users to create and share content.
Collaborative projects	Wikis	Joint and simultaneous content creation by users.
Social bookmarking	Delicious, Blink list	Group- based collection, rating, and sharing of internet links and media content. Low media richness.
Virtual social worlds	Second Life	Users are generally in their 3D avatars and interact in a virtual environment.
Social gaming	World of Warcraft, Farm book	Similar to virtual social worlds, with high social presence and media richness.

Content communities	Video (YouTube, Vimeo, Vine). Photo (Instagram, Flicker, Tumbler). Audio (Sound cloud, podcasts). MS Office docs, PDF, PT (Slide share).	Mostly formed to share specific types of content easily among many users.
Forums, discussion boards, and groups	Google Hangout, Blackboard, discussion groups (D groups).	Content creation and sharing among users with specific interests or activities is easy.
Socially integrated messaging platforms	WhatsApp, Facebook, Messenger, Snapchat.	Highly popular because of group messaging options and high media richness. Users can create and share any form of content in groups or to individuals.
Professional networking	Research Gate, Academia.edu, LinkedIn.	Specifically for professional networking, these platforms increase the scope for scientific discussions among peers and experts in specific fields.
Social news	Reddit, Propeller, Digg	News item sharing platforms where users can comment on the posts.

Purposes of Social Media

- Find out about news and events.
- Share information.
- Exchange knowledge.
- Share professional activities.
- Connect with friends and relatives.
- Discuss new events related to profession.

Characteristics of Social Media

- Providing useful content.
- Instant communication.
- Users can easily share and post news content on their networks in real time.
- Clusters of like-minded individuals can easily swap ideas and scrutinize data on public matters.

Use of Social Media in Agriculture

1. Networking (farmer to farmer) via social media platforms:

- Reduce social isolation of farmers and enable direct interaction with people of influence.
- Enable farmers and agribusinesses to meet and network with other farmers, agribusinesses, and consumers domestically and globally.
- Provide users with a wealth of knowledge and ideas from a range of sources.
- The AgChat model (Twitter online discussion group), which is widely used in the USA, the UK, Australia, and Ireland, is a great concept for facilitating discussions of industry issues between farmers and agribusinesses.

2. Industry knowledge, extension, and marketing (farmers to the agricultural industry)

- Marketing using social platforms.
- Lobbying on social media brings together a collective voice to bring about action and change by interacting directly with people of influence and power.
- Extension messages and knowledge of agricultural practices may reach a wide audience through social media tools.

3. Consumer engagement (farmer/industry to consumer)

- Connecting and engaging with consumers is becoming more important as consumers increasingly are using social platforms to make purchasing decisions.
- Allows farmers and the agricultural industry to better understand consumer needs and viewpoints.
- Being transparent and authentic helps build trust.

Merits and Demerits of Social Media

Merits

- Providing vast knowledge to social media users.
- Social media allows anyone to create/publish information.
- Social media encourage creation of user-generated content.
- Ideas can be posted to a large number of users beyond physical boundaries.
- A knowledge pool is created with a large number of participants in real time.
- Social media initiate and support discussions among global and local peers.
- Social media ensure better feedback than conventional modes of communication.
- A large number of interactive media makes communication through social media interesting.

Demerits

- Social media are not suitable for in-depth scientific discussion.
- In social media, impractical ideas may gain popularity, thus creating noise in the process of communication.

- Social media cannot be practically applied in agricultural extension.
- Discussions in social media can easily lose focus and divert from the main topic under discussion.

Challenges and Opportunities of Social Media

- Ensuring participation.
- Quality control and monitoring of posts.
- Internet and IT infrastructure issues.
- Satisfying heterogeneous users.
- Institutionalizing social media.
- Continuous engagement.
- Skilled human resource to maintain social media interactions.
- Lack of capacity for tools and analytics that help monitor and assess the value of information.
- Creating awareness about social media's potential at the organizational level.
- Allocating time to update content.
- Encouraging stakeholders to access resources through social media links.

Social Media Pages for Agriculture

Social media pages with examples and their description are summarized in Table 5.4.

Table 5.4: Social Media Pages

Social Media	Weblink	Description
Facebook page: Turmeric farmers	https://www.facebook.com/turmeric.farmers	Turmeric farmers created this page to stabilize the price of turmeric. Farmers connect through the page and share information to keep the turmeric price stable and increase turmeric-marketing opportunities.
Twitter: AgChat	https://twitter.com/agchat	The AgChat (Twitter online discussion group by the AgChat Foundation), started in 2009 by a group of American farmers, is widely used in the USA, the UK, Australia, New Zealand, and Ireland for facilitating discussions of industry issues between farmers and agribusinesses.
WhatsApp group		WhatsApp, a leading smartphone application, is rapidly gaining popularity among Indians, particularly in remote areas.

Instagram: agrigoi	https://www. instagram.com/ agrigoi/?hl=en	This is the official Instagram account of the Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India.
Blog: TNAU Agritech Portal	https://agritech. tnau.ac.in/	A unique initiative by the TNAU, the blogs in TNAU Agritech portal are one of the earliest examples of social media use and impact on the farming community.
		The blogs are by farmers mostly, but contributions from extension professionals are also there.
		Blogs cover a varied range of agricultural issues in Tamil Nadu and are available in both English and the Tamil language.
YouTube: TNAU TV	https://www.you-tube.com/channel/ UCKlCAGokck4y-U1sf-RviTvQ/fea-tured	• Started on 01.04.1987. • Production of video films and modules in agriculture and allied subjects with telecast quality. • Video programs for telecast through Doordharshan Kendra, Chennai. • Agricultural technology videos on TNAU TV YouTube Channel. • Distribution of video modules to the developmental departments and farmers at subsidized cost. • Production of video program for govt. of India, state government, NGOs, and private agencies on cost basis. • Documentation of farmers' success stories. • Dissemination of video on agro- technology through social media. • Video recording of university activities / functions / workshops, etc. • Showcasing technology videos in farmer's exhibition.

Agricultural stakeholders need to take personal initiative to use social media as part of their job within the norms of institutional guidelines. Engagement at the individual level is needed to widen influence, carry out fruitful discussions, and encourage rural communities to get involved.

Encouraging farmers, agripreneurs, and agribusinesses to directly connect with consumers through social media can raise awareness about agriculture among the public and increase their income. Communities of extensionists and professionals can promote faster translation of research findings into practical application by sharing results through social media. The awareness campaigns on social media uses increase the social media technical literacy among farmers.

5.5 Extension Using New Media Tools

5.5.1 Role of Technology in Agriculture

Technology plays a vital role in farming and agriculture. The application of technology in agriculture has grown rapidly over the past few years, making farming operations more efficient, productive, and as profitable as possible. "Precision agriculture" and "digital farming" are two common terms that we hear in the light of the technological boom of agriculture. Precision agriculture (PA) is the application of technologies and principles to manage spatial and temporal variability associated with all aspects of agricultural production for improving crop performance and environmental quality (Pierce and Nowak, 1999). PA uses satellite navigation systems or terrestrial systems for geographic information and sensors located in the plot. These systems collect vital information to be used to make decisions with greater precision and to optimize crop yields. Thus, PA contributes to a more efficient and ecological agriculture (Cambra Baseca et al., 2019). "Digital farming" is the consistent application of the methods of precision agriculture and smart farming, internal and external networking of the farm, and use of web-based data platforms together with "Big Data". Increasingly, both computer and mobile applications have been incorporated in the agricultural domain to enhance agricultural productivity.

5.5.2 Computers in Agricultural Extension

A computer is an advanced electronic device for storing and processing data, typically in binary form according to instructions given to it in a variable program. The basic components of a modern digital computer are input device, output device, central processor unit (CPU), mass storage device, and memory.

Application of computers among agro-meteorologists, agronomists, and other agricultural professionals has risen rapidly in the past decade. Early on, computers were used in agricultural research for the conversion of statistical formulae or complex models in digital form for easy and accurate calculations that were tedious and time consuming to do manually. In the next generation, the same computers have been used for mechanization and automation of agriculture and to develop decision support systems for agricultural production and protection research. The applicability of computers is also known as digital farming. In this, we use advanced technologies to enhance crop yields, scale down costs, and boost productivity.

Examples of Computer Applications in Agriculture

Digitalization of Land Records

Digitization of land records, maintenance of land records, and the availability of easily accessible land information make up one of the most important issues facing governance today. "Land records" can

include the register of land ownership, records of rights (RoRs), tenancy and crop inspection register, mutation register, disputed cases register, etc., along with geological information regarding the shape, size, soil type, and economic information related to irrigation and crops. Thus, the computerization of land records (CLR) is necessary with a view to ensure efficient, accurate transparency in delivery mechanism, and conflict resolution in ownership.

Agricultural Commodity Trading

The government of India in 2003-04 initiated major steps toward introduction of futures trading in commodities, which included removal of the prohibition on futures trading in all the commodities by issue of a notification, and setting up national- level commodity exchanges, such as the National Commodity and Derivatives Exchange Limited (NCDEX), the Multi Commodity Exchange of India Limited, and the National Multi Commodity Exchange of India Limited (NMCE).

Information Dissemination

m – Kisan – SMS Based Farm

Through m-Kisan, a farmer can get a preferred advisory on his mobile through SMS. Experts can register and send advisory messages to farmers at www.mkisan.gov.in. The messages are sent in the local language.

Kisan Call Centres (KCC)

To harness the potential of ICTs in agriculture, the Ministry of Agriculture launched Kisan Call Centres (KCCs) on January 21, 2004, aimed at answering farmers' queries on a telephone call in farmers' own dialects. Fourteen call centres cover all the states and Union Territories and provide agriculture-related information to the farming community through toll- free telephone lines. One country- wide 11-digit number is accessible through all mobile phones and landlines of all telecom networks, including private service providers. Replies to the farmers' queries are given in 22 local languages.

Farm Advisory Through Mobiles

Green SIM

This program, implemented by IFFCO Kinas Sanchar Limited (IKSL), delivers up to four free voice messages on areas of interest and offers a helpline service managed by experts, phone-in programs, and mobile-based quizzes. IKSL is covering 108 zones in 19 states and 108 zones in those states, and it has a subscriber base of 11 lakhs. IKSL provides messages through both push- and pull-based approaches. The messages are delivered daily in regional languages and have content in 16 categories: agriculture, horticulture, animal husbandry, floriculture, poultry, irrigation, fertilizers, insurance, banking, rural health, government schemes, market prices, sericulture, employment opportunities, human health, and cooperatives. To increase the access to information, IKSL has an online portal (voice, text, and images) that can be accessed by anyone anytime and even on a mobile app. Users can customize the app to their needs and receive information in their preferred language.

i-Kisan

A Nagarjuna Group initiative, Ikisan.com is a comprehensive agri-portal addressing the information, knowledge, and business requirements of various players in the agricultural arena: farmers, trade channel partners, and agricultural input/ output companies. Leveraging information technology and extensive field presence, i-kisan is an information/ knowledge exchange and e-marketplace.

e-Sagu

e-Sagu is a web-based personalized agro- advisory system that uses information technology (digital photo- based) to help farmers adopt improved scientific management practices in agriculture. In e-Sagu, rather than visiting the crop in person, the agricultural expert delivers the expert advice at regular intervals (once in one or two weeks) to each farm after getting the crop status in the form of digital photographs and other information.

'e-Velanmai' (Electronic Agriculture)

'e-Velanmai' (electronic-agriculture) is a combination of personal and ICT- based, demand- driven, and participatory technology transfer model in agriculture that provides timely advisory services by agricultural experts to farmers using ICT tools through a field coordinator on a need basis (Karthikeyan, 2012).

e-Velanmai- FCMS app

An Android app for performing extension advisory services was created and integrated with the Farm Crop Management System (FCMS) software of the Department of Agriculture. The e-Velanmai-FCMS app can be loaded in any mobile/ tablet with an Android platform. Using the application, extension officers effectively provided extension advisory services to the farmers in Tamil Nadu. This extension approach was found to be reliable and valid for disseminating cost-effective and timely advisory services to farmers over mobile phones in the form of SMS advice followed up by extension personnel (BTM/ATM) to clarify and guide the technology adoption process.

Facebook for Farmers and Extension Workers

The social media platform Facebook is being effectively used in Kerala for reaching out to farmers and extension workers. Based on the success of using Facebook by the Vattamkulam Krishi Bhavan (Malappuram District, Kerala), the government of Kerala has decided to officially include Facebook as an important tool to strengthen the extension activities of the Department of Agriculture. The state agriculture department has urged all the officials under it to extend the activities of the department through the social media platform to enhance the productivity and profitability of farming. Each farmer registered with the department will have to maintain a social media account to be in touch with the local Krishi Bhavan. The government has mandated that all agricultural officers should have active Facebook accounts.

Advanced Application of Computers in Agriculture (Computer Vision)

The agriculture sector is one of the most important industries in the world because it is the source of our food. As digital technologies revolutionize every industry, agriculture is no exception. Like every other sector, the agriculture sector also faces various challenges, including climate change, labor shortages, and the disruptions created by the COVID pandemic.

Digital technologies such as computer vision can help the agricultural sector overcome these challenges and achieve efficiency, resiliency, and sustainability.

This chapter explores five-computer vision use cases that can help agriculture tackle current challenges and excel in the future.

1. Crop monitoring with Drones

Drone technology is being extensively used in the agriculture sector to overcome labor shortages and improve efficiency.

In precision agriculture crop monitoring, drones are equipped with a high-definition camera that is enabled with computer vision and geothermal technology to:

- Detect crop condition and health.
- Monitor soil condition, including soil moisture availability, nutrient availability, soil texture, soil structure, and other physio- chemical properties of soil.
- Map the farmland according to the crop area.
- Detect abnormalities.

These drones can be highly efficient and can cover a large area much faster and more accurately than human monitoring. Drones enabled with computer vision can be expensive, however. Therefore, it is important for farmers to study the business, short/long-term expectations, and potential return on investment before purchasing such technologies.

2. Crop Sorting and Grading

Computer vision-enabled machines are being extensively used in sorting and grading the harvest. These jobs involve repetitive and time-consuming tasks, so automating them can offer improved efficiency and speed. Through machine, vision systems, crops of various types can be identified and sorted based on order requirements. For example, some orders require large potatoes, and some require medium-sized ones. A machine vision system can do this in a fraction of the time it would take human sorters. Machine vision systems can also sort products based on perishability to identify which batch to ship first and which ones to ship later. Computer vision systems are also used in counting fruits and vegetables.

3. Pesticide Spraying with Drones

Spraying pesticides on crops is a common practice to protect plants from pests and diseases. This can be a time-consuming process, and pesticides, if inhaled can be harmful to the farmer's health.

Automated drones can perform this task with higher precision and speed than human applicators can. Drones with spray guns and cameras enabled with computer vision can identify areas that need pesticide and spray accordingly in required amounts.

4. Computer Vision Phenotyping

"Phenotyping" refers to measuring and analyzing plant characteristics for research purposes. Information is gathered to learn how plants grow, what environment is best for specific plants, and provide insight into plant genetics. In the past, it was done manually, but now it is performed through AI and computer vision. As climate change threatens the agricultural sector, computer vision-enabled phenotyping enables breeders to learn more about plants to make them more resilient to the changing weather. It also helps farmers in finding the crop that would be most successful and sustainable in a particular location.

5. Livestock Farming

Artificial intelligence is being widely used in livestock farming. The investment in AI is projected to significantly increase by 2026, and computer vision accounts for the largest chunk of that market.

Computer vision technology combined with Internet of Things (IoT) can provide the following benefits for precision livestock farming:

- Monitor the health of all livestock, including cattle, livestock, sheep, pigs, and poultry.
- Examine the health of the livestock with high- definition cameras.
- Monitor the food supply for the livestock.
- Detect abnormal behaviour of the livestock.
- Count livestock with drones.
- Send real-time information to the farmers for planning and decision-making.

5.5.3 Mobile Applications in Agricultural Extension

Mobile applications for agriculture are increasingly being used to help farmers manage their farms more efficiently. Uses include crop management, irrigation management, livestock management, accessing market information, and farm accounting.

Crop Management

Mobile applications in agriculture assist farmers in crop management by providing information on soil quality, weather patterns, and pest control measures. Some apps even use machine-learning algorithms to predict crop yield and suggest ways to improve it.

Irrigation Management

Mobile apps also provide real-time data on soil moisture levels and weather conditions, which helps farmers, improve their irrigation systems. In addition, it helps farmers reduce water usage and ensure that their crops are getting the right amount of water.

Livestock Management

With agriculture mobile apps, farmers can also manage their livestock by getting information on feeding schedules, health care, and breeding. Some apps even use GPS technology to track the location of animals in real time.

Market Information

Mobile apps can provide farmers with up-to-date market information on commodity prices, demand, and supply. This can help farmers make informed decisions about when to sell their crops or livestock.

Farm Accounting

One of the most significant features of the farming apps is farm accounting, which helps farmers keep track of their financial data, such as income and expenses. This can help farmers manage their finances more effectively and make better decisions about investments and expenses.

Overall, with the right use of mobile apps in agriculture, farmers can improve their productivity and profitability by gaining quick access to critical information.

Examples

1. A. I. in Goats – Central Institute for Research on Goat (ICAR-CIRG)

Artificial insemination is widely used in large ruminants, but it is not very common in small ruminants. Nowadays stakeholders are showing great interest in this technology for small ruminants. Through this technology, genetic improvement as well as breed conservation can be done at a faster rate.

https://play.google.com/store/apps/details?id=com.goat_incimation

2. Agriculture Machinery Rent Calculator – ICAR RCER, Patna

This app will help farmers to decide the optimum rent value of their agricultural machines -- i.e., at what rate they should rent their machines. The app provides rental value individually for most of the machines as well as machine attached with, If they input details such as the cost of the machine, fuel consumption, fuel price, etc., they get better results than if they rely on the default values provided by the app. See https://play.google.com/store/apps/details?id=appinventor.ai_rajdhandevwebsoft1.Agricultural_Machinery_Rent_Calculator_App_Inventor1

3. Ikshu Kedar – IISR, Lucknow

Using this app enables sugarcane growers to avoid unnecessary irrigation. This app is designed with the weather of North Indian states and the general conditions of sugarcane farming in mind. Its use is not recommended in special situations such as saline or alkaline soil, waterlogged areas, and areas with very heavy or loamy soil. Important suggestions for irrigation date compliance must be noted.

https://play.google.com/store/apps/details?id=in.gov.icar.iisr.irrigationmanagementinsugarcane

4. Farm Tree – ICAR-CAFRI, Jhansi

The Farm Tree mobile app provides farmers with a user-friendly, bilingual, e-platform with basic information on 20 commonly grown, promising agroforestry tree species, giving common name, botanical

name, family, potential area, silvicultural requirements, nursery techniques, planting techniques, tending operations, suitable agroforestry systems, tree protection, yield, utilization and material availability.

Farm Tree provides appropriate content supported by beautiful original photographs, making it useful for forestry professionals, naturalists, Forest Department personnel, students, and farmers.

https://play.google.com/store/apps/details?id=com.cafri.farmtree&hl=en_IN

5. OrchidoPedia – ICAR- National Research Centre for Orchids

The Director of ICAR-NRCO and his team developed the OrchidoPedia Android application, an offline app that covers 56 genera and 172 species of native orchids of the North East regions of India. Right now, this application is in English.

https://play.google.com/store/apps/details?id=nrco.orchidopedia

6. CTRI – FCV TOBACCO

The Indian Council of Agricultural Research (ICAR)-Central Tobacco Research Institute, established in 1947, has developed a mobile app to provide technological support to growers to improve the yield and quality of Flue Cured Virginia (FCV) tobacco.

https://play.google.com/store/apps/details?id=com.icar.ctri

7. M-Velanmai – TNAU

The M-Velanmaï app is an interactive, demand- driven, and personalized Android mobile- based extension advisory system for accessing appropriate and timely technological information / decision support in agriculture and allied enterprises by the farmers of Tamil Nadu. from experts.

8. Fertilizer Calculator – ICAR-CCARI, Goa

This completely offline soil test-based fertilizer recommender (STFR) app for Android enables growers to get calculations according to the area of farm or the number of plants/trees. It is specially customized for Goan farms.

https://play.google.com/store/apps/details?id=in.res.ccari.fertilizerrec.goa

9. Fodder Kannada – Jayalaxmi Agro Tech

This app, designed exclusively for livestock farmers, can work without internet after downloading to your mobile device. It provides extensive information about fodder, from varieties, suitable soil and weather, and fertilizer required to cultivation practices, nutrition content, harvesting, and yield, all in Kannada language with visuals support.

https://play.google.com/store/apps/details?id=com.agri.fodder

10. Oil Palm Cultivation – Mobile Seva

This app provides information on climatic requirements for oil palm cultivation in India: cultivated varieties, planting season, planting, population, spacing requirements, cultural practices, management of oil palm plantations during juvenile period, and adult plantations.

https://play.google.com/store/apps/details?id=com.cdac.CultivationPractices

11. RKMP Rice Vocs – Mobile Seva

 This compendium of rice- related vocabulary includes about 2500 terms arranged alphabetically. The intended audience is extension professionals and other stakeholders.https://play.google.com/store/apps/details?id=cdac.ricevoc.in

5.5.4 Artificial Intelligence

Artificial intelligence (AI) is making a huge impact in all domains, including agriculture. Every industry is looking to automate certain jobs with intelligent machinery. Using artificial intelligence, we can develop smart farming practices to minimize loss of farmers and provide them with high yields. Using artificial intelligence platforms, one can gather large amounts of data from government and public websites. Real- time monitoring of various data is also possible by using IoT (Internet of Things). Data can then be analyzed with accuracy to enable farmers to address the uncertain issues they face. By the end of 2050, the UN projects that two-thirds of the world's population will live in urban areas. As the rural workforce shrinks, new technologies will be needed to ease the workload on the remaining farmers. Operations will be done remotely, processes will be automated, risks will be identified, and issues solved. In the future, a farmer's skills will increasingly be a mix of technology and biology skills rather than purely agricultural.

Importance of Artificial Intelligence in Agriculture

Artificial intelligence can be applied across disciplines, and it can bring a paradigm shift in how we see farming today. AI-powered solutions will not only enable farmers to do more with less -- it will also improve quality and ensure faster go-to-market for crops. Today's technology advancements in artificial intelligence, big data, and IoT are becoming the major drivers for digital IT solutions in almost all fields and business sectors. In agriculture, it is proposed to make use of digital solution aided by artificial intelligence to provide new opportunities for farmers, businesses, and agricultural entrepreneurs by enabling smart farm as a service.

Applications of Artificial Intelligence in Agriculture

The agriculture industry is turning to artificial intelligence technologies to help grow healthier crops, control pests, monitor soil and growing conditions, organize data for farmers, help with the workload, and improve a wide range of agriculture-related tasks in the entire food supply chain.

Use of Weather Forecasting

With the change in climatic conditions and increasing pollution, it is difficult for farmers to determine the right time for sowing seed. With the help of artificial intelligence, farmers can analyze weather conditions and use weather forecasting to plan the types of crops to grow and when to sow the seeds.

Soil and Crop Health Monitoring System

The type of soil and nutrition of soil play an important role in crop selection and quality. Because of increasing deforestation, soil quality is degrading, and it is hard to determine the quality of

the soil. A German-based tech start-up, PEAT, has developed an AI-based application called Plantix that can identify the nutrient deficiencies in soil, along with plant pests and diseases. This app uses image recognition-based technology. Farmers can capture and share images of plants using smartphones, and view short videos with soil restoration techniques, tips, and other solutions. Similarly, Trace Genomics, another machine learning-based company, helps farmers to do a soil analysis and monitor soil and crop health conditions to increase productivity of crops.

Analyzing Crop Health Using Drones

SkySqurrel Technologies has developed drone-based aerial imaging solutions for monitoring crop health. In this technique, the drone captures data from fields and then data is transferred via a USB drive from the drone to a computer and analyzed by experts. This company uses algorithms to analyze the captured images and provide a detailed report on the current health of the farm. By identifying pests and harmful bacteria, it helps farmers make timely use of pest control and other required actions.

Precision Farming and Predictive Analytics

AI use in agriculture has led to applications and tools that provide farmers with guidance in water management, crop rotation, timely harvesting, crop and variety selection, optimum method of planting, optimum time for planting, and pest and nutrition management. While using the machine learning algorithms in connection with images captured by satellites and drones, AI-enabled technologies predict weather conditions, analyze crop sustainability, and evaluate farms for the presence of diseases or pests and poor plant nutrition using data such as temperature, precipitation, wind speed, and solar radiation. Farmers without connectivity can get AI benefits right now with tools as simple as an SMS-enabled phone and the sowing app. Meanwhile, farmers with wi-fi access can use AI applications to get a continually AI-customized plan for their lands. With such IoT- and AI-driven solutions, farmers can meet the world's needs for increased food, sustainable growing production, and revenues without depleting precious natural resources. In the future, AI will help farmers evolve into agricultural technologists, using data to optimize yields down to individual rows of plants.

Agricultural Robotics

AI companies are developing robots that can easily perform multiple tasks in farming fields. This type of robot can control weeds and harvest crops faster than human worker's harvest. They can also check the quality of crops and detect weeds while picking and packing crops.

AI-enabled System to Detect Pests

Pests are one of the worst enemies of farmers' crops. AI systems can compare current satellite images with historical data and detect whether and which type of insect has landed, and send alerts to farmers' smartphones so that farmers can take required pest management actions.

Artificial intelligence in agriculture is helping farmers not only to automate their farming operations but also to shift to precise cultivation for higher crop yields and better quality while using fewer resources. Companies involved in improving machine learning- or artificial intelligence-based products or services such as training data for agriculture, drones, and automated machine making will push technological advancement and provide more useful applications to this sector, thus helping the world deal with food production issues for the growing population.

5.5.5 Expert System

An expert system is defined as an interactive and reliable computer-based decision-making system that uses both facts and heuristics to solve complex decision-making problems. It is considered at the highest level of human intelligence and expertise, and it solves the most complex issues in a specific domain.

The expert system can resolve many issues that generally would require a human expert. It is based on knowledge acquired from an expert. It is also capable of expressing and reasoning about some domain of knowledge. Expert systems were the predecessor of the current day artificial intelligence, deep learning, and machine learning systems.

Capabilities of Expert Systems

Expert systems are capable of:

- Advising.
- Instructing and assisting a human in decision-making.
- Demonstrating.
- Diagnosing.
- Deriving a solution
- Explaining.
- Interpreting input.
- Predicting results.
- Justifying the conclusion.
- Suggesting alternative options to solve a problem.

They are incapable of:

- Substituting for human decision makers.
- Possessing human capabilities.
- Producing accurate output from an inadequate knowledge base.
- Refining their own knowledge.

The applications of expert systems are summarized in Table 5.5.

Table 5.5: Applications of Expert Systems

Application	Uses
Design domain	Camera lens design, automobile design.
Medical domain	Diagnosis systems to deduce cause of disease from observed data, conduct medical operations on humans.
Monitoring systems	Comparing data continuously with observed system or with prescribed behavior such as leakage monitoring in long petroleum pipeline.
Process control systems	Controlling a physical process based on monitoring.
Knowledge domain	Detecting faults in vehicles, computers.
Finance/commerce	Detection of possible fraud, suspicious transactions, stock market trading, airline scheduling, cargo scheduling.

Development of Expert Systems: General Steps

1. Identify problem domain.
2. Design the system.
3. Develop the prototype.
4. Test and refine the prototype.
5. Maintain the system.

Benefits of Expert Systems

- Availability – they are easily available because of mass production of software.
- Affordability Production cost is reasonable. This makes them affordable.
- Speed – They offer great speed. They reduce the amount of work an individual puts in.
- Low error rate – Error rate is low compared frequency of human errors.
- Reducing risk – They can work in environments dangerous to humans.
- Steady response – They work steadily without getting emotional, tense, or fatigued.

5.5.6 M-Velanmai

M-Velanmai (Mobile Agriculture)

This is an AI-based extension system that can provide farmers instant access to decision support in agriculture. Services are intended to be delivered through an Android application that is bilingual and interactive. It was created using machine/deep learning technologies that detect crop damage symptoms instantly and offer technical advisories through voice/text to farmers growing the major crops of Tamil Nadu.

The app is designed to work on both web applications and on Android mobile phones. (Karthikeyan, 2020).

5.5.7 Chatbot

Currently, AI-powered chatbots (virtual assistants) are used in retail, travel, media, and insurance sectors. However, agriculture could also leverage this technology to assist farmers with answers and recommendations on specific problems in their native languages. The chatbot engine is driven with both supervised and reinforced machine learning techniques for continuous and context- sensitive learning. Thereby the chatbot answers to most of the generic queries before it lets to human operator intervention for any queries that are unique in nature. Chatbot promotes remote interaction of the users/farmers to the agriculture environment using natural language processing. We want to build a chatbot that can answer basic queries of farmers and can provide possible information and solutions related to agriculture. The term "chatbot" or "chatterbot" indicates a robot that can talk, and it can be defined as software that simplifies interactions between humans and machines. These interactions can occur through speech or writing in the natural language, through motion sensors, interaction with devices, and in other ways. Humans can easily adapt their language to human-chatbot communication, although there are notable differences in the content and quality of these conversations. People communicate with chatbots for longer periods but with shorter messages compared with human conversation. Human-chatbot communication has impoverished the vocabulary used by humans and increased the occurrence of profanity.

Chatbots can be categorized in two ways:

1. Rules-based, operating by means of specific commands (or keywords), which generally obey well-defined navigation flows and produce targeted conversations.
2. AI-based, making use of more advanced technologies such as machine learning to increase its capacity for dialogue and interaction.

The engine is the most important feature of a chatbot. It is responsible for the transformation of natural language into machine-understandable actions. Chatbot engines are usually developed using several natural language processing and machine learning models to provide acceptable levels of accuracy.

Chatbots can positively affect underserved communities by responding to queries related to agriculture, horticulture, and animal husbandry using natural language technology. Farmers will be able to receive agricultural information as well as localized information such as the current market prices of various crops in the local district and weather forecasts through a messaging app.

Agribot

A farmer can directly message through Agribot and get an answer in his/her language. The farmer can ask any number of questions, anytime. This will in turn speed the spread of modern farming technology. Because the question-answer system in Agribot can answer queries on its own without any human intervention with high accuracy and most local queries are redundant, using Agribot will lead to better utilization of human resources and avoid unnecessary costs in setting up new call

centers. This system can be updated to handle new queries and provides the option for the farmer to ask questions directly to the Kisan Call Centre (KCC) employees if and when necessary. While the system provides a secure communication channel to farmers, it also helps policymakers understand the needs and concerns of the farmers. The data analysis also provides an understanding of which sector of agriculture or in what season farmers require attention.

Agriapp

AgriApp is one of the most popular apps among farmers. It has a rating of 4.3 out of 5 on the Google Play store. This portal brings information about farming resources and government services to farmers through an online mobile application. It also provides a chat option for farmers that enables them to chat with an agricultural expert. However, AgriApp is a knowledge bank wherein the user has to search for a particular piece of information manually. If the user opts to chat with the application operator instead of searching manually, the user has to wait for a significant period for a response from the operator.

FarmChat

FarmChat combined conversational and language technologies to naturally converse with farmers and answer their farming-related queries. The conversational intelligence of the chatbot was informed by analysis of a large corpus of farmers' call center logs and guided by agri-experts who work closely with farmers. The study with farmers in rural areas indicated that it's possible to provide satisfying information support to farmers through chatbot (Sahana et al., 2022).

5.6 ICTs in Extension - Challenges

5.6.1 Challenges in Development of Skills and Competencies in ICTs

The challenges preventing maximum benefit of ICTs being realized can be categorized in three categories: technology, human capacity, and content (Rahman et al., 2016).

Technology

Technology itself is not a challenge, but difficulties occur when demands exceed the ability to deliver services. Internet and cellular coverage are not up to expected levels in many parts of the world. Where there is coverage, the cost of these services remains a barrier, regardless of the innovations available.

Technology-related challenges include:

    i.   Poor ICT infrastructural development.

    ii.   Lack of internet access.

    iii.   Internet and electronic security.

    iv.   Inconsistency in electricity supply.

    v.   Lack of a communication policy by governments of most developing countries or policy inconsistencies in the sector that discourage private sector investment.

Human Capacity

These challenges relate to those associated with human abilities in various forms and include:

    i.   Illiteracy.

    ii.   Cost of internet data and electronic services.

    iii.   Fear of change.

    iv.   Low income.

    v.   Poor ICT training.

    vi.   Gender.

Content

If ICTs are to provide real decision- support tools, it is necessary for an "ecosystem" of relevant information and data to exist. This information is under development in most cases. Information should be developed according to the needs of end users (farmers) and provided in native languages in simple interactive form. It must be up- to- date, relevant, and supplied in a timely manner. Content variables include:

    i.   Non-tailored service provision.

    ii.   Language barrier.

5.6.2 Challenges for Promoting ICTs in Extension

Despite the promise and potential of ICTs in extension services, there are numerous challenges facing ICTs as an extension strategy.

1.   One key challenge is the scaling up of ICTs in extension services. Many ICT interventions fail to achieve widespread adoption because of market fragmentation and the lack of financially sustainable business models that will attract private sector investments in innovative solutions for small-scale agriculture (World Bank, 2016). Rather than assuming that an ICT approach will always be cost-effective and yield a better outcome, there is a need for a more nuanced understanding of the underlying institutional environment and constraints (World Bank, 2016).

2.   Complex and dense information, such as nuanced information on agricultural practices and inputs, must be converted into ICT-based messages (Aker, 2011). To transform these into SMS messages or videos requires the capacity to summarize complex information into concise key points that can be easily understood and utilized.

3.   Though the expansion of mobile phone access has been rapid and commercially self-sustaining, even among many of the poor, the same does not hold for the internet. In the long run, however, the internet can have an even greater impact on rural growth. Much depends on finding sustainable business models that encourage its spread in the poorest parts of the world (World Bank, 2016).

4.   Even with the information provided from the ICT intervention, it is not guaranteed that the farmer will act upon this information because of the inaccessibility of alternative markets and

the complex interlinked relationships between buyers and sellers in low-income developing economies (World Bank, 2016).

5. Communicating information in the national language might lead to misunderstanding or low adoption rates because farmers in many rural areas speak only local languages. Regarding adoption rates, integrating traditional media and new ICTs can expand the reach of extension. However, to achieve high rates of adoption, farmers need to be engaged in determining the relevance and content that will be shared and distributed to other farmers (Francis and Addom, 2014). This also relates to the capacity of the farmer to search information. Even if the information is simple and the message is fast and timely, reception depends on farmers' understanding of the phone, computer, or any other medium used. This holds also for the extension worker or call center agent sending the information; in case farmers respond with questions, he or she must be able to search the answers and respond in an understandable way (USAID, 2010).

6. Another challenge is the diversity of farmers. Having the potential to tailor and personalize messages, ICT initiatives can reach a diverse and large number of farmers. However, this requires good knowledge of the user group. It is important to differentiate between the farmers in a community. For example, women and elderly farmers often have lower literacy and schooling rates than entrepreneurial young men. This requires the development and use of adapted information and training materials.

7. Difficulty in localization of content: Content needs to be aggregated from various sources, but it needs to be sorted in the form of examples for rapid adaptation for local use.

8. One-way information flow: Most of the ICT tools and facilities information flow goes one way, leading to limited scope for interaction.

9. "End users" are the key factor in defining the needs and critical success factors for ICT development and implementation. End user' lack of ICT awareness does not seem to be a significant impediment, but their lack of involvement is. End user complaints of "ICT- related waste of time" seem to be diminishing in importance as an adoption constraint.

Other adoption and dissemination difficulties usually encountered include:

i. Not all farmers are interested in a computerized managerial information system. Some are satisfied with cost accounting at season's end; sometimes not even that.

ii. Some of the farmers use other software packages, including Excel spreadsheets or dedicated software that may or may not be adequate.

iii. Personal preferences. There are farmers who tried ICT and decided to quit because they did not find it user-friendly enough, special needs were not met, etc.

iv. Dissatisfied farmers will discourage others from using ICTs, even after installation.

v. Marketing of ICTs to farmers is non-existent.

vi. Experience shows that farmers not associated with the extension service are left behind professionally, including in the use of ICTs.

vii. The financial aspect is a key issue. Who pays for the services? ICT-based extension services often involve private sector parties such as mobile phone service providers. An example is the Vodafone Farmers' Club, a mobile price plan that offers special rates and a range of information services to farmers. Profit- oriented services are relatively more client- oriented than conventional services because they depend on clients for income and therefore tend to be more up-to-date and targeted.

5.7 Key Lessons and Recommendations

The multitude of ICT initiatives in agricultural extension plays an important role in revitalizing the interaction between extension services and farmers by making services more demand-driven, up-to-date, and inclusive. However, ICT is but one element in the wider transformation toward pluralistic extension services. Francis and Addom (2014) argue that extension alone cannot lift people out of poverty without the right combination of policies, technologies, and market opportunities. Context specificity is critical. To be effective, it is essential to choose the ICT tool that is the most appropriate in a specific situation and context, such as in affordability (McNamara et al., 2011). This depends both on the type of information to be transferred as well as on the characteristics of the target group. ICTs should not be seen as the sole solution to the challenges associated with agriculture because broad access to more sophisticated and integrated ICTs requires organizational capacity that public sector agricultural extension systems at present lack. The private sector could play a key role in changing current communication concepts in agricultural extension. However, this would require a supportive policy and enabling environment to facilitate the development of strong institutions and private sector actors who can drive innovations in ICT- based extension. Moreover, ICTs are supporting tools that can never fully replace conventional extension approaches such as real-time advice from extension officers. In fact, without an organized extension system, ICTs would be less likely to achieve widespread impact. Because ICTs can neither do without nor replace face-to-face interaction between farmers and extension agents, support to enhance extension systems in developing countries should therefore be broader than the introduction of ICTs. Finally, empirical evidence on the impact of ICTs remains limited. As mobile phones and other ICTs continue to gain popularity and offer unique opportunities to share information among large numbers of farmers and other stakeholders, there is little doubt that ICT has a key role to play in agricultural extension systems. However, not a panacea for all the problems facing extension, the integration of ICTs as a communication channel will help in reaching millions of farmers.

5.8 Conclusions

Agricultural extension agents need to familiarize themselves with modern ICTs and how they can enhance rapid and cost-effective transfer and sharing of knowledge. Computer technology has led to communications media that combine some of the properties of mass media and interpersonal media. This hybrid medium has the potential to reach a large target audience, but at the same time, it can be more interactive than traditional mass media. These modern communication media or ICTs have become widely used tools for both extension agents and farmers. Modern ICTs include devices such

as mobile phones, tablets, and laptops. These media enable new ways of virtual knowledge transfer and sharing. Their increased affordability and availability have made them a cost-effective option for farmers, even in resource- poor regions. For extension professionals, it is important to use these media to transfer knowledge and enhance learning but also to know their limitations. In this chapter, we discussed some of the modern ICT tools available to extension agents and farmers along with their uses to facilitate change. We also suggested why and how to use these tools in daily extension activities.

5.9   Self -Assessment Exercises

1.   What are the essential ICT skills and competencies required in agricultural extension?

2.   Outline the need for, purpose, and major functions of ICTs in agricultural extension.

3.   Describe the evolution of ICTs over time with examples.

4.   How can we strengthen the delivery of extension through ICTs? Illustrate with examples.

5.   Differentiate between synchronous and asynchronous communication with examples.

6.   Discuss the applications of social media in agricultural extension.

7.   What are the key challenges in promoting ICTs in extension?

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Program Evaluation in Extension: Skills and Competencies

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6.0   Learning Outcomes

- Explain the concept of evaluation.
- Differentiate between appraisal, monitoring, evaluation, and impact assessment.
- Apply different types, tools, techniques, designs, and approaches in evaluation of extension programs.
- Implement evaluation data collection, analysis, report writing, and sharing of results.

6.1   Introduction

Extension workers are our highly valuable assets. Their job performance depends heavily upon the training they receive during their undergraduate -level training. To perform their roles effectively, extension educators should possess sound technical knowledge and skills in the subject matter with which they work. These technical skills and competencies are necessary but not enough for extension educators to serve effectively.

In the previous modules, we discussed the program planning, program implementation, communication, and information and communication technologies skills and competencies. The other concept which closely follows them is program evaluation skills and competencies. Because we live in an era of accountability, funding agencies demand to know about impacts of extension work. Knowledge and skills in program evaluation can help respond to these demands and, thus, are recognized as core competencies for all extension educators.

The demand for evaluation of extension programs / projects is rising as funding agencies and stakeholders want to know from the extension professionals:

- What did you do with the money?
- Why should we continue to fund extension programs / projects?
- Are the extension programs effective?
- How will you improve or terminate ineffective extension program / projects?

Evaluation of extension programs / projects is essential to answer the above questions with evidence. Therefore, to be relevant, every extension professional should possess or acquire evaluation skills and competencies (Box 6.1).

Box 6.1: Extension Program Evaluation Skills and Competencies

Every extension professional should be able to:

- Understand theories and principles of monitoring and evaluation.
- Conduct evaluation of extension programs.
- Develop data collection instruments -- interview schedules / questionnaires -- for evaluation of extension programs.
- Conduct online surveys for evaluation of extension programs.
- Apply qualitative tools and techniques (e.g., focus group discussion, case study, etc.) to collect evaluation data.
- Apply quantitative tools and techniques (e.g., survey, interview, farm data, etc.) to collect evaluation data.
- Analyze and interpret data (qualitative and quantitative).
- Write evaluation reports.
- Share evaluation reports within their organizations and with stakeholders.
- Apply the evaluation findings in replicating/scaling up of extension programs.

Source: Suvedi and Morford, 2003

6.2 What is Evaluation?

Evaluation is a systematic investigation of the worth or merit of a program, project, or policy. In an extension setting, evaluation is a management tool that involves measuring and reporting on the results of programs and projects.

Evaluation involves systematic collection and analysis of information about the characteristics and outcomes of a program / project as a basis of judgment to improve its effectiveness and/or to inform decisions about current or future programming (USAID, 2011).

Evaluation is both an art and a science. The art of evaluation involves identifying purposes and audiences, creating appropriate designs, and interpreting data about a program, project, or policy. The science of evaluation involves systematically gathering and analysing evidence about the impacts. When evaluations are conducted by parties outside an organization, it is usually called "auditing." In this chapter, evaluation means an internal look—within an organization—at how well outcomes match what was intended (Suvedi and Morford, 2003). Various steps in design and execution of program evaluation are summarized in Box 6.2.

Box 6.2: Steps in Extension Program Evaluation

1. Developing an evaluation proposal, which includes information about:

   - Program/project background.

   - Need for evaluation -- economic / technical / social / environmental benefits.

   - Research / evaluation questions to be answered.

   - Objectives of evaluation.

   - Evaluation framework/model -- e.g., program logic, hierarchy of evidence or results framework.

   - Budget, staff, and time required.

2. Designing evaluation instruments (survey questionnaire, focus group questions, key informant interview questions, observation sheets, office records, etc.).

3. Pretesting of evaluation data collection instruments, data coding and recoding plans.

4. Data collection, data entry and analysis.

5. Evaluation report writing and communicating findings .

Example: See the following links for an evaluation proposal and an evaluation report with survey instrument on 'Integrated contract broiler farming: An evaluation case study in India'

https://sites.google.com/a/meas-extension.org/safety_2013_07_31/meas-offers/case-studies/contract-farming

https://dev.meas.illinois.edu/wp-content/uploads/2015/04/MEAS-EVAL-2015-Broiler-India-long-Sasidhar-Suvedi-June-2015.pdf

Source: Sasidhar and Suvedi, 2015

6.3 Appraisal vs. Monitoring vs. Evaluation vs. Impact Assessment

Though appraisal, monitoring, evaluation, and impact assessment are often interchangeably used, the following distinctions exist between them:

Appraisal: This is a critical examination of an extension program / project proposal, normally before implementation and funding, with respect to economic viability, technical feasibility, social desirability, etc. It is basically an extension planning and project formulation activity guided by evaluation findings of similar programs / projects which have already been implemented.

Monitoring: It is a continuous process that starts and ends with an extension program / project. Monitoring helps to ensure that programs are implemented in accordance with their design and objectives, and helps answer questions such as:

   - Are we doing the right thing?

   - Are we doing it right?

Extension managers use monitoring to track progress by gathering periodic information on project inputs and activities and, based on data, adjust an ongoing program's personnel, resource allocation, and/or staff recognition. Most extension systems have set up a data collection system on what extension program is offered to whom and where, and how many benefitted, etc.

Generally, monitoring is used to track resources (e.g., funds, personnel, and supplies) and processes (e.g., occurrence of meetings, demonstrations, field/farm visits, and publications). Ideally, monitoring should be built into projects so that key indicators of progress throughout a program or project can serve as a basis to evaluate outcomes of the intervention. Good evaluations employ sound indicators to measure change. Indicators are observable phenomena that point toward the intended and/or actual condition of situations, programs, or outcomes. They are markers that can be observed to show that something has changed or improved. Indicators, when incorporated into an appropriate monitoring system, can help people notice changes at an early stage of a program's implementation. Quality indicators of an evaluation process are those that are relevant to project objectives; simple and unambiguous; realizable given logistical, time, technical, or other constraints; conceptually well-grounded; and can be updated at regular intervals (Examples in Box 6.3).

Box 6.3: Examples of Indicators for Varied Intended Impacts	
Goal	**Examples of Indicators**
Increased productivity	Change in yield/unit (e.g., kilograms of rice production per hectare, liters of milk per animal)
Reduced cost	Change in cost of production (e.g., cost per kilogram of meat production)
Reduced inputs	Change in input use as measured by cost/unit (e.g., change in kgs of inorganic fertilizers per hectare)
Improved nutrition of young children	Change in prevalence of underweight children under 5 years of age
Improved health of women	Change in prevalence of anemia (or other diseases or conditions) among pregnant women
(Source: Suvedi and Vander Stoep, 2014)	

Source: Suvedi and Vander Stoep, 2014

Information from monitoring is required for immediate use and midcourse correction of a program or project. Monitoring is a built-in activity in a program or project and often serves as a symptomatic and early warning system.

Evaluation: It is an in-depth, one-shot operation at a point of time, usually at the completion or midway of an extension program. It is undertaken for future planning / replication / expansion of

a project or program activities. It is a learning and diagnostic process usually done by an outside agency or experts with a representative sample of beneficiaries.

Impact Assessment: Conducted at the conclusion stage of a program or project, it seeks to measure lasting impacts on important indicators such as crop yields, sustained profitability, farm household income, or livelihood improvement. It is a type of evaluation that seeks to answer cause-and-effect questions -- e.g., does training mothers on food preparation through cooking demonstrations lead to reduced malnutrition of under -5 children?

6.3.1 What are We Evaluating?

In general, evaluation is conducted to assess the progress, outputs, outcomes, and impacts of extension programs or projects. A few commonly used analytical aspects of evaluation described by Dale (2004) are given in Box 6.4.

Box 6.4: Commonly Used Analytical Aspects of Evaluation

Relevance: To what extent has the extension program or project addressed, or is addressing, problems of high priority as viewed by actual and potential stakeholders, especially beneficiaries?

Effectiveness: To what extent are the planned outputs, expected changes, intended effects (immediate and effect objectives), and intended impact (extension development objective) being or have been produced or achieved?

Impact: The overall consequences of the extension program or project for the intended beneficiaries and any other people. What difference has the intervention made?

Efficiency: The number of outputs created and their quality in relation to the resources (capital and human efforts) invested by extension departments. How well have the resources been used?

Sustainability: The maintenance or augmentation of positive achievements induced by the evaluated extension program or project (or any component). Will the benefit last?

Replicability: The feasibility of adapting a particular extension program or project, or parts of it, in another context -- i.e., at a later time, in other areas, for other groups of people, by other organizations, etc. Can we do it again? Or can we repeat this action or intervention?

Source: Suvedi and Vander Stoep, 2014

6.4   Evaluation Types and Designs

6.4.1 Types of Evaluation

On the basis of general purpose and time, evaluations can be classified in two broad categories:

- Formative evaluation.
- Summative evaluation.

Formative Evaluation: A formative evaluation, often called a process/midterm/concurrent evaluation, is conducted during the life of a program to identify its strengths or weaknesses and

to enhance its quality and effectiveness. Process evaluations are undertaken during the program implementation stage to determine whether the program is going as per plan, and what changes, if any, are required to meet the objectives. Generally, these evaluations offer meaningful information for long-term programs/projects for cross- checking/corrective measures.

Summative Evaluation: A summative evaluation, also called an impact evaluation, is conducted at the conclusion phase of a program to determine the value of a program or project. Findings help decision makers decide a program's impact and its future. The focus is on determining program results and effectiveness --merit and worth. It serves the purpose of making major decisions about a program – continuation, expansion or reduction, and funding.

Formative evaluation may take many forms. Usually these are evaluative studies conducted during the early stage of a program or project such as needs assessment, baseline studies, evaluation of on-going activities, or monitoring. Summative studies are usually implemented during the later stages of a project -- i.e., at the end or after the completion of a project.

Patton (1997) classifies evaluation into three categories:

- Judgment-oriented evaluation.
- Improvement-oriented evaluation.
- Knowledge-oriented evaluation.

Impact assessments have judgment orientation. Management generally values improvement-oriented studies. Donors and policymakers seek knowledge-oriented evaluations and studies that answer accountability questions.

Depending on timing and the specific purpose of the evaluation, evaluative studies can be grouped under three broad categories:

- Evaluative studies at the program planning stage.
- Evaluative studies at the program implementation stage.
- Evaluative studies at the end of the program.

A. Evaluative Studies at the Program Planning Stage

- **Needs assessment:** A needs assessment is an environmental monitoring process through which information is obtained that can be used to design timely, relevant, and reasonable programs (Fear, 1988). It helps to establish which messages or media would work best to meet the identified need(s).
- **Feasibility study/market analysis:** The purpose of a feasibility study or market analysis is to determine if a program is feasible and/or desirable, and whether the available inputs and ideas can be crafted into a real-world program to benefit the intended audience. It also assesses how likely the program is to be successful in light of any other service providers who may be offering similar programs.

- **Benefit/cost analysis and rate of return-on-investment analysis:** These are common methods used to determine the economic feasibility of new technology or recommended development interventions.
- **Baseline study:** Baseline studies measure the status quo, establishing a benchmark against which to judge future changes or program outcomes and impacts.

B. Evaluative Studies at the Program Implementation Stage

Various types of formative evaluations or monitoring studies are conducted to determine how a program is implemented, progress made by the program, and how the implementation process might be improved. They are conducted to make immediate changes or adjustments in the program. Formative evaluation usually takes place early in implementation and helps program managers find the strengths and weaknesses in a program while it is still going on. This type of evaluation is helpful for program improvement.

- **Midterm or midstream evaluation:** This is conducted to adjust a program/project that is already underway. For example, a five-year project may plan the midterm evaluation at the end of the second year so that adjustments in program design or delivery can be made to achieve project goals. Usually donor-funded projects use midterm evaluation to make adjustments in project activities and strategies.
- **Monitoring:** As indicated earlier, monitoring involves gathering periodic information on project inputs and activities to ensure that the project is implemented as planned. It enables management to take corrective actions when necessary. Monitoring, therefore, should generate timely, reliable, and accurate information needed for decision making.
- **Operation evaluation:** Similar to monitoring, operation evaluation seeks to understand whether implementation of a program unfolded as planned. The aim is to compare what was planned with what was actually delivered to determine whether there are gaps between planned and realized outputs (Khandker et al., 2010).

C. Evaluative Studies at the End of the Program

A summative evaluation is conducted at the end of a program or project. It determines whether project objectives were met. These evaluative studies look for evidence of the value or success of a program or project. They measure the effects or impacts of a program. Some of the commonly used summative evaluations include:

- **Output evaluation:** Output evaluation looks at basic program outputs, such as number of training programs conducted, extension bulletins published and distributed, number of male and female farmers reached, and program costs.
- **Outcome evaluation:** Outcome evaluation often measures progress in learning, such as changes in awareness, knowledge, attitudes, skills, or behaviors. Usually, these studies focus on short-term impacts of a program, such as learning and medium-term impacts on people or policy. One example is development of a new policy to establish farmers'

markets through cooperatives. The evaluation question would focus on changes in farmers' access to markets as a result of a new policy on cooperatives.

- **Impact evaluation:** Building on appraisal, monitoring, and evaluation, impact evaluation focuses on longer term and wider ranging changes beyond the immediate results of the extension program or project. Impact evaluation seeks to measure lasting impacts of programs or projects on important indicators such as crop yields, farm profitability, farm households' income, or livelihood improvement. Such assessments focus on broad and long-term program effects, such as changes in food security and nutrition, ecological, social, economic, or community conditions.

- **Follow-up evaluation:** A follow-up study is conducted long after a program or project is completed. This stage of evaluation looks at the long-term benefits of a program or policy (Sasidhar et al., 2011). When follow-up evaluations are repeated at set time intervals to study the long-term benefits, sustainability of results and outcomes, they are called longitudinal evaluations.

Various evaluation techniques used at different program/project stages are displayed in Box 6.5.

Box 6.5. Evaluation Tools and Techniques by Program Stage			
Program Stage	**Evaluation Type**	**Evaluation Questions**	**Evaluation Tools and Techniques**
Planning stage	Needs assess-ment Feasibility study Baseline study	• What are the felt and unfelt needs of beneficia-ries? • Do they fit into extension program mission? • Can extension program address these needs? • Is extension program fea-sible (socio-economic and environmental)?	Survey Focus group discussion Observation Content analysis of records Economic analysis Benefit:cost ratio
Implementation stage	Formative evaluation	• Is the extension program meeting its objectives of intended outcomes? • Are beneficiaries satisfied with the extension pro-gram?	Annual monitoring reports Technology adoption patterns, knowledge, attitude, satisfaction, and aspiration (KASA) change Satisfaction surveys

Conclusion stage	Summative evaluation	• Are the needs ad-dressed? • Are the desired out-comes achieved? • What is the cost effec-tiveness of the extension program?	Pre- and post-project data analysis from sur-veys, reports Cohort studies Panel studies Economic analysis

(Source: Suvedi and Vander Stoep, 2014)

6.4.2 Evaluation Frameworks

Extension professionals need a basic understanding of three common conceptual frameworks or models to evaluate a program or project:

- Program Logic Framework.
- Bennett's Hierarchy of Evidence.
- Results Framework.

A. Program Logic Framework

Program logic is a framework for describing the relationships between investments, activities, and results (Taylor-Powell and Henert, 2008). The framework consists of a logical chain of connections showing what the program intends to accomplish with the help of a series of "if __then __" relationships. It helps to clarify logical links between project inputs and objectives, project activities and outputs, broader purposes, and the ultimate goal.

IF	. . . THEN	. . . THEN	. . . THEN
We want to achieve	We create these	We conduct these	We need these
these results	products.	activities.	resources

Key elements of a logic model

- **Inputs:** Inputs are the human, financial, and material resources required to implement a program or policy.
- **Outputs:** Outputs are the products and services delivered by the program or project to its clientele, such as number and types of programs, number of participants, memberships' acquired satisfaction with program, and services.
- **Outcomes:** Outcomes are the measurable results or consequences – both expected and unexpected – of an activity or program in meeting its stated goals and objectives, such as the percentage of participants who gain knowledge or skill as a result of the program.

- **Impacts:** The intended or unintended change occurring in organizations, communities, or systems as a result of a program/project. These could be short-term (e.g., awareness of learning), medium-term (e.g., adoption of a new practice or taking social action such as formation of a farm cooperative), or long-term (e.g., quality of livelihood, adoption of environmentally friendly farm policy).

Program Inputs, Outputs & Activities
- Food security project hires extension staff
- Extension staff demonstrate use of new crop varieties
- New seed & inputs are made available locally
- Training programs are conducted
- Price fixed ????

Short-term Outcomes
- Farmers increase their knowledge about new rice & maize varieties
- Farmers observe performance of new varieties
- Early adopters start growing new varieties
- Farmers discuss benefits of using new varieties

Medium-term Outcomes
- More farmers adopt new rice & maize varieties
- Farm production & income increase
- Food is available locally
- Food prices do not increase
- Consumption of food increases

Long-term Outcomes, Impacts
- Poverty is reduced
- Hunger is reduced
- Nutrition is improved
- Incidents of illnesses are reduced

Figure 6.1: Illustration of a Program Logic Framework
(Adapted from: Suvedi,2011)

B. Bennett's Hierarchy of Evidence

Bennett's Hierarchy of Evidence provides a way of conceptualizing the relationships between program objectives and outcomes at various program levels. The hierarchy shown below (Figure 3) suggests the kind of information appropriate to determine if an objective has been met. The lowest level of evaluation (Inputs) refers to resources expended for programs or projects. At this level, evaluative studies report the number of person-days of staff time devoted to a project, money spent, or vehicles procured. This statement does not say very much about the difference that the program or project has made on the target audience. Ideally, evaluations want to report from a higher level on the ladder. Further up the ladder, you document changes in knowledge, attitudes, skills, and aspirations (or plans) of the target audience. You might report about knowledge change such as understanding impacts of an extension program -- e.g., integrated pest management (IPM) on vegetable production, based on pre- and post-test results. This kind of evidence is slightly more convincing to someone judging whether your program was worthwhile. Further up the ladder, you can report on changes in practices or behaviors of your target audience. For example, "About three out of five (60%) of farmers who participated in IPM training reported using the recommended practices within 2 years." This is even better evidence of a program's worth, but it requires you to survey participants to determine if they incorporated the new practices into their operations.

Figure 6.2: Hierarchy of Program Performance Evaluation
(Adapted from Bennett, 1976, and Bennett and Rockwell, 1995)

The extension program or project manager should establish the desired level of outcomes at the outset of a program, project, or policy. The higher up the hierarchy they are, the more time and resources it generally takes to gather data about outcomes, but the more convincing the evidence will be. As a manager, you must decide the trade-off between strong evidence of worth and the cost/time required to gather evidence (Suvedi and Morford, 2003).

The top rung of the ladder shows results related to the long-term benefits or impacts that drive the program or project – for example, "environmentally friendly agricultural production." Managers typically cannot evaluate at the top level because they cannot isolate other factors that may have led to the long-term result, but it is nevertheless helpful to know what the ultimate expected outcome or impact is.

C. Results Framework

The results framework is used widely as a strategic planning and management tool by USAID in the broader context of programs and national goals. It is a graphical presentation of the expected results of a program or project. It includes objectives and the intermediate results of a program. Program managers can use the framework to identify the indicators by which a project's progress is monitored and evaluated, and the conditions necessary for the project to achieve the expected results. It is particularly useful for realistic planning of the activities and allocation of resources required to meet project objectives (Uribe and Horton, 1993). It helps clarify the logical links between project inputs and objectives, project activities, outputs, broader purposes, and the overall goal. It conveys the development hypothesis implicit in the strategy (USAID, 2011). The framework itself is not a plan for evaluation, but it is useful in designing program evaluation.

6.4.3 Evaluation Designs

In general, extension is complex, and evaluation is messy. People hold different meanings of evaluation. Evaluation professionals use a wide array of research methods, ranging in rigor and

complexity from casual observation to randomized experimental design. In the context of agricultural extension, however, program evaluation is not a common practice for various reasons. First, extension service is a public good. Staff members may lack evaluation capacity; the organization does not have the necessary support structure and services, such as in-service training, to promote the use of evaluation; or no funds are allocated to finance evaluation.

There are two schools of thought about evaluation of public extension programs. One school believes that evaluation involves value judgments and, thus, absolute accuracy is neither necessary nor attainable. Therefore, evaluation should be structured to serve as a learning process. The other school considers that evaluation is useful only insofar as it provides credible evidence to inform real-world decision making. This school believes that sound evaluations are based on empirical evidence or data. Accordingly, program evaluators should be able to identify cause-and-effect relationships between an activity designed to induce change (such as a demonstration of home gardening) and a particular desired outcome (such as increased vegetable consumption resulting in improved nutrition of family members). This requires a good evaluation design and statistical knowledge to analyze impact data.

Determining cause-and-effect relationships may require experimental or quasi-experimental research designs in which an experimental group (or groups) receives a specific treatment(s) while the control group receives no treatment. Use of a control group (also termed a comparison group or counterfactual) enables evaluators to discount many alternative explanations for the effect of the treatment. So, comparisons are essential in scientific investigations. In the case of extension, comparing farmers receiving extension services with an equivalent group receiving no extension services makes it possible to draw well-supported conclusions.

The sections below describe experimental, quasi-experimental and non-experimental designs commonly recommended for extension program/project evaluators.

A. Experimental Evaluation Designs

What is an experiment? An experiment is a scientific investigation in which "the researcher manipulates one or more independent variables, controls any other relevant variables, and observes the effects of manipulations on the dependent variable(s)" (Ary et al., 2002). Experimental design refers to the conceptual framework within which the experiment is conducted. It is the researcher's plan for carrying out the experiment.

The experimental design serves two functions:

- It establishes the conditions for the comparisons required to test the hypotheses.
- It enables statistical analysis of data.

An experiment has two important variables:

- *Independent variables* are manipulated (changed) by the experimenter (e.g., the amount of nitrogen fertilizer applied in kg/hectare to rice crop).

- *Dependent variables* are observed but not manipulated by the researcher. They are variables upon which the effects of changes in independent variables are observed (e.g., rice yield per hectare).

Also, there are three essential ingredients in the conduct of an experiment:

- *Control* of context and variables provides a situation in which the effect of a variable can be investigated.
- *Manipulation* is the process of setting up different treatment groups or conditions to facilitate observation of the impacts of independent variables on dependent variables.
- *Observations* are made with respect to specified characteristics/conditions.

In the context of extension evaluation, characteristics of beneficiaries, technology options, and information delivery methods utilized by a program could be considered independent variables; outcomes/impacts may be considered dependent variables.

When we make experimental comparisons, we usually begin with a hypothesis, which is a prediction that the experiment will have a certain effect. The experimental group receives a specific treatment, while the control group receives no treatment. The use of a control group enables the researcher to discount many alternative explanations for the effect of the treatment.

Comparisons are essential in scientific investigation. Comparing a group receiving treatment with either an equivalent group receiving no treatment or an equivalent group receiving an alternative treatment makes it possible to draw well-founded conclusions (Box 6.6).

Box 6.6: Experimental Design for Evaluation				
Randomly Assigned	Results of Pre-Project Measurement	Treatment	Results of After-Project Measurement	Impact
Treatment Group Random selection of project villages Random selection of households from each selected village	A0	Extension Project Households receive new technical assistance and educational support	A1	A1-A0 = Y
Comparison Group Random selection of control or comparison villages Random selection of households	B0	No Extension Project Households receive regular technical assistance from government program	B1	B1 – B0 = Z

A true experiment requires random assignment of subjects to a treatment group. Random assignment is the only way that groups can be considered statistically equivalent. In the above experimental design: A1-A0 = Y (outcome due to treatment) and B1-B0 = Z (outcome without treatment).

If Y is greater than Z, the program has had a positive impact on net outcome. If Y=Z, the project had no impact on outcome. If Y is less than Z, the project had a negative impact on the outcome. In agricultural extension and rural advisory service settings, data collection following a randomized experimental design is often not practical. It is difficult to control the experiment in a societal setting – treatments could have spill- over effects in nearby communities. Data collectors would face political and ethical issues in excluding some households within the same service area. As a result, the evaluators cannot easily observe the outcomes of a program on participants if they had not been the beneficiaries. Without information on the counterfactual (i.e., what would have happened to the participants of a program had they not participated), the best alternative is to compare outcomes of project households with those of a comparison group that has not been the beneficiary of the project.

Khandker et al. (2010) offer strategies to address the counterfactual issue, including use of propensity score matching, the double-difference method, the instrumental variable method, and the regression discontinuity and pipeline methods.

B. Quasi-Experimental Designs

While evaluating developmental programs, including extension education, it is frequently not possible to conduct a true experiment with random assignment of subjects. We often have to deal with pre-existing groups such as 4-H clubs, neighborhoods, districts, or training groups. Designs that do not include random assignment are known as quasi-experimental designs. These designs permit us to reach reasonable conclusions even though full control is not possible (Box 6.7).

Box 6.7: Quasi-Experimental Design or Non-Equivalent Control Group Design				
	Before Project		After Project	Impact
Group A	A0	Treatment / Project	A1	A1-A0 = Y
Group B	B0	No treatment / Control	B1	B1-B0 = Z

No random assignment of subjects; treatment given to Group A but not to the other group (i.e., Group B). If A1 is greater than A0, the project has a positive impact on participants. If Y is greater than Z, the program had a positive impact on outcome.

Results of quasi-experimental design provide reasonably good evidence of program impacts. Generally, program and policy evaluators in extension and rural development settings have not used experimental research designs. Pound et al. (2010) conducted a meta-evaluation of 17 national/regional extension evaluation case studies. The findings indicated that most evaluation studies used

some form of questionnaire survey, review of relevant documents, key informant interviews, or case studies. Only one evaluation used random sampling of survey respondents.

Alternatively, evaluators may collect only after-project data from both groups (i.e., participants and non-participants) using a random sample from each group (Box 6.8).

	Sample	Group	Score Before	Score After	Net Change
Box 6.8: Example of Evaluation Design for a Training Program (Weiss, 1998)					
	Random assignment of trainees	Experimental group or program participants	P1	P2	P2 - P1 = P'
		Control group or Non-participants	C1	C2	C2 - C1 = C'

In the above example, if P' is greater that C', the program has had a positive net outcome.

We believe that evaluation in extension and rural advisory services should be a learning process. Evaluation results should be utilized in improving the program and developing more effective policies to serve rural populations. Extension managers, therefore, should plan evaluation at the time of planning the project itself. The monitoring process should be developed to track key indicators of progress over the course of the project.

For practical reasons, we believe that not all agricultural extension programs and policies need experimental (or randomized) setups (and it is not feasible costwise to use it every time) to accurately document the impacts of the programs or projects on families, communities, and society. Alternatively, qualitative studies could offer the depth of information needed about the impact of programs or policies on the intended audience. A mixed- method approach might offer better documentation of outcomes and impacts.

Assessing the feasibility of a program evaluation helps ensure that the program can be evaluated meaningfully, and that the evaluation will contribute to improving program design and/or performance.

Because of several limitations -- such as availability of baseline data, budget, and absence of a suitable comparison group -- experimental or quasi-experimental designs may not be feasible in many contexts. In such situations, extension program evaluators have frequently used non-experimental evaluation designs to conduct program/project evaluations. Two commonly designs used evaluation designs are:

Pre- vs. Post-program Evaluation: It is undertaken through comparison of the present situation and the situation prior to the extension program/project. Note that this design may suffer from sampling

error and memory or recall bias of the respondents. To overcome this, it is always advisable to have a baseline or benchmark study and a post-program study. Unfortunately, in most extension programs, baseline studies are not undertaken or secondary data are either unavailable or inadequate.

With-without Program Evaluation: A comparable sample of extension beneficiaries and non-beneficiaries are to be selected within the program area. Alternately, a comparable adjoining area where extension the program/project has not been implemented can also be studied along with the program area. Note that there could have been spill-over and/or ripple effects of project activities among non-beneficiaries and, thus, comparison may not result in accurate results on impacts.

As far as practicable, use of baseline and end-line data derived from a random sample and careful selection of a comparison group to avoid spill-over effects of the extension program/project are recommended for both pre- and post- project and with-without project evaluation studies.

C. Non-experimental Evaluation Designs

Expost facto Studies: Despite the rigor and appropriateness of experimental designs, in the context of public agricultural extension and advisory service evaluation, it is difficult to establish a control or comparison group, maintain uniform treatments, and measure long-term impacts. More often, extension programs or projects make use of Ex Post Studies for evaluation (Box 6.9).

Box 6.9: Types of Ex Post Studies Conducted after Program/Project Completion

Cross-sectional Surveys: Surveys are popular for collecting evaluative data and are used to measure people's opinions, attitudes, beliefs, behaviors, reactions, and attributes in response to specific questions. Cross-section surveys query respondents within a target population at one point in time.

Case Studies: Case studies use a mix of methods to obtain information that, together, provides in-depth information about a single unit, project, or organization. Using a systematic process, the evaluator captures the essence of a situation through personal discussion and interaction with relevant stakeholders, observation of behaviors and other variables, and/or review of existing documents. Case studies could be explanatory, descriptive, or exploratory.

Focus Groups: Focus groups, which are in-depth guided discussions with a small group representing a target population, traditionally are used in marketing research to find out what a particular segment of the public needs or wants, and what they will consume. In recent years, this technique has been used to identify community needs and issues, to obtain citizens' perceptions on a defined area of interest, and to generate program alternatives. In the case of ex post evaluation, focus groups are used to assess the impacts of a particular program on individuals and communities.

Benefit-Cost Analysis (BCA) and Return on Investment (ROI): These are two common types of analysis used to determine the economic feasibility of new technology or development alternatives.

- BCA is a tool used to identify, express in money terms, and then compare all the costs and benefits of a policy, program, or project.
- ROI is a performance measure used to evaluate the financial efficiency of an investment.

Many administrators and funders are interested particularly in economic impacts. Thus, social scientists with a background in economics also are engaged in impact evaluation. However, valuing the economic impacts of extension programs is not simple. Often, economists depend on secondary data, such as census records, to track impacts. They also utilize surveys to gather information for determining impacts. Richardson and Moore (2002) describe a variety of indicators and tools for valuing economic impacts (Box 6.10).

Box 6.10: Indicators and Tools for Valuing Economic Impacts

Reduced Cost: This indicator measures the money saved by a participant. For example, a farmer adopts a less expensive pest management practice after attending an integrated pest management (IPM) training program. The reduced cost is equal to the cost of regular pest management practice minus the cost of the new IPM practice.

Increased Income: This indicator compares the income of a program participant before and after the program. For example, a farmer's income may increase as a result of planting a new variety of rice that has a higher yield per hectare, or because of value-added practices – such as use of improved driers for large cardamom or implementation of organic farming practices – implemented as a result of extension information or training.

Increased Productivity: This indicator is derived by computing economic value by measuring the increase in productivity by the same number of workers or units of production due to adoption of a new practice learned from an extension program or demonstration. For example, extension programs teach farmers how to use a new technology. The higher profits from use of the new technology minus the cost of buying the technology equals increased productivity.

Value Added: This indicator refers to the additional profit, or value, assigned to a crop or product that is used in a new way, or processed in a way that adds value beyond the cost of the processing. For example, a program that teaches fruit farmers to make jam or jelly enables farmers to add value to the fruit. The profit from selling jelly, after costs of making the jelly are considered, minus the profit made from selling the fruit equals the value added.

Expected Value: This method estimates how much income a new business will earn. Banks rely on this method when deciding whether to make a loan. The income of similar businesses, along with the quality of the business plan, is used to estimate the income of the new business. For example, extension agents can use this method to estimate the value of an extension program that teaches participants how to start a small business. The combined expected values of the businesses started within a specified timeframe, as a result of extension training offered to potential new business entrepreneurs, could be considered the value of the extension program.

Alternative Opportunity Cost of Capital: Extension programs can teach participants how to make more money by using existing capital in different or more efficient ways. For example, land could be used to grow a higher value crop. The income from the higher value crop is compared with the

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income from the lower value crop to estimate the economic worth of the extension program that made farmers aware of and assisted them in changing to the new, higher value crop.

Willingness to Pay: The willingness of clients or consumers to pay for some item or service may be considered an economic benefit when this willingness exceeds what would be considered a standard norm for a product or service. If a product is marketed more effectively, if it is a value-added product, if it or reaches a new niche clientele as a result of extension training or assistance, the buyers' willingness to pay can be considered the value of the extension services.

(Source: Richardson and Moore, 2002)

6.5   Evaluation Data Collection Methods

There are several methods of evaluation data collection. The choice of method for collecting evaluation data depends on:

- Type of information desired.
- Time availability.
- Cost associated with the use of the method.
- The evaluator's level of expertise using the method.
- Whether the information collected will be viewed as credible, accurate, and useful by the stakeholders of the evaluation.

Therefore, no one method is the "right" or only one. When an evaluation assesses many components, you are likely to use a combination of methods to "triangulate" -- i.e., use more than one source of evidence. In a less complex evaluation, you may be more likely to need only one source of data.

Evaluation data may be gathered using primary sources (e.g., collecting new data using surveys or interviews) or secondary sources (e.g., using existing data). The secondary sources of data may include memos, diaries, photographs, records, receipts, reports, meeting minutes, proceedings, newspaper articles, or editorials. These types of descriptive data provide insights into a program that cannot be obtained in any other way. The information is typically available at minimal cost.

Two types of data are used in evaluation: qualitative and quantitative. Mixed methods are getting popular in recent years.

6.5.1 Qualitative Methods

Qualitative methods include methods such as interviews, document review, observation, and case studies. Generally, open-ended questions are asked to bring out perspectives. These methods are most appropriate for:

- Understanding the context in which a program or project takes place.
- Clarifying relationships between program objectives and implementation.
- Identifying unintended consequences of a program.

- Understanding operations and effects of programs.
- In-depth analysis of the effects of the program.

Commonly used qualitative methods are described below:

Participant Observation

Developed by anthropologists, participant observation is a method that is well- described by its name. Rather than remaining detached, the participant observer lives with, eats with, works with, plays with, and may even join in rituals with the people he or she is studying. Participant observation entails gathering information about behavioral actions and reactions through direct observation, interviews with key informants, and participation in the activities being evaluated.

True participant observation requires the investigator to immerse him/herself in the life of the community being studied. This method is especially useful in the assessment of long-term effects on local residents of a new policy or development program. It is useful in determining reasons for community conflicts or misunderstandings, assessing community needs and problems, and finding acceptable ways of involving people in problem solving.

Participant observation alone will rarely provide enough information for a program evaluator. More detailed information usually must be elicited by interviewing informants. Such interviews may be particularly valuable to learn about local people's beliefs, values, motivations, power relationships, etc. The observer requires strong observational skills to document complex human behavior because the quality of information is subject to biases of the observer.

Some significant ethical issues are involved with the study of other humans through participant observation. Many people do not enjoy being observed; it may make them feel self-conscious, awkward, or embarrassed. People have a right not to be observed if they do not want to be. Therefore, it is important to follow some general guidelines while practicing participant observation.

Whenever possible, ask people's permission to observe them. You can say something as simple as, "I'm very interested in learning about such-and-such from you. May I write down a few notes about our conversation?" You should assure them that their names will never be used in the report.

In some cases, it will not be possible to ask permission. There may be too many people, the action may be temporary, or the people may be at some distance. In these cases, observe and record only behaviors that are enacted in public.

If anyone objects to your observation or data recording, you must respect their wishes and stop your activities immediately.

Guidelines for Engaging in Participant Observation

Participant observation (PO), as used in evaluation, is motivated by the need to solve practical problems, not to construct theory. Therefore, the evaluator using this technique should enter

the field with an initial conceptual framework (Casey et al., 1988.) The framework should include preliminary issues and the possible relationships among them.

- Define the main concepts in the framework -- e.g., adoption of a new farm practice, leadership style, etc.
- Identify sources of information.
- Select the site in which participant observation is to be carried out. Selecting two or more sites allows for comparative analysis of data. An informal sampling technique is used. The site selected should be representative of the type of program or organization being observed, the organization must be willing to accept the observer, and the observer must be able to enter activities under observation. Timing is crucial for one-time activities, seasonal events, or those having a daily routine.
- Arrange for access and develop arrangements for maintaining confidentiality.
- Assemble tools for observation: checklist, pen, camera, tape recorder, etc. How data is recorded depends on the situation. You may want to take notes on the spot, or you may want to make notes after completing your observations. Photographs and recording devices assist in recording, but in some instances they may be intrusive and influence the situation being observed.
- Begin observation. You do not need to observe everything that is going on but rather should focus only on those aspects of the activity pertinent to the evaluation.
- Summarize your findings.

Limitations of this Method

- If the group members are aware of being observed, their behaviors may be affected.
- Different observers may not record events consistently.
- If the evaluator is involved in an activity, he or she may lose objectivity.

Case Studies

A case study provides in-depth information on a single unit, project, or organization. Using a systematic process, the evaluator captures the total essence of a situation through personal discussion, interaction, observation, and/or review of existing documents. Yin (1984) describes case studies as explanatory, descriptive, or exploratory.

- Exploratory case studies focus on information as a prelude to a more in-depth evaluation. This can help identify performance measures or pose hypotheses for further evaluation.
- Explanatory case studies can measure causal relationships. They seek to explain how and why something happens and what could possibly make those things happen.
- Descriptive case studies are used to describe the context in which a program takes place and the program itself.

Case studies may also take the form of:

- *Comparative case studies*, which are used to compare program processes and impacts of two or more cases or programs.

- *Pre- and post-case studies*, which examine and describe the situation before and after a program or event takes place.

- *Longitudinal case studies*, which look at a case at multiple times over the course of a program or project.

Limitations of this Method

- People sometimes question the evaluator's objectivity.

- Case studies require extensive amounts of data and time.

- The findings cannot be generalized to a larger population because they focus on a limited number of cases.

Personal Interviews

This method consists of collecting information from one individual at a time through face-to-face (or telephone) contact. The major advantages are:

- The interviewer can see the respondent and hear responses.

- The interviewer can pick up nonverbal clues and ask for clarification.

- The response rate is usually very high.

Limitations of this method:

- Interviews are costly, particularly when respondents are widely dispersed.

- Interviewing requires special skills.

- It may be difficult to keep respondents on track.

- Some respondents may feel uneasy being interviewed.

Casey et al. (1988) offer the following guidelines for conducting personal interviews:

- Clarify the purpose of the interview with respondents. They want to know what is expected of them, how they were selected, and if they can see the results of the evaluation. Always emphasize the confidentiality and anonymity of their responses. You may want to ask respondents for permission to take notes or record thee interview.

- Take notes or record the interview. Sometimes the exact words people use may be important.

- Focus the respondent's attention on the question. If the respondent wants to talk about something else, politely but firmly refer him/her back to the question.

- Ask all questions. Check if you omitted any questions. Be flexible when unexpected problems arise.

- Do not cut respondents off in midanswer, even if their remarks do not seem relevant.

- Respect the respondent's right to refrain from answering a question.

Focus Group Interviews

Historically, focus group interviews have been used in market research to assess consumer preferences and needs, but recently they have been used in program evaluation. Focus group interviews reveal information about human perceptions, feelings, opinions, and thoughts. They are relatively inexpensive, and they stimulate dialogue among participants.

A focus group typically is composed of seven to 10 participants, with members selected because they have certain characteristics in common or interests that relate to the topic of the focus group (Krueger and Casey, 2000). If conducted carefully, the focus groups methodology could serve as a participatory approach to evaluation (Bagnol, 2014).

Focus groups should be conducted by a skilled moderator. The moderator should create an open environment in the focus group that nurtures different perceptions and points of view without pressuring participants to vote, plan, or reach consensus. Krueger and Casey (2000) suggest that the discussion needs to be relaxed, comfortable, and potentially enjoyable for participants as they share their ideas and perceptions. The group discussions should be conducted several times with similar types of participants to identify trends and patterns in perceptions. Careful and systematic analysis of the discussions provides clues and insights as to how a product, program, or service is perceived.

Suvedi and Morford (2003) suggest the following steps to conducting a focus group interview:

- Consider your purpose. Why do you want to conduct focus group interviews? Who are the users of this information? Why do they want the information?
- Identify questions to be asked in the focus group. Establish the context for each question. Arrange the questions in a logical sequence.
- Arrange a suitable meeting place in a convenient location such as a public meeting room, restaurant, or school. The location should be easy to find, relatively free from outside distractions, and have tables and chairs arranged with participants facing one another. Arrange for a tape recorder and test it in advance.
- Identify the audience to be interviewed. Invite members well in advance. Reconfirm their availability to participate just prior to the interview. Explain the purpose of the meeting and how they can contribute. Prepare name tags for each participant.
- Identify a trained interviewer (and assistant, if the group consists of more than 10 people) to conduct the focus group. The interviewer should ask questions, keep the discussion flowing, and take notes.
- Conduct the focus group interviews. The interviewer should welcome participants and restate the purpose. He or she should reassure the participants about the confidentiality and anonymity of their responses.
- Immediately following the focus group interview, the interviewer and assistant should discuss the common themes that surfaced during the interview. They should review the tape before the next focus group interview and make notes.

- Analyze the results by transcribing and summarizing the taped discussion. The interpretations should focus on the meaning of the findings. Are findings of value to the stakeholders? Provide a summary of the focus group interview rather than lengthy transcriptions.
- Prepare a short report for stakeholders.

Limitations of the Method

- Focus group interviews are easy to set up but require skill to conduct.
- Data interpretation is tedious, and capturing the major issues without bias is often difficult.
- Results may not be relevant to the target population.

6.5.2 Quantitative Methods

Quantitative methods are used for summarizing, comparing, or ranking, classifying, and generalizing evaluation results. These methods are suitable for collecting data to evaluate large-scale projects. These methods are often accepted as more credible by those who are more accustomed to use numeric data. Data are useful for generalizing findings to a larger population. Data can also be useful to determine cause -and -effect relationships. Commonly used quantitative methods are described below:

Surveys

Surveys are commonly used in evaluation to document opinions, attitudes, beliefs, expectations, and aspirations. They can provide information about a population by surveying only a sample of the population. Surveys are especially useful when broad information from a large population is needed.

Surveys are generally cheaper than personal interviews and can reach large numbers of respondents. They can allow for anonymity of responses. Evaluators can also ask relatively complex questions. Surveys allow time for respondents to reflect on events and report changes and feelings. The utility of survey data can be enhanced if the information is combined with other methods, such as observation or case studies.

Surveys can be conducted using mail, telephone, online, or a combination, or they can be administered under a group setting such as respondents at the end of a workshop or conference.

Mail Survey

Mail is the method of choice when:

- Size of sample is large.
- Visual display of questions is needed.
- Educational level is high.
- Respondents are dispersed in a large geographical area.
- The budget is low.

If designed properly, surveys can generate valid and reliable information. A mail survey, however, should be avoided if the target population has low education, survey questions are open-ended, postal services are inadequate or weak, or sampling frames are inadequate or not available.

Online Survey

An online or web-based survey is better when:

- Email addresses of respondents are available.
- Respondents have access to the internet.
- Sample size is large and the budget for data collection is low.
- Survey needs to be completed in a short time.

An online survey is similar to a mail survey except the mode of communication is via computer using the internet. Internet or online surveys were a novelty until the late 1990s. Only a few households had internet connections, and email with dial-up modems was very slow. Today, many households have high-speed internet access. University students, school teachers, professional workers, and employees all have access to the internet, and this survey method is gaining popularity.

Many online survey software programs – such as Qualtrics, Survey Monkey, 1-2-3 Survey, etc. -- are available. Compared with mail and telephone surveys, online surveys are more powerful and flexible because of the potential for incorporating built-in features such as:

- Dropdown menus.
- Slider scales.
- Pictures or photos to illustrate scales.
- Color, animation, sound.
- Video.
- Feedback screens and hotlinks.

Telephone Survey

A telephone survey is the method of choice when:

- Respondents are widely dispersed geographically.
- Speed in data collection is essential.
- Sample size is small.
- Cost is not a big factor.

Telephone surveys may yield a higher response rate than mail surveys. To some extent, interviewers can explain questions not understood by the respondents. Telephone surveys, however, should be avoided if we need to ask long and complex questions and/or bias against people without telephones cannot be tolerated. The cost may be higher than that of a mailed questionnaire, it requires good interviewing skills, and there is a natural bias in favor of those with listed numbers and those who are usually in their homes. Phone surveys require clear and simple questions. If

a respondent is unfamiliar with the organization or caller, indifference and/or poor cooperation may affect results.

Group-Administered Surveys

These are used when data are to be gathered under group situations, such as at the end of a workshop, conference, seminar, class, etc. The questionnaire is handed directly to each participant, who answers the questions individually and returns them to the person conducting the evaluation. This approach has two major advantages: there is little or no cost in reaching respondents, and the purpose behind asking for the information can be clearly explained. The disadvantages include: limited generalizability of information to a larger population, (b) time taken away from the regular program, (c) group mood or setting at the time may affect responses, and it does not allow for long-term reactions and changes to occur.

The group- administered questionnaire is developed following the objectives of the evaluation being planned. Instructions for completing the questionnaire are explained to the participants by the evaluator. The evaluator should also tell participants that their participation is voluntary and assure them that their responses will remain confidential. After introduction, the questionnaire is distributed to participant to be filled out individually. Completed questionnaires are placed in a drop-box or returned to the evaluator.

Guidelines for Questionnaire Design

The overall aim of questionnaire design is to solicit quality participation. Response quality depends on the trust the respondent feels for the survey, the topic, the interviewer, and the manner in which the questions are worded and arranged. As you begin drafting the questionnaire, you should make a list of what you want to know and how the information will be used. Make sure the information is not already available somewhere else so you can eliminate all but essential questions for your evaluation. As you write questions, try to view them through the eyes of the respondents. Some guidelines to writing questions and designing questionnaires include the following:

- The title and accompanying graphic of the questionnaire should appeal to the respondents.
- The font should be large and easy to read.
- The questionnaire should appear professional and easy to answer.
- The introduction should identify the audience, describe the purpose of the survey, and give directions about how to complete the questionnaire.
- Questions should not appear crowded. Each question should be numbered, and subparts of a question should be lettered.
- Questions should be arranged in a logical order, with general questions preceding more specific ones. Easy-to-answer questions come first, followed by increasingly complex, thought-provoking, or sensitive questions. Personal or potentially threatening questions should be placed at the end. A request for demographic information should be included near the end of the questionnaire.

- Sufficient space should be left for answering open-ended questions.
- Clearly indicate where branching occurs and where general questions resume.
- Key words should be boldfaced or capitalized to minimize the possibility that they are misread.
- The questionnaire should end with a "thank you" note and return address.

Creating Quality Surveys by Avoiding Errors

Sometimes surveys produce inaccurate results due to data collection errors. Accuracy means survey results closely represent the population from which the sample has been drawn. Inaccuracy can be caused by several types of errors, including coverage error, sampling error, selection error, frame error, non-response error, or measurement error.

Although not all error can be eliminated, the evaluator can minimize the potential for various types of survey error by taking specific actions throughout the evaluation development and implementation process. Dillman (2007) offers suggestions to minimize various type of errors (Box 6.11).

Box 6.11: Types of Survey Errors and Ways to Minimize Them		
Type of Error	**Cause of Error**	**Control of Error**
Coverage error	The sampling frame does not include all units of the population.	Redraw list from which the sample is drawn to include all elements of the population.
Sampling error	A subset or sample of all people in the population is studied rather than conducting a census.	Increase the size of the sample; use random sampling; purge list of duplicate entries.
Selection error	Some sampling units have a greater chance of being chosen than others are.	Use random sampling.
Frame error	List is inaccurate or some sampling units are omitted.	Use up-to-date, accurate list.
Non-response error	Subjects can't be located or fail to respond. Sometimes people who do respond to a survey are different from sampled individuals who do not respond.	Dillman (2007) suggests the use of a social exchange theory to improve response rate -- i.e., increase respondents' perception of possible rewards (e.g., provide token incentives), decrease perceived costs (e.g., time and effort to complete the survey), and encourage trust (e.g., promote trust by showing trustworthy sponsorship) so that rewards outweigh costs.

		Miller and Smith (1983) suggest the following strategies:
		• Compare early and late respondents. If no difference is apparent, results can be generalized.
		• Contact 10% of non-respondents and compare these data with the respondents. If no difference is apparent, results can be generalized.
		• Compare respondents to non-respondents on known characteristics. If no difference is apparent, the results can be generalized.
Measurement error	A respondent's answer is inaccurate because of unclear questions or instructions; socially correct responses; respondent does not know the correct information or is deliberately lying.	• Choose appropriate method of data collection for your evaluation. • Write clear, unambiguous questions that people can and want to answer. • Train your interviewers carefully. • Use valid and reliable instruments.

(Source: Suvedi, 2011)

Pretesting Evaluation Instruments

Pretesting means trying the method and the instruments before actual data collection in the field. It is usually associated with quantitative methods, though qualitative and participatory methods can be pretested as well. The pretesting process avoids costly errors and wasted effort. When possible, pretesting should be done in circumstances like those anticipated during the evaluation. If feasible, use the same sampling plan you will use during the evaluation to select a mini sample.

In pretesting, we ask questions such as:

- Are the issues to be discussed, the questions to be asked, and/or the words to be used clear and unambiguous?
- Is the technique or instrument appropriate for the people being interviewed or observed?
- Are instructions for the interviewer or observer easy to follow?
- Are the techniques and/or forms for recording information clear and easy to use?
- Are procedures standardized?

- Will the technique or instrument provide the necessary information?
- Does the instrument provide reliable and valid information using the criteria of the chosen data collection approach?

You may find that you have to modify the technique or instrument after field testing. If extensive revisions are made, a second field test may be necessary.

Once the evaluation data collection instrument is developed, it should be examined for validity and reliability. Validity and reliability are related directly to objective measurement. Validity asks the question, "Does the evaluation instrument measure what it purports to measure?" One way to assess validity of an evaluation instrument is to use a panel of experts consisting of persons who are knowledgeable of the project being evaluated. Panel members review the instrument's content, format, and audience appropriateness.

Reliability asks the question, "Does the instrument consistently yield the same results with the same group of people under the same conditions?" Reliability looks for consistency, accuracy, and dependability of an instrument. Usually, reliability is established by conducting a pilot test or pretest.

A frequently asked question about reliability is "What value of reliability coefficient is adequate to establish the instrument's reliability?" There is no hard and fast answer to this question. Consider what type and how important a decision is to be made on the basis of evaluation results. The more important the decision to be made, the higher the reliability needed. Generally, an alpha value of 0.7 is considered the cutoff for acceptable reliability (Kerlinger and Lee, 2000).

Combining Qualitative and Quantitative Methods

Combining qualitative and quantitative methods in one evaluation effort can offset perceived biases and complement strengths of different methods. When using multiple methods, take care to ensure that the methods are appropriate to the evaluation questions, and that resources are not stretched too thinly. Multiple methods are appropriate for:

- Understanding a complex social phenomenon.
- Allowing for greater plurality of viewpoints and interests.
- Enhancing understanding of both typical and unusual cases.
- Generating deeper and broader insights.

6.5.3 Participatory Methods

Participation is a fundamental element of effective extension work (Andrews and Vlasin, 2000). We believe that participation creates the environment for learning, change, progress, or improvement. When people participate, they develop a sense of ownership, which is a critical ingredient for long -term capacity building and thus, sustainability. For various reasons, however, evaluators have not used participatory methods in the evaluation of extension work. For example, participatory rural appraisal (PRA) tools can be used in monitoring and evaluation of extension work.

Participatory rural appraisal is an assessment approach that involves multiple data collection techniques that are quick, flexible, and adaptive, yet relevant. The approach aims to incorporate the knowledge and opinions of the target audience or clientele in the planning and management of development projects and programs. While conducting a rapid rural appraisal (RRA), a multidisciplinary team of experts and local representatives visits a community to learn about local people's situations, experiences, and problems from a local perspective. The team may use key informant interviews, observations or checklists, group interviews, or other group methods to solicit ideas, opinions, and perspectives of the local people. The RRA can capture more accurate information than surveys. A few basic participatory methods are given in Box.6.12.

Box 6.12: Basic Participatory Methods

Meetings – Arranging and conducting meetings with stakeholders such as project beneficiaries, development agents, etc., and proceedings are used as evaluation reports. The main disadvantage is that it involves only a little interaction and in-depth assessment is not possible.

Informal Group Discussion – The evaluator comes into an unplanned group setting in which a relevant discussion takes place, coordinated by the evaluator.

Facilitated Group Discussion – Group discussions may also be planned and arranged and will normally be moderated by the evaluator. It is highly interactive and is an in-depth discussion on the effect of the extension program.

Workshop-based Participatory Analysis – The extension beneficiaries and extension agencies jointly explore problems, plan, or evaluate in a workshop setting. Participatory rural appraisal (PRA), participatory learning methods (PLM), and participatory assessment monitoring and evaluation (PAME) are a few examples of this approach.

Collective Brainstorming – An intensive and open-minded communication event that a group of persons agree to embark on in a specific situation. Useful method for analyzing problems that occur suddenly and require an immediate solution.

(Source: Dale, 2004)

6.5.4 Strategies for Improving Evaluation Data Collection

Many factors influence the quality of evaluation. Following are the major ways to improve evaluation (Suvedi and Vander Stoep, 2014).

Selecting appropriate data sources

Data sources are important. Evaluation data can be gathered from primary or secondary sources. Primary sources include original documents, the first reporting of facts, and the first grouping of the raw data collected either by the evaluator or obtained from some other source/method. Secondary sources are materials that combine and synthesize data from multiple primary sources. There is no one "best" method. Selecting appropriate data sources should be based on the relative merits

of each source and influenced by the type of information desired, time availability, and resources available to conduct an evaluation. Data source selection also should consider population type and the nature of the issue to be evaluated. If original data is to be collected, the specific format or source should consider all the above plus question form and content, response rates desired and expected from a specific population, and temporal duration of the data collection process.

Carefully selecting, training, and monitoring data collectors

Surveys and personal interviews are popular forms of data collection for evaluating extension projects and programs. Evaluation projects generally utilize more than one person to collect data. Although many factors may affect data quality, minimizing interviewer variance is critical for acquiring valid and reliable data. In addition to potential diversity among the interviewers themselves, there exist a variety of factors reflecting interviewers' interactions with interviewees, the instrument, and the interview context that might affect data quality. Suvedi and Vander Stoep (2014) discuss various interviewer characteristics, all elements that may affect their understanding of a questionnaire or guiding questions, and their interactions with both the context and interviewees that might affect the nature and quality of the data. As so many factors may affect variance in results attributed to interviewers, careful selection and training of interviewers can help ensure data quality and consistency. If possible, evaluators should identify and select data collectors at the time of finalizing data collection instruments and plans. They must understand the local culture and should have good reading and writing skills, good listening skills, and the ability to build rapport quickly. Trained interviewers having no special attachment to the project/program being evaluated often are the best choice.

Training of data collectors is essential prior to actual data collection. Training topics should include, as relevant to a specific evaluation, an introduction to the study, role of the interviewer, confidentiality procedures, review of the questionnaire and interview protocols, standardized interviewing techniques, probing, recording responses, gaining cooperation, and presentation of scenarios. Pretesting or pilot testing of instruments offers an opportunity for hands-on training for data collectors.

A common problem with using personal interviews as an evaluation technique is falsification of data. Falsified information may include fabrication of entire interviews, deliberate skipping of some questions, or fabrication of contextual factors and interviewee characteristics (socio-demographics). Incomplete surveys and inconsistent answers are common problems with personal interviews. Direct supervision, random verification with sample respondents, and close monitoring help minimize such problems. Frequent checking for completeness of information or data collected, timely adjustment of procedures or tools to fit changing conditions, and timely data entry into a computer database for safe-keeping and analysis contribute to the level of data quality for data analysis. Numerous electronic devices such as PDAs, smartphones, and tablet computers, in conjunction with electronic forms, increasingly are being used to collect survey data. In addition to the ease of using such devices, they can be "stamped" with geo-position data to facilitate geospatial analysis.

6.6   Sampling in Evaluation

Evaluation of extension programs and projects usually involves firsthand collection of data from people. The collection of data essentially involves decisions about the population and a sampling plan. First, we must understand the concepts of population and sample.

"Population" is defined as a group of individual persons, objects, or items having characteristics in common, such as recipients of agricultural extension services, vegetable producers in a district, women business owners, or farm radio listeners in a province. It is the total group from which samples are taken for statistical measurement.

Most evaluative studies use samples to gather information. Some use purposive samples; others use random samples. Many sampling techniques are available for researchers and evaluators.

Why use a sample rather than a complete count? It is cheaper in terms of time, money, materials, and effort. Using statistics, combined with an appropriate sampling plan and relatively high response rate, results can be accurate and precise.

A good sample is a subset of the population that reflects the characteristics of or is representative of the target population (Fink, 1995). A good sample is a miniature version of the population. Sampling involves selecting a smaller number of units from the population in such a manner that they can be used to make estimates about the whole group. Therefore, sampling saves time, money, materials, and efforts without sacrificing accuracy and precision.

Sampling methods usually are categorized in two types:

6.6.1 Purposeful or Nonprobability Sampling

Some evaluators may have to choose purposeful (non-probability) samples if accurate listings of the population are not available, resources to develop a sampling frame are limited, or obtaining cooperation from potential respondents is difficult. A purposeful sample may be chosen to be sure to include a wide variety of people on the basis of several critical characteristics. Sometimes, individuals are specifically chosen to represent a certain characteristic. More frequently, evaluators choose non-probability samples because they can be conveniently assembled. A purposeful sample does not rely on random selection of units.

The following are common purposeful or non-probability sampling methods:

- Accidental sampling. This is the weakest type of sample but is the easiest to get. "Man-in-the-street" interviews are typical of accidental samples. The evaluator usually uses the first five or 10 people who happen along and are willing to talk.

- Reputational sampling. This involves selecting specific people to respond to a survey or to be interviewed about an issue. The choice of an individual depends on someone's judgment of who is and who is not a "typical" representative of the population.

- Convenience sampling. A convenience sample consists of individuals who are available for data collection. For example, households living near parks or schools or persons working in a factory or business are chosen because of convenience.

- Snowball sampling. This type of sampling relies on previously identified members of a group to identify other members of the population. As newly identified members name others, the sample snowballs. This technique is useful when a population listing is unavailable.

6.6.2 Random or Probability Sampling

This is based on random selection of units from the identified population. Random (also called probability) sampling provides a statistical basis for claiming that a sample is representative of the target population. This sampling method eliminates subjectivity in choosing a sample. Every member of the target population has a known probability of being included in the sample.

Several types of random (or probability) samples can be used, including the following:

- **Simple random sampling:** All individuals in the population have an equal and independent chance of being selected as a member of the sample. The list of eligible units comprising a population from which to sample is called a sampling frame. Members of the population are selected one at a time and independently. Once they have been selected, they are not eligible for a second chance and are not returned to the pool. One can use computer-generated lists of random numbers to select the sample. A random numbers table is sometimes used with a random starting point to identify numbered subjects.

- **Systematic random sampling:** All members in the population are placed on a list for random selection and every nth person is chosen after a random starting place is selected. Suppose you have a list of 4,500 households living in a watershed for which a sample of 450 is to be selected for surveying. Dividing 4500 by 450 yields 10, indicating that you have to select one of every 10 households. To systematically sample from the list, a random start is needed. You can toss a die to get a number or use the month of the year you were born. Suppose you were born in March, the third month of the year. This means that the third name on the list is selected first, then the 13th, 23rd, 33rd, 43rd, and so on until 450 names are selected.

- **Stratified random sampling:** To ensure that certain subgroups in the population will be represented in the sample in proportion to their numbers in the population, each subgroup, called a "stratum," is separately numbered and a random sample is selected from each stratum. A clear rationale should exist for selecting any stratum. It is more complicated than simple random sampling and using many subgroups or "strata" can lead to a large and expensive sample.

- **Cluster random sampling:** The unit of sampling is not the individual but rather a naturally occurring group of individuals, such as a classroom, neighborhood, or club. The

clusters are randomly selected, and all members of the selected cluster are included in the sample. Cluster sampling is used in large-scale evaluations.

Several factors need to be considered when determining the sample size:

- **Characteristics of the population:** Sample size must consider the amount of variability in the population to be sampled. A relatively homogeneous population may permit a relatively small sample size; conversely, a more heterogeneous one may require a larger population size.

- **Sampling error:** The difference between an estimate taken from the population and that taken from the sample when the same method is used to gather the data is called the sampling error. It is larger when the sample size is small. Therefore, it is advisable to use the largest sample size possible, given constraints of time, money, human resources, and materials.

- **Confidence level and the margin of error of findings that you desire:** It relates to how sample results are used to make statements about the overall population. Confidence intervals often are used to demonstrate reliability of an estimate. A common rule of thumb is that a 95% confidence interval is adequate.

- **Type I error:** Type I error is made when an effect is shown where one does not exist (similar to a false positive in pregnancy testing). Potential for Type I error is reduced with larger sample sizes.

- **Type II error:** Type II error is made when results show no impact of a program when, in fact, an impact has occurred. Type II error is also reduced with larger sample sizes.

- **Minimum detectable effect size (MDES):** MDES is the smallest true program effect that can be detected for a given power and level of significance. The smaller the effect size we want to detect, the larger a sample size we need for a given power.

A frequently asked question is "How large a sample should be taken?" As indicated above, many factors influence the size of sample. Kerlinger and Lee (2000) offer a rough-and-ready rule – "Use as large a sample as possible… the smaller the sample the larger the error, and the larger the sample the smaller the error" (p. 175). For a simple random sample, Suvedi (2011) provides a table for determining sample size from a given population based on a 5% margin of error.

Table 6.1: Table for Determining Sample Size from a Given Population

Population	Sample	Population	Sample	Population	Sample
10	10	220	139	1200	291
15	14	230	143	1300	296
20	19	240	147	1400	301
30	28	260	155	1600	309
40	36	280	161	1800	316

50	44	300	168	2000	322
60	51	340	180	2400	331
70	59	380	191	2800	337
80	66	420	200	3500	346
90	72	460	209	4500	353
100	79	500	217	6000	361
110	79	550	226	7000	364
120	91	600	234	8000	366
130	97	650	241	9000	368
140	102	700	248	10000	369
150	107	750	254	15000	375
160	112	800	259	20000	377
180	123	900	273	40000	380
200	131	1000	284	75000	382
210	135	1100	288	1000000	384

Note: These numbers represent the total number of surveys/interviews needed to form a valid sample (Source: Suvedi, 2011).

6.7 Organizing and Analyzing Evaluation Data

Sound design and sampling are necessary, but not sufficient, to ensure a quality evaluation. Appropriate and robust statistical analysis is critical to credible results. Choice of analytical technique depends, in part, on whether the data are quantitative or qualitative. But rigor is an essential characteristic for both.

First, evaluators must develop a plan for organizing data before the data are actually collected. A good data organization plan ensures that the data will be maintained in a database that is secure and provides ready access for the analysis. Statistical software (e.g., Excel, SPSS, and SAS) are available for quantitative information. NVivo, NuDist, and Ethnography are commonly used qualitative analysis software.

Tips for organizing your evaluation data:

- Establish a protocol for how to receive and record the information as it comes in. Do not wait for all the information to come in before recording data.
- Label all data immediately as you collect or receive it. It is particularly important to label audio/videotapes with the name of the interviewee, interviewer, and any other pertinent information.
- If questionnaires are used, record the date received, insert code number, and check off the name of the respondent in the master list.

- If interview schedules are used, record date of interview and name of interviewer, and check for completeness of information.
- If data are being transcribed or transferred in some way, check to be sure that this is done accurately.

6.7.1 Qualitative Analysis

Qualitative data are mainly narrative data that come in many forms and from a variety of sources. Sources include personal interviews, focus group interviews, key informant interviews, case studies, daily journals and diaries, documents, and testimonials or storytelling based on personal accounts of experience. Data collection primarily involves the use of participatory methods. Use of participatory methods enables inclusion in impact evaluations of voices of underrepresented groups – such as the poor, the landless, and women – often missed in other types of studies (Chambers, 2009).

Analysis of qualitative data is the process of bringing order to the data and organizing data into patterns, categories, and basic descriptive units. It requires reading, comprehension, and organizational skills. Interpreting qualitative data is the process of bringing meaning to the analysis, explaining patterns, and looking for relationships and linkages among descriptive dimensions. Based on interpretation, the evaluator makes judgments about the value, or worth, of a program or project.

Evaluators who specialize in qualitative analysis use a method called content analysis. Content analysis is a systematic technique for analyzing the substance of a variety of documents, transcriptions, and open-ended survey comments. This process includes carefully reading the information, then identifying, coding, and categorizing the main themes, topics, and/or patterns in the information. Coding involves attaching some alphanumeric symbol to phrases, sentences, or strings of words that follow a similar theme or pattern. One should consider the words used by the participants/respondents and the meaning of those words, the context of comments, frequency and intensity of comments, and specificity of responses. This process allows placing these themes into dominant themes and categories to draw meanings. Guidelines for facilitating qualitative data analysis are presented in Box 6.13.

Box 6.13: Guidelines for Qualitative Analysis

- Get to know your data. Read and reread the text or listen to the tapes before you begin the analysis. Quality analysis depends on understanding the data and its context.
- Classify information into themes and subthemes, know patterns, and organize them into coherent categories that summarize and bring meaning to the text.
- Identify quotable statements, comments, and noteworthy explanations that characterize main themes, and place them under each theme and subtheme.
- Organize themes and sub-themes, patterns, and connections within and between categories.
- Interpret the findings by using themes and connections to explain them.

In summary, qualitative data analysis should focus on organizing and reducing information and making logical inferences. Interpretation attaches meaning to information and draws conclusions. The interpretations may be influenced by the evaluator's philosophy. One method of bringing multiple perspectives to the interpretation task is to use stakeholder meetings. Stakeholders can be supplied in advance with the results, along with other pertinent information, such as the evaluation plan and list of questions, criteria, and standards that guided the evaluation. The meeting with stakeholders can systematically review the findings, with each participant interpreting each finding, using questions. Final evaluation reports should incorporate feedback from the stakeholders.

6.7.2 Quantitative Analysis

Quantitative analysis involves numbers. Evaluation data usually are collected in the form of numbers, or qualitative responses, and are converted into numbers using systematic coding procedures. Data may be grouped by types of data as obtained through different scales of measurement, i.e., nominal, ordinal, interval, and ratio scales. Understanding scales of measurement allows evaluators to use the appropriate statistical test to analyze data and report fairly and concisely the evaluation results.

Frequency counts and percentiles are commonly used techniques to describe findings. Mean, median, and mode are often used to describe and compare results, identify some behavior that is unknown, or compare a group to a standard. Measures of variability such as range, variance, and standard deviation are also used to present and explain results.

Quantitative data help determine relationships or differences between variables. There is a relationship between variables when knowledge of one property (characteristic) of a case reduces uncertainty about another property (characteristic) of the case. If results show a relationship between variables, it means that variables tend to go together in a systematic way.

Correlation statistics measure the relationship between two variables, often between a dependent variable and an independent variable (e.g., number of new production practices adopted and rice yield per unit area) and are reported within a range of +1 (perfect positive correlation) to -1 (perfect negative correlation). Positive relationships indicate that, as the value of x increases, the value of y increases. Negative relationships indicate that, as the value of x increases, the value of y decreases. A correlation coefficient value of 0 means there is no linear relationship between the variables.

Correlations are used with questions such as: Do farmers who attend extension workshops on a regular basis adopt more new practices than those who do not? Are female farmers more likely than male farmers to intend to adopt hybrid maize seed? It is important to note that correlations identify relationships between variables, but they do not establish causation. Table 6.2 provides a guide for common data analysis methods and statistical tests.

Table 6.2: Selection Guide for Common Statistical Methods

Scale of Measurement of Data	Statistical Method	Testing for: Differences (Between groups)	Testing for: Relationships (Within one group)
Categorical Nominal Ordinal	Non-parametric Test	Crosstab or Chi-square	Contingency coefficient: • Phi coefficient • Cramer's statistic • Kendall Tau b (square table) • Kendall Tau c (rectangular table)
Nominal Interval Ratio	Parametric Test (use random sample; assume data come from normally distributed population, and equality of variance)	Independent variable should be categorical; dependent variable should be interval or ratio scale. • Use t-test for independent groups to compare means for 2 groups.	• Use Pearson correlation to determine linear relationship between 2 variables measured at interval or ratio scale. • Use regression to determine relationship between two or more variables.
		• Use t-test for matched-pairs to compare pre/post (before/after) mean scores. • Use ANOVA to compare means of >3 groups.	• Use discriminant analysis if independent variable is measured at interval/ratio scale and dependent variable is dichotomous.

(Adapted from: Miller, 1998; Suvedi, 2011)

Advanced statistical tools and data analysis software are available to assist in determining impacts of extension programs on people, communities, or the environment. A practical concern with use of statistical tools is forgetting to test the assumptions of the tools, which must be met to permit use of the specific tools and to facilitate proper interpretation of results (Miller, 1998). For example, the evaluators fail to use a random sample but inferential statistic like t-test and analysis of variance are used to show differences between project participants and non-participants.

6.8   Communicating and Utilizing Evaluation Findings

The most challenging task for evaluators is to develop useful results from the data and then to share the results with its users. Program administrators and managers have a responsibility to report evaluation findings to stakeholders and other audiences who may have an interest in the results. Additionally, it should be remembered that use of results is different from simply reporting and disseminating them (Patton, 1997). Use of findings means making thoughtful and deliberate decisions based on those results. Thus, communication with stakeholders should occur throughout the evaluation process to help ensure meaningful, acceptable, and useful results.

High quality evaluations should contribute to improvements in programs and policies. Evaluators who are committed to having their work used must ensure that their findings reach intended users in a timely manner. In fact, relatively new thinking in evaluation posits that the job of evaluation is not complete until the results are used. Evaluators should, in collaboration with stakeholders, deliberatively build in clear strategies for integrating evaluation and for using the results during the extension program planning process. In fact, Patton (1997) advocates that evaluation itself be evaluated based on whether results are actually used to inform decisions, make changes in programs, reallocate funds and other resources, and propose policy. Such an approach is termed utilization-focused evaluation. Additionally, telling the truth to those who may not want to hear it is another purpose of evaluation.

Not all information, however, is useful to all stakeholders. Also, not all stakeholders are information users. Therefore, getting the right information to the right people at the right time is essential so that information intended for specific uses is likely to be successful. Evaluators must determine the most effective media formats and venues to reach specific stakeholder groups, and tailor the focus and depth of the reports to specific groups, as not all stakeholders prefer or use the same formats. For example, some prefer short oral presentations; others prefer written reports. Typically, using more than one method is needed to reach all the stakeholders and intended users. The most important thing is sharing evaluation findings in a timely manner with appropriate stakeholders. Varied media formats for sharing evaluation results are listed in Box 6.14.

Box 6.14: Formats and Venues for Reporting Evaluation Results	
Verbal reports	Audio-visuals
Media appearances	Journal or newspaper articles
Executive summaries (varied distribution)	News releases
Public meetings or workshops	Newsletters, bulletins, and brochures
Personal discussions	Poster presentations
Web pages (static and dynamic)	Evaluation reports
Radio broadcasts	Cell phone networks and apps
QR codes linked to information	Text messages
	(Source: Suvedi, and Kaplowitz, 2016)

In a world that is constantly changing technologically, as illustrated with extensive diffusion of cell phone technology into many remote villages and to farmers globally, it is critical that extension systems and services continue to modify and expand their information dissemination systems. For example, extension managers might consider networking with extension professionals online.

Sometimes an evaluator must report negative findings. For example, a program may not be meeting its objectives; a program is being mismanaged; or program changes are needed to increase effectiveness or efficiency. Evaluation can identify negative results as well as their potential causes or contributing factors. Thus, negative results can be just as important as positive results in making decisions. Reporting these difficulties can help avoid future mistakes and suggest ways to improve (Suvedi and Vander Stoep, 2014). However, negative findings must be reported in a manner that helps promote learning and improvement rather than engender feelings of failure.

6.9   Challenges in Program Evaluation

The results of extension programs-- especially knowledge, skills, aspiration changes, and long-term outcomes -- are often intangible and difficult to measure. Suvedi and Vander Stoep (2014) outlined three major challenges in evaluation:

(a)   Frequent use of descriptive, one-shot case study for impact evaluation and lack of precise and straight assessments of cause-and-effect outcomes of program. The extension agency needs to establish a scientific knowledge base and generate evidence on its work. Example: Do farmers who attend trainings adopt new technologies earlier than those who do not?

(b)   It is difficult to establish a control or comparison group, maintain uniform treatments, and measure long-term impacts of extension program.

(c)   Non-availability/inadequate baseline and monitoring data on impact indicators make it difficult to see expanded impacts over time.

6.10 Strategies for Improving Evaluation Practice

Evaluation of extension programs/projects is important for learning lessons and accountability reasons. Lessons learned from evaluation should be utilized in improving programs and developing more effective rural and agricultural development policies.

Listed below are suggestions to improve our evaluation practice:

a)   Good evaluation begins with the planning of an extension project itself. So, plan your evaluation when you plan the extension project.

b)   For an evaluation to be valid and useful to the results users, it must employ sound indicators to measure change or impacts.

c)   Monitoring is a part of the evaluation process, a systematic monitoring process should be developed to track key indicators of progress over the course of an extension program/project.

d)   Good evaluations start with baseline data to establish benchmarks. Baseline data are gathered before the start of intervention.

e) Evaluation data collection methods and data sources should consider the purpose of the evaluation, the quality of evidence, and users of evaluation results. Good evaluations gather valid and reliable data. By using mixed methods, we can complement quantitative data with qualitative information to provide a richer description of impacts.

f) Training of data collectors is essential prior to actual data collection. A common problem with using personal interviews as an evaluation technique is falsification of data. Falsified information may include fabrication of entire interviews, deliberate skipping of some questions, or fabrication of contextual factors and interviewee characteristics (socio-demographics).

g) Select a randomized and representative sample for evaluation studies.

h) Use appropriate and robust statistical analysis to have credible results.

i) Communicate evaluation findings to program managers, policymakers, and funding agency staff using a various formats and venues.

6.11 Conclusions

Evaluation has been neglected and mistakenly seen as a fault-finding mechanism. It is to be understood that evaluation of extension programs and projects is a learning process, and our past experiences guide us to a better future. Therefore, every extension professional should acquire evaluation as a core competency to assess the impact of their programs.

In this module, we discussed the meaning and steps in evaluation, and we differentiated between appraisal, monitoring, evaluation, and impact assessment. Later we discussed important types, tools, and techniques of evaluation by extension program stage and analyzed evaluation designs, evaluation data collection methods, data analysis and report writing. We also discussed the challenges in evaluating extension programs and strategies for improving evaluation practice.

6.12 Self-Assessment Exercises

1. Write the essential program evaluation skills and competencies.
2. Define the following terms:
    a. Appraisal
    b. Evaluation
    c. Baseline evaluation
    d. Follow-up evaluation.
    e. Impact assessment
    f. Monitoring.
    g. Qualitative data
    h. Quantitative data
    i. Stakeholders

3. Differentiate between the following:

   a) Appraisal, monitoring, evaluation, and impact assessment.

   b) Effectiveness and efficiency .

   c) Qualitative and quantitative evaluation data collection.

4. Discuss the various types of evaluations with suitable examples.

5. What are the major evaluation frameworks that are commonly used? Explain the logic framework approach.

6. Write a report on evaluation hierarchy levels and indicators as per Bennett's hierarchy of evaluation for any development program or project.

7. What is experimental design? Discuss its utility in program evaluation.

8. How do you collect evaluation data? Illustrate with examples.

9. How is sampling done in evaluation studies? Discuss with examples.

10. What are the various types of survey errors? Explain the ways to minimize them.

11. Discuss the challenges and strategies for improving evaluation research in practice.

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Personal and Professional Development Skills and Competencies

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7.0   Learning Outcomes

- Define the concept of professional development.
- Identify professional development activities including their benefits for agricultural extension professionals.
- Describe ethical codes guiding the extension profession.
- Engage in various professional development activities.
- Assess progress made while engaging in professional development activities.
- Apply fundamental governance principles in extension work.

7.1   Introduction

Changes in the agricultural system necessitated by factors such as the varied and ever-changing nature of agricultural systems, advancement in science and technologies, changing socio-demographics, increasing globalization, and the increasing struggle for scarce resources require that agricultural extension educators exhibit a high level of professionalism in their service (Ayansina and Adeogun, 2017; Suvedi and Ghimire, 2015). Agricultural extension workers should acquire and employ a variety of essential professional competencies to deliver quality educational programs of relevance and importance to the clients. These relevant skills and competencies are acquired through professional development activities that improve the abilities of extension professionals and stimulate individual improvements (Box 7.1).

Box 7.1: Personal and Professional Development Skills and Competencies

Every extension professional should:

- Apply principles of good governance --i.e., clients' participation, accountability, and transparency -- in extension work.
- Show commitment to career advancement (participate in lifelong learning, inservice training, professional development events and conferences).

The professional development of extension professionals is a critical factor in promoting the efficiency and effectiveness of extension staff and the proper use of their personal and collective capacities and abilities to accomplish the goals of the agricultural extension organization. It cumulatively leads to continual enhancement of staff performance to improve personal and collective aptitudes and abilities (Moradi et al., 2011)

7.2 Concept of Professional Development

The term "professional development" has been used interchangeably in literature with in-service development, staff development, inservice education, staff training, etc. While maintaining the basic concept, various authors have in different ways defined professional development as it relates to agricultural extension. For example, the University of Kentucky (2008) used the term "professional development" to refer to the diverse learning experiences that enhance an extension educator's aptitude as a professional, improve his/her ability to respond to local needs, or aid in meeting continuing career goals. Further, Mincemoyer and Kelsey (1999) defined professional development as education delivered to extension educators in a structured setting that enables them to become professionally competent. Sims (1998), on the other hand, opined that professional development is a continual learning process which can be designed to keep extension educators current in their fields and to foresee the future needs of the organization and its clientele. Extension professional development therefore refers to continuing education and career training for extension professionals following their entrance into the professional workforce to help them develop new skills, stay up- to-date on current trends, and advance their careers.

7.2.1 Rationale for Professional Development

The rationale for professional development is to provide opportunity to extension professionals and educators to continuously learn and apply new knowledge and skills that can assist them in their jobs and advance in their careers. The whole essence of professional development is to build the skill set and knowledge base of extension professionals (Upskillist, n.d.).

7.2.2 Benefits of Professional Development

Antley (2020) and Upskillist (n.d.) identified the following as benefits of professional development:

1. **Expands Knowledge Base:** Professional development offers experienced as well as young extension professionals' opportunities to gain new ideas, enhance knowledge, and boost their professional expertise. These opportunities are of immense benefit to workers who especially seek them out.

2. **Strengthens Confidence and Credibility:** Professional development enhances the professional expertise of extension professionals, thus underpinning their confidence in the workplace. As extension professionals acquire new skill sets and professional advancement through professional development courses and training, they build confidence and credibility.

3. **Improves Income Potential:** Professional development and continuing education offer extension professionals opportunities to gain additional certifications, credentials, and designations. These certifications enhance their employability and provide the potential for a pay rise (increase in income). Often, the value placed on professionals is a function of their professional qualifications and certifications. Extension professionals with the right skill sets who take advantage of improvement opportunities are often seen as more resourceful than those who do not.

4. **Provides Networking Opportunities:** Opportunities for professional development such as workshops, conferences, and seminars provide a good avenue for extension workers to network with colleagues from a variety of organizations and institutions who may be able to help them with career opportunities in the future. These professional networks and relationships become especially useful when extension professionals are ready to move up the career ladder.

5. **Keeps Professionals Updated on Current Trends:** Professional development and continuing education opportunities provide ample avenues to keep up with and stay updated on current trends in agricultural development. Agriculture and farmers' needs are constantly changing. Extension professionals can use professional development and training opportunities to expand their knowledge base, learn about new practices and techniques, and adopt innovative strategies.

7.2.3 Process/Steps to Professional Development

Professional development is a lifelong process. The steps can take a circular path as illustrated in Figure 7.1.

1. **Ascertain Needs:** There are several means by which an extension professional can ascertain development needs. One of these is to conduct a skills audit. The extension professional might request and obtain comments from contemporaries or supervisors on areas in which s/he may need improvement. Conversely, s/he might be interested in a particular area and want to widen his/her knowledge. As soon as the needs and key areas for development have been ascertained, the next step is to plan development activities.

Figure 7.1. The Professional Development Process (Skills You Need, 2022).

2. **Planning and Carrying Out Development Activities:** Development activities can be either formal or informal.

- **Formal:** These are trainings or courses that are often, though not always, provided by formal organizations, institutions, or external providers, and may sometimes involve a cost. Examples include postgraduate studies, short courses, conferences, and workshops. If cost is a constraint, alternatives such as online resources may be less expensive or even free. Both kinds of opportunities can be found through regular web searches.

- **Informal:** Informal education includes learning by practice on the job, virtual training (video training), shadowing, mentoring, coaching, or personal study on subject matter of interest. Showing interest and participating in a team or committee can lead to learning opportunities.

3. **Reflecting on Learning:** This is a very important part of professional development. Learning does not take place only from activities that are designated as development; much learning can take place informally during routine activities done daily.

For any designated development activity, whether formal or informal, there is need to record the highpoints and major learning activities, including new knowledge gained and experiences that are practicable or otherwise. In each case, it is imperative to determine how the development activity will change what one does in the future.

> ***Note:*** *It is a good practice to keep a learning record or diary. Extension professionals should form a habit of writing in the learning log at least at the end of any learning experience (if left longer, the tendency will be to forget). For each learning activity done, record the highpoints and practical lesson. Notes to take may include:*
>
> - *The situation.*
> - *Knowledge gained.*
> - *How to use the new knowledge.*
>
> *An extension professional is expected to use this log to assess his/her progress against set development goals.*

4. **Applying Learning Results:** Attending a training course or watching training videos marks the start of a development process. The application of the leanings/ training result on the job is crucial. According to the competence theory of learning, one moves through four stages whenever learning takes place:

i. Unconscious incompetence – this is a stage where an individual does not know what s/he does not know.

ii. Conscious incompetence – this is the stage where an individual knows where he/she needs to develop and watches other people do something but is still unable to do it on his/her own with any skill.

iii.   Conscious competence – this a stage of being able to do something reasonably well, provided concentration is maintained.

iv.   Unconscious competence – a stage of being able to do something almost intuitively, without needing to focus on it intently (SkillsYouNeed, 2022).

When an extension professional has undergone some sort of training or other skill-building activities, s/he will most likely be somewhere between conscious incompetence and conscious competence, depending on how much s/he has been able to practice. Moving to the stage of unconscious competence requires spending time applying the learning results.

5.   **Sharing Learning Results with Others:** An important part of making sure that one has fully internalized the lessons in the training is to share the result/knowledge /skill with others.

> *Extension professionals should get into the habit of discussing learning outcomes with contemporaries. Discussing learning outcomes with others helps to identify new areas for development or ideas for other development activities, and it helps to refine what they have already learned.*

7.3   Professional Development Activities in Agricultural Extension

There are several types of professional development opportunities for extension professionals. Below are some identified by Halim and Ali (1998):

7.3.1 Preservice Training

The process through which persons interested in pursuing a career in agricultural extension are basically prepared and trained for the profession is known as preservice training. The expectations of this training include attending regular classes in a formal institution, completing a definite curriculum and courses successfully, and receiving a formal certificate, either a degree or a diploma. The content of preservice training emphasizes mostly the technical subject matter -- such as crops, animal husbandry, soil management, and fisheries -- as well as academic skills to prepare the students to work in agriculture.

The two types of preservice training available to agricultural extension professionals are:

- Degree level with either B. Agric or B.Sc. (at least a bachelor's degree in agricultural extension or a related field), which is usually offered over four or five years by a university.
- Diploma level with either OND or HND, which is mostly offered by schools (colleges) of agriculture or polytechnics for a period of two to three years.

Access to preservice development training differs across countries and regions. Generally, the perquisites include:

- Having a good post primary school subject combination result.
- Passing a higher school entrance exam.
- Gaining admission from the university, college, or polytechnic institute.

7.3.2 Inservice Training

The purpose of inservice training is to bring extension professionals at all levels up to date with the current realities. In an ever-changing field like agriculture, driven by emerging technologies, inservice training is very critical. The competencies of extension workers need to be updated and strengthened while they're on the job. According to Halim and Ali (1998), in-service training is always a problem-centered, learner-oriented, and time-bound series of activities which provide the opportunity to develop a sense of purpose, broaden the perception of the trainees, and increase their capacity to gain knowledge and mastery of techniques. Inservice training includes all forms of training for professional improvement which are carried on while an extension professional is already employed with an extension organization and may involve either training on the job itself or training on study leave or away from the job.

Inservice training programs are a supplement, not an alternative, to the formal preservice study program. Extension professionals should be ready to make some sacrifices, financially and otherwise, to take advantage of the opportunities that in-service training provides.

7.3.3 Induction or Orientation Training

This training is designed for newly employed extension staff before they receive a specific work assignment. It is vital for all new extension staff. Through it, they can gain self-confidence and avoid the pain of making costly mistakes. Induction/orientation training helps new professionals understand their responsibilities, job expectations, methodology, policies of the organization, and ethics of conduct, among others. If the work requires some practical skills that were not adequately covered in preservice training, induction training will make up for the deficiency. Most importantly, it familiarizes new job entrants with the basic problems of the people in the area they are going to work.

7.3.4 Maintenance or Refresher Training

The aim of this training is to update and maintain extension professionals' knowledge of a specialized subject matter after they're on the job. Though the focus of maintenance/refresher training is on new information and new methods, it is also concerned with the review of older materials and methods in areas such as soil management, organic farming, livestock management, impact assessment, value addition, and brokering and marketing. Extension organizations may sometimes organize this training for their staff using resource persons from within and outside the organization. In other cases, individual professionals seek out opportunities to update their skills and knowledge in areas of interest.

7.3.5 Career or Development Training

This is a type of inservice training designed to upgrade the knowledge, skills, and ability of employed professionals to help them assume greater responsibility in higher positions. This training is arranged departmentally for successful extension workers at all levels for their continuing education and professional development. Although it is the responsibility of extension professionals to design their career development plan, the extension organization at times sets some basic criteria and provides

opportunities for the staff by offering options. Below are some examples of career development training opportunities.

7.3.6 On-the-Job Training

Extension professionals who have diplomas from an agricultural college or polytechnic may work on obtaining a degree from a university, while those with degrees may proceed to graduate school to obtain a master of science or doctor of philosophy (Ph.D.) degree. The technical knowledge and process skills obtained from the graduate study add to their capacity to meet clientele needs and increase their status among professional colleagues and clients. Whether the extension professional applies for a study leave to obtain an additional qualification or obtains such qualification on a part-time basis, the goal is to improve one's professional competencies and skills. The cost of obtaining an additional degree may be self-funded or paid by an extension organization or an international organization. Many international scholarships are available. Most of these international scholarships are geared toward improving the capacity of extension organizations in low-income countries.

The steps involved in obtaining a higher degree on the job include:

- Meeting the minimum requirement for admission to the institution of your choice.
- Applying for admission to a graduate school.
- Receiving an offer of admission from a graduate school.
- Receiving approval from your organization to pursue a higher degree.

7.3.7 Short Courses or Workshops

Extension professionals may pursue short courses in a particular competency area such as human resource and personnel management, leadership, ICT and digital proficiency, data analysis, communication and advocacy, conflict management, etc. Many of these short certificate courses can be accessed online via the official website of the awarding institutes; lectures, facilitation, and training are also taken online or in person depending on the circumstances and choices of the applicant.

7.3.8 Lifelong Professional Development Opportunities

1. Participation in Professional Organizations/conferences

Membership and participation in professional organizations or associations is another avenue for professional development (Buffalo State, n.d.). Ways to develop oneself through professional organizations include:

- Attending conferences and workshops sponsored by professional organizations.
- Presenting papers at conferences and workshops.
- Serving as an executive member, board member, or committee member.
- Coordinating events sponsored by the organization.

Many extension organizations and associations organize annual conferences for the development of their members. For example, there are national associations of extension professionals in almost

all countries, and a host of regional and international associations, such as the African Forum for Agricultural Advisory Services (AFAAS), the European Seminar on Extension and Education (ESEE), the Association for International Agricultural and Extension Education (AIAEE), International Society of Extension Education (INSEE), etc. Memberships in these associations are open to all interested in agriculture and extension education. Most often, memberships are in two or more groups:

- Student members (with discounted registration fee).
- Professional or ordinary members.

Membership registration is via the association's official website. For example:

AIAEE   https://www.aiaee.org/Join-us/

INSEE   https://www.inseeworld.com/subscription-rate.php

Registration is authenticated on payment of the stipulated registration fee, and membership is sustained by the annual renewal of registration or payment of annual dues. These associations create platforms for members to come together to cross-fertilize ideas, promote scholarship and professionalism, and generate communiqués and research publications contributing toward sustainable development of the agricultural sector and rural economy.

Extension professionals not registered as members of these associations can also benefit from the opportunities these associations provide via their annual or biennial conferences. Often these associations call for submission of abstracts for presentation at their conferences. Also, most times such conferences are organized along with workshops for capacity building of participants.

How to Access and Participate in Conferences?

- Submit an abstract for review and possible acceptance for presentation.
- Pay the stipulated conference participation and paper presentation fee.
- Attend and present the accepted paper at the conference.

Among the several benefits these associations provide are:

- Participation in the annual conferences and professional development workshops.
- Certificates for conference or workshop participation.
- Subscription to the association journal.
- Participation in the association management through committee services.

2. Mentorship Program

Mentoring is an excellent process for the career development of extension professionals. Rolfe (2006) describes mentoring as an alliance of two people that creates a space for dialogue which results in reflection, action, and learning for both. It is a one-to-one reciprocal relationship between a more experienced and knowledgeable person and a less experienced one. It is a multidimensional interaction which can be formal or informal and evolve overtime according to the needs of both the mentor and the mentee. Good mentors can help accelerate mentees' professional development and

help them build confidence and the ability to tackle key tasks (APEN, 2007). Mentoring is crucial for ongoing career development and leadership.

> ### *Mentorship in Extension*
> It is the process in which a more experienced and knowledgeable extension professional provides support, feedback, and guidance to a less experienced or knowledgeable extension professional.

Mentoring as a professional development path is targeted at:

- Increasing the knowledge and skills of new/young extension professionals.
- Boosting the confidence of new/young extension professionals.
- Simplifying and clarifying the job for recently appointed extension professionals.
- Increase the understanding of the role of extension and productivity in the workplace.
- Enlarging the amount of knowledge sharing among professionals.
- Increasing job satisfaction and organizational morale.

APEN (2007) identified the following as benefits of mentorship to the mentee, the mentor, and the organization.

For mentees, a mentorship program helps to:

- Increase knowledge and skills in a particular area of interest.
- Boost confidence in undertaking daily work.
- Improve understanding of what is expected in a work role.
- Provide a helpful setting where one is encouraged to take risks and learn constructively from failure.
- Increase prospects for career mobility and promotion.
- Enhance understanding of the extension system.

Mentors will benefit from:

- Revitalizing and sharpening their professional skills.
- The contentment of nurturing another person and seeing him/her grow and develop.
- Being challenged to think about their perspectives and viewpoints.
- The challenge of having to explain difficult principles and improving their own understanding in the process.
- Being updated on recent trends and developments in the area of expertise.
- Reflecting on their careers and where they are headed.

An extension organization will benefit from:

- Reduction in time needed for new staff to "come up to speed" and be highly productive.

- Improved delivery of services by staff members who are better informed and more highly skilled.
- Reduced employee turnover due to higher employee satisfaction.
- Improved people management skills among staff members and ability to effectively talk through problems.
- Reduced isolation of staff from people outside their section.
- Presence of informal support networks for employees in times of organizational change.

Mentorship opportunities can be established through engagement and fellowship in professional networks such as LinkedIn, Video, Research Gate, etc. Some organizations run mentoring programs. For example, the Australasian Pacific Extension Network (APEN) is a professional organization that provides a mentoring program for people with an interest in extension. Through this program, they match experienced mentors with mentees. The organization has also produced a guide for mentors and mentees.

The steps involved are:

- Mentors volunteer and mentees subscribe to the mentoring scheme.
- The APEN Secretariat matches mentors and mentees, contacting the mentee to confirm the pairing.
- Training is provided to mentors and mentees separately through teleconferences.
- Mentors and mentees meet face-to-face and formalize their relationship by completing the mentoring agreement.
- Mentors and mentees continue to meet and work together on a mutual learning journey.
- Midterm evaluation for participants to review their progress and satisfaction.
- A concluding evaluation is done at the end of the formal relationship.

3. Research

Research provides the opportunity to investigate the unknown, read for additional information on a particular subject, and apply research methodologies. In agricultural extension, a variety of methodologies, approaches, and tools are used for research purposes. Conducting research provides an opportunity to develop the skills and competencies needed to use these tools effectively and helps to expand one's knowledge and competency.

Conducting research and presenting findings to others (Buffalo State, n.d.) can improve one's professional development. Research also provides an opportunity to work/ collaborate/ network with fellow professionals, learn from their experience, and share ideas. For example, in collaborative study, professionals from different extension organizations or even different fields come together to share ideas and resources for research.

4. Personal Reading and Study

Personal reading of professional journals, books, and periodicals is an essential aspect of professional development. Most extension professionals develop libraries of journals, books, and periodicals

related to their professional interests and jobs. Also, some offices have small extension program-oriented libraries. Utilizing these resources and applying the lessons and principles learned can help keep one updated and relevant.

Personal reading of relevant journals, books, and periodicals helps in:

- Staying up to date with technology, systems, processes.
- Learning about new developments in your field.
- Improving existing skills.

> ### *Places to Obtain Books for Personal Reading.*
>
> Websites of international extension associations such as the International Journal of Agricultural Extension, The Journal of International Agriculture and Extension Education, The Journal of Agricultural Education and Extension, Extension organization libraries, and online resources.

5. Increased Duties and Responsibilities

Requisite skills and competence are expected of a particular role or an assignment to meet the challenges related to the task. For example, attaining the position of head of the department or director of an extension organization requires the application of managerial and leadership principles. Hence at this point, it becomes pertinent to develop skills and competency in these areas. Some duties and responsibilities and short-term assignments even in the current position come with challenges that may demand developing new skills. An instance could be when extension professionals are assigned to be part of a committee to organize an extension program or conference. This may require the development of interpersonal skills to be able to work as a team with other committee members. During the committee assignment, cross-fertilization of ideas among members is likely to benefit all members.

7.4   Professional Ethics in Agricultural Extension

Professional ethics are the personal, organizational, and corporate standards of behavior expected from professionals. Professional ethic aims to improve professionalism.

> ### Professional Ethics in Extension
>
> Professional ethics in extension provide guidelines of behavior for extension professionals, not only in their relationship with clients but also their fellow professionals.

7.4.1 Codes of Ethics and Conduct

A code of ethics is a document, usually issued by a board of directors. It is sometimes referred to as a value statement. Its purpose is to encourage specific behavior and provide principles for behavior during difficult situations. These principles are usually general and non-specific, allowing members to make independent judgments about the most appropriate behavior in a given situation (Terblanche et al., 2016).

A code of conduct, on the other hand, is a compulsory set of standards that are stringently enforced. Failure to follow the code of conduct will always attract disciplinary action. Unlike a code of ethics, a code of conduct contains clearly defined expectations about what actions are expected, acceptable, or not allowed in each situation, and it does not allow for any independent judgment of members (Terblanche et al., 2016).

To maintain a level of professionalism, extension professionals should know and follow the code of conduct guiding the agricultural extension profession in line with the ethical standards.

7.4.2 Ethical Codes in Agricultural Extension

The ethical code of conduct in agricultural extension is related to the values upheld. The values shown below are adapted from the Nigerian Ministry of Agriculture, Animal Industry and Fisheries (n.d.).

- Integrity
- Respect
- Diversity and inclusion
- Collaboration and partnership
- Gender and cultural sensitivity
- Accountability and transparency
- Farmer centeredness
- Innovativeness, knowledge, and skills for the enhancement of human welfare

Understanding these core values and standards of extension, which are of equal importance and together form the framework for the code of conduct, is essential for all professionals.

1. Integrity

Integrity connotes the idea of constantly acting according to acceptable morals, ideals, standards, and principles. Individuals with integrity are honest, accountable, and responsible for their actions and lapses. Upholding this value demands that all extension professionals should:

- Follow government policies and regulations.
- Refrain from any action or anything which could compromise their professional judgment.
- Be morally chaste in their dealings and relationships with their clients.
- Avoid working conditions which compromise their professional judgment or cause a decline in the quality of their service.
- Abstain from actions that bestow a personal benefit outside the requisites of employment.
- Refuse gifts, favors, or hospitality that may compromise the professional relationship with the client. This excludes small gestures of courtesy extended by some communities as part of the culture of hospitality and gratitude.
- Avoid promoting or selling products or services to clients for personal gain using their professional position as a cover.

2. Respect

Respect is treating peers and clients in a way that maintains their values, worth, dignity, and uniqueness. Upholding this value demands that extension professionals should:

- Be careful with the property of the farmers or clients while providing services.
- Not reveal private information of the employer or client or partners gotten as part of their job.
- Recognize the experience and expertise of colleagues and respect their contribution.
- Refrain from indifference, bullying, verbal abuse, harassment, or discrimination.
- Avoid gossiping about colleagues and clients in public places or on social media (such as Facebook, emails, Twitter [X], and other electronic communication media).
- Avoid criticizing clients in public.
- Manage time efficiently.
- Acknowledge the contribution of other professional colleagues.

3. Diversity and Inclusion

Diversity involves recognizing and accepting individual differences and uniqueness in values and beliefs, culture, ethnicity, language, ability, experiences, and social/ economic status. Inclusion, on the other hand, refers to deliberate actions to appreciate, acknowledge, and address individual and gender differences. Upholding this value, extension professionals should:

- Uphold all laws regarding human rights and equality, both national and international.
- Recognize that some clients are more disadvantaged and might need additional support and assistance.
- Avoid favoritism and nepotism -- decisions on issues of common interest should be based on merit, using the best available information.
- Strive to communicate with farmers or other clients in a manner that is appropriate to their educational level and understanding.
- Use channels of communication suitable for the message and the audience.
- Avoid political biases, religious sectarianism, and tribalism.

4. Collaborations and Partnerships

Collaboration connotes the idea of teamwork -- working with others to achieve results. Partnerships, on the other hand, are deliberate actions to form alliances between two or more organizations or individuals. Upholding this value and principle demands that extension professionals should:

- Endeavor to work with colleagues and other actors where it is obvious that this adds value.
- Provide support, mentorship, and training to colleagues, young professionals, and other members of the extension profession, particularly those who are inexperienced or under their supervision.

- Refer clients to more qualified service providers if unable to meet their needs.
- Be sincere and trustworthy with partners or collaborators.

5. Cultural and Gender Sensitivity

Culture refers to the way of life, beliefs, and practices of a distinct group of people. It includes the understandings, patterns of behavio4, and values shared by the group. Gender, on the other hand, refers to the culturally and socially determined attributes and opportunities associated with being male and female. The ability to recognize and address the different problems and needs of men and women arising from their culturally determined roles, responsibilities, power relations, and access to and control over resources is referred to as gender sensitivity. Upholding this core value demands that extension professionals should:

- Ensure that the services provided recognize the clients' cultural beliefs and are acceptable to them. Beware of and respect the clients' beliefs, values, and practices in matters such as dressing and grooming.
- Use approaches and methods that promote access to services by men, women, and youths as well as the various ethnic categories of the clientele.
- Assure that recruitment, appraisal, and reward systems are fair and impartial.

6. Accountability and Transparency

Accountability implies taking responsibility for one's decisions and actions. Transparency means to be open and free without a hidden agenda. Upholding this value demands that extension professionals:

- Be truthful and sincere in their relations with professional peers and partners.
- Communicate unambiguously and without delay with colleagues and other actors.
- Assure that accurate incident management records are kept, and that a full report is provided to relevant officials and/or the client in case of an emergency.
- Update peers and key stakeholders about performance through timely, accurate reports.

7. Farmer Renteredness

Farmer centeredness refers to a situation where all activities or initiatives are focused to benefit the farmer. Upholding this value demands that extension professionals should:

- Ensure that the clients' gains are at the center of whatever the service provides.
- Endeavor to respect the client's choices, priorities, beliefs, and values in the context of their capacity.
- Refrain from or discontinue any unsafe, incompetent, unethical, or unlawful extension practices to safeguard clients.
- Minimize loss or failure while providing extension services to the farmer or client.
- Assure that any charges are fair and do not take advantage of the client.

8. Innovativeness, Knowledge, and Skills for the Enhancement of Human Welfare

Innovativeness refers to novelty, newness, and changing processes or creating more effective processes, products, and ideas. Knowledge is defined as what is learned, understood, or aware of. Skill refers to the ability and capacity acquired through experience and aptitude to carryout activities or job functions. Upholding these values will require that extension professionals:

- Be certain that they have the proper knowledge and skills to provide quality services to their clients.
- Build the aptitude of extension staff to meet the demands of their professional duties.
- Disseminate information or provide services only within their area of expertise.
- Always be honest about things they do not know.
- Disseminate correct, complete, timely, and verified information.

7.5 Governance in Agricultural Extension

According to Bitzer et al. (2016), governance in extension refers to the managerial, institutional, and organizational structures and procedures within which agricultural extension services function. It refers to the institutional design of extension services, such as the level of decentralization, privatization, and pluralism of extension services, as well as their monitoring and accountability mechanisms (Devi, n.d.; Bitzer et al., 2016). It also focuses on the roles and responsibilities of the public, private, and civil society sectors in providing and financing extension services, as well as the linkages and coordination across all these actors (Bitzer et al., 2016).

Governance could also be seen as the process by which an extension professional judiciously exercises his/her authority in the execution and administration of agricultural projects in a country while utilizing economic and social resources for development. It could also be seen as the competence of extension professionals to plan, invent, and execute policies and programs to yield expected outcomes (Singh, 2020).

Good governance demands the application of fundamental governance principles. These include participation, transparency, and information and accountability.

1. Participation

Good governance requires that clients (farmers and their interest groups) should be involved and make input during the formulation of development strategies that directly affect them (Subash and Indrajit, 2011). This aspect of governance is very important in securing the commitment and support of the people for the smooth and qualitative operation of agricultural projects. In this regard, extension professionals should ensure that policies and programs are flexible enough to offer beneficiaries and others affected the opportunity to improve, amend, and modify their design and implementation. Stakeholders (clients) should exercise influence over policy decisions and share in the control of resources and institutions that affect their lives. All categories of farmers, including women, should have a voice in decision making, either directly or through legitimate intermediate institutions that

represent their interests. Such broad participation and consultation are built on freedom of association and speech, as well as on the capacity to participate constructively (Singh, 2020).

2. Transparency and Information

Transparency means that decisions and fellow- up activities are carried out openly according to rules and regulations. It also means that information is freely available, easily understandable, and directly accessible in various forms and media (Subash and Indrajit, 2011) to those who will be affected by such decisions and activities. Transparency and information are essential components of good governance. Users of extension programs should have access to transparent information on policy decisions and programs of investment to ensure efficient resource use, minimize waste, and avoid diversion and unproductive use (Singh, 2020). They should also have easy and reliable access to institutions, processes, and information through various authentic sources, and clarity about rules and regulations.

3. Accountability

Accountability is a key prerequisite for good governance. An organization or an institution is accountable to those who will be affected by its decisions or actions (Subash and Indrajit, 2011). Extension professionals, therefore, are expected to be accountable to their clients. Extension professionals should account for the allocation, use, and control of public assets following legally accepted standards.

7.6 Conclusions

Professional development activities are indispensable to the success, growth, and performance of extension professionals on the job. The skills and competencies required of extension professionals to build relationships with clients and form sustainable collaborations with colleagues come through professional development and enhance efficiency in the discharge of duties. Continuous professional development keeps extension professionals updated and attuned to the changing realities. Professional development does not come by chance -- it follows a circular process or steps that make it continuous and uses formal and informal strategies. Like every other profession, the extension profession is guided by ethical codes of conduct, values upheld by extension organizations for proper conduct and behavior of extension service providers. Knowledge and understanding of these core values of extension are essential for all professionals. Above all, extension professionals need to implement principles of good governance in developing and implementing extension programs to ensure involvement, acceptance, commitment, and sustainability of programs.

7.7 Self-Assessment Exercises

1. What do you understand is meant by professional development? Discuss the rationale and benefits of professional development for agricultural extension professionals.
2. Explain various professional development activities for agricultural extension professionals.
3. Discuss the process/ steps to professional development.

4. How would you engage in various professional development activities? Illustrate with examples.

5. What are the fundamental governance principles in extension work? Explain them with examples from field extension work.

6. Describe ethical codes guiding the extension profession with suitable examples.

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Diversity and Gender in Extension: Skills and Competencies

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8.0   Learning Outcomes

- Explain the concept and dimensions of diversity and gender in extension.
- Identify the needs of women and youth farmers.
- Discuss the importance of integrating gender development indicators and diversity concerns in extension.
- Describe the strategies for managing diversity in extension organizations.
- Develop critical thinking skills related to gender issues, gender stereotypes, and gender equality.
- Conduct gender analysis and develop extension programs for women and youth farmers.

8.1   Introduction

Addressing gender issues is critical in agricultural extension programs to promote inclusivity, equity, and social justice. Agriculture is a gendered sector, and gender plays a significant role in shaping access to resources, decision making, and control over productive assets. Therefore, gender consideration is essential to ensure that agricultural extension programs are responsive to the needs and priorities of women and men as well as other diverse groups of farmers.

Diversity and gender are crucial factors that must be considered in agricultural extension programs to improve social, economic, environmental, and a variety of other types of outcomes. By adopting gender-sensitive and inclusive approaches, extension workers can ensure that both men and women as well as other diverse groups of farmers have equal access to resources, knowledge, and decision making in agriculture. The objective of this chapter is to equip agricultural extension professionals with the necessary skills and competencies to effectively address diversity and gender issues in their work (Box 8.1).

Box 8.1: Diversity and Gender Skills and Competencies

Every extension professional should:

- Understand that diversity exists within and among clients and stakeholders.
- Explain the concepts of gender and gender analysis.
- Identify the needs of small-scale farmers.
- Identify the needs of minority groups.
- Develop extension programs to benefit women farmers.
- Develop extension programs to benefit youths.
- Engage marginalized and vulnerable groups in extension programs.
- Do teamwork with diverse staff members.

8.2   Understanding Diversity

Over the past decades, agricultural extension programs have experienced greater participation of women, minorities, migrants, older people, persons living with disabilities, youths, and people of various nationalities as their clients. Gradually the changing composition of the clientele is becoming apparent, and the emergence of these groups as clients presents equally new challenges. Increasing diversification of clients' needs requires creative retention strategies and innovation. Agricultural extension projects/programs, processes, products, and services must be customized to meet these specific needs. Still, many ask why extension should concern itself with diversity. The simple answer is that discrimination is wrong, both legally and morally, and today, the notion of diversity is more and more gaining ground: a more diverse clientele can increase the effectiveness of agricultural extension to achieve its objectives. It can lift morale, bring greater access to new segments of the marketplace, and enhance agricultural productivity.

The understanding of diversity has been evolving since the 1980s, when the term was mainly used to refer to minorities and women in the workforce. The commonly used definition of diversity is the representation of minorities within a group or organization (Chen and Hamilton, 2015). For a long time, it was common to assume that diversity is about increasing gender, national, or ethnic representation -- that it is concerned with including more people from underrepresented "identity groups".

According to Washington and Patrick (2018), diversity represents the full spectrum of human demographic differences -- race, religion, gender, sexual orientation, age, socio-economic status, and physical disability. Various demographics as well -- lifestyles, personality characteristics, perspectives, opinions, family composition, education level, or tenure elements of diversity -- are considered, too.

Diversity refers to the extent to which members of an entity, such as a group or organization, differ from one another (Gonzalez and Zamanian, 2015). This encompasses a very broad range of individual attributes, although most attention has been given to differences in gender, race/ethnicity, and

age. Diversity in attributes such as nationality, culture, education, function, tenure, ability, sexual orientation, religion, values, personality, goals, and many others is gaining attention.

The five most significant advantages that organizations with active diversity policies ascribe to diversity are:

1) Strengthening cultural values within the organization.

2) Enhancing corporate reputation.

3) Helping to attract and retain highly talented people.

4) Improving motivation and efficiency of existing staff members.

5) Improving innovation and creativity among employees.

8.2.1 Diversity and Inclusion

Inclusion must be understood as very different from diversity because simply having a wide roster of demographic characteristics will not make a difference to an organization's bottom line unless the people who fall into the various demographic groups feel welcomed. Therefore, inclusion refers to a cultural and environmental feeling of belonging (Washington and Patrick, 2018). It can be assessed as the extent to which employees are valued, respected, accepted, and encouraged to fully participate in the organization. People in inclusive environments feel appreciated for their unique characteristics and are therefore comfortable sharing their ideas and other aspects of their true and authentic selves.

Despite the clear distinctions between the two, diversity and inclusion often go undifferentiated because the two are intertwined when it comes to cultivating a uniquely diverse and inclusive environment. In the context of an organization, diversity equals representation. Without inclusion, however, the crucial connections that attract diverse talent, encourage their participation, foster innovation, and lead to business growth will not happen.

Therefore, diversity and inclusion work together to affect outcomes. Understanding them as fundamentally *different* things is essential, however because it divides and clarifies the primary challenge for leaders: understanding the implication that demographic variety has on organizational performance, and creating an environment that invites the full spectrum of clients' perspectives and maximizes them.

How can extension workers incorporate diversity and inclusion in their work?

To assess and obtain the advantages of a diverse, inclusive environment, extension professionals need to first define what diversity means for their unique culture and how they expect inclusion to manifest on their teams. Next, extension professionals need to quantify the various constituencies -- demographic, social, and otherwise -- at all levels of the extension organization and in various roles to have objective data to indicate if they are diverse and inclusive. Identifying the demographic makeup of the organization is an easy, quantitative process, indicated below.

(1) Ask/Inquire

Assessing a culture of inclusivity requires both qualitative and quantitative information. To get that, all an extension worker needs to do is ask about the environment, the culture, and people's feelings

about them. Inquire if they feel comfortable offering opinions based on their experiences, or if their perspectives are well -received.

(2)   Listen and Respond

Listening carefully to their answers and thoughtfully laying them alongside quantitative data will illuminate the bigger issues in many cases. The extension worker should first tackle areas where clients' responses indicate they need the most attention. In any case, diversity and inclusion improvements both reflect the tone and the values set at the top level.

The three requirements that must be present in each of the strategies above are:

1.   **People are treated with respect:** A culture of inclusiveness is rooted in respect. Clients must be treated with and treat others with civility and decency. Just knowing that respect is an organizational policy encourages them to speak up and share new ideas.

2.   **People are valued for their strengths:** This will lead to effective collaboration, productivity, and profitability.

3.   **Do what is right:** For a diversity strategy to promote a culture of inclusion, extension professionals must make their values and intentions clear. They must intentionally create an environment where their clients feel they can safely express themselves and where specific concerns can be raised with transparency and confidence. The extension professional should be fair to all and create a trusting and open environment. Perceived bias in hiring, assigning work, evaluating, compensation, and promotions can instantly erase people's belief that an organization is genuinely committed to diversity. And that goes for everyone, whether in the minority or not.

8.2.2 Diversity Management

The potential for positive, negative, and complex effects from diversity warrants efforts to manage diversity. Diversity management refers to the development and implementation of practices, processes, and systems designed to enhance workplace diversity, exploit its benefits, and minimize adverse outcomes (Gonzalez and Zamanian, 2015).

It is a multifaceted concept which integrates managerial activities, based on the definition of workforce diversity, through cultural awareness, to consider diversity as an organizational goal and implement a supporting program for diversity (Sabharwal et al., 2016). Consequently, diversity management is all about integrating the ideas and practice of diversity into the day-to-day managerial and learning processes of an organization and its environment so that business decisions are made in an atmosphere of trust, acceptance, and appreciation. The active and conscious development of a future- oriented, value- driven, strategic, communicative, and managerial process of accepting and using certain differences and similarities as a potential in an organization adds value to the organization. In other words, diversity management can be associated with a constructive process which requires both reflection and action; it is learned and constructed, not simply adopted.

Diversity management includes affirmative action policies, which aim to comply with the law, as well as management-led diversity initiatives, which refer to formalized human resource management

practices designed to reduce bias and discrimination, promote and sustain organizational diversity, and improve performance.

According to Schreier, Capone, and Nuntana (2019), five important competencies are necessary for an extension professional to effectively manage diversity:

- Interpersonal competence.
- Leadership competence.
- Business management competence.
- Diversity management competence.

Diversity Management Competence (DMC)

For successful diversity management, a competency approach is considered the most appropriate strategy, and this depends on the development of specific diversity management competencies (DMC). Competence means and requires action in a specific domain, and action is required to attend to organizational objectives through the benefits of successful diversity management. Competence also combines knowledge, aspects of character, skills, and attitudinal and other factors which positively affect performance (Adebukola, 2018), and this is what is being examined to optimize the diversity management process and its outputs.

Hansen et al. (2000) described diversity management competence as: (a) awareness and knowledge of how age, gender, race, ethnicity, national origin, religion, sexual orientation, disability, language, and socioeconomic status are crucial to an informed professional understanding of human behavior; and (b) clinical skills necessary to work effectively and ethically with culturally diverse individuals, groups, and communities. Derek and Kecia (2005) present diversity management competencies as reflecting individual understanding and awareness of the ways in which cultural and various factors within shared identity are vital for professional understanding of human behaviors, both within the workplace and externally, as well as reflecting the people skills which are needed for managing and working with people, groups, and organizations with a wide-ranging demographic. This view of diversity management competencies evokes the dynamic aspect of diversity management competence and means that diversity management competencies must be operationalized through behaviors which can improve work and conditions of work.

On the basis of this analysis, diversity management competencies will be considered as an individual dimension related to the personality, translated through actions and benefits on an inter-individual level. Diversity management competencies can be appreciated individually and at the organizational level. According to Alfalih (2022), diversity management competencies on the individual scale are examined through three main dimensions: diversity adaptability, which is related to the ability to adapt and reflect the degree of openness needed to reach an adequate solution and avoid conflicts; diversity leveraging, expressed by the strategic engagement of diversity to achieve organizational objectives; and inclusiveness, related to equality independently of differences.

Finally, diversity management cannot exist without its being embedded in a moral and legal climate. The ethics and law concerning anti-discrimination are not just a part of the organization's environment; the organization's identity itself has to reflect our human rights traditions.

According to Visagie, Linde, and Havenga (2011), extension professionals need to possess five key competencies to manage diverse groups:

i. Cultural empathy: Cultural awareness, cultural understanding, respect for values, treating people as individuals, using divergent perspectives, and experience in other cultures.

ii. Learning of the job: Adapting to the content, curiosity, willingness/openness to learning about others who are different, willingness to change one's own concepts about diversity, tolerance for ambiguity and being observant, sensitivity toward terms labelling groups regarding diversity; ability to identify diversity issues and understand related tensions.

iii. Communication competence: Listening, open-door policy, clear expression, non-verbal nuances, knowing other languages, active and non-judgment listening, and ability to provide appropriate responses.

iv. Leadership competence/generic managerial skills: Motivating, consulting, human resource factions, conflict resolution, planning, goal and task focus, and budgeting.

v. Personal style: Emotional stability, ability to express respect and appreciation.

vi. Collaboration skills.

vii. Empowerment: Ability to educate others on how to build diverse people skills.

8.3   Dimensions of Diversity

Diversity has many dimensions that interact with and influence one another, and that emerge or are displayed differently in different contexts, environments, and circumstances, making analysis and management complex. Generally, dimensions of diversity depend on the location of an organization. If diversity is well- managed, it can improve organizational effectiveness, but if it is not very well -managed, it can go against productivity and effectiveness.

The Four Layers Model of Diversity

1. Personality: This includes an individual's likes and dislikes, values, and beliefs. Personality is shaped early in life. It influences and is influenced by the other three layers throughout one's lifetime and career choices.

2. Internal dimensions: These include aspects of diversity over which we have no control (though "physical ability" can change over time due to choices we make to be active or not, or in cases of illness or accidents). This dimension is the layer in which many divisions between and among people exist and which forms the core of many diversity efforts. These dimensions include the first things we see in other people, such as race or gender, and on which we make many assumptions and base judgments.

3. External dimensions: These include aspects of our lives which we have some control over, which might change over time, and which usually form the basis for decisions on careers and work styles. This layer often determines, in part, with whom we develop friendships and what we do for work. This layer also tells us much about whom we like to be with.

4. Organizational dimensions: This layer concerns the aspects of culture found in a work setting. Issues of preferential treatment and opportunities for development or promotion are impacted by the aspects of this layer.

The usefulness of this model is that it includes the dimensions that shape and impact both the individual and the organization itself. Though the internal dimensions receive primary attention in successful diversity initiatives, the elements of the external and organizational dimensions often determine the way people are treated, who "fits" or not in a project, who gets the opportunity for development, and who gets recognized. Box 8.2 shows four layers of exercises for extension workers.

Box 8. 2: Four Layers of Exercises for Extension Workers

1. Read over the factors on the four dimensions. Think about how the various factors influenced the choices and decisions you made in selecting beneficiaries of extension projects. Which has had a positive impact? Which has had a negative impact? Which are you proud of? Which do you try to hide from others?

2. Looking at the factors again, think about those you have difficulty in accepting in other people. Which of the factors do you make snap judgments on? Which influences your decisions in a negative manner? What factors cause you to try to avoid contact with others?

3. To explore your values, create a list with the names of individuals/groups/communities you associate with frequently. Next to each name, write some of the factors from the dimensions that you are both aware of and those you assume to be true about them.

   For example: Akpago community: black, osu, impoverished, little or no education, dominantly traditional worshippers.

   Ifeadigo community: black, middle-class, somewhat educated, mixed religions (Christians, Muslims, Traditionalist) (You can select different factors for each group.)

   Then ask yourself: how do I treat these groups differently, both in a positive and a negative manner, based on what I know or the assumptions I am making, about them? Where are my biases coming out?

4. Finally, the four layers can be used as a team- building exercise for organizations by having each extension agent work through exercises 1 and 2 individually, and then discussing responses together.

   Adapted from Gardenswartz and Rowe (1998).

Dimensions of Diversity

1. Race and Ethnicity Diversity

Race has to do with a person's grouping based on physical traits. A number of theories have been used for studying race/ethnicity as a central variable of interest. Most of these theories attempt to explain behavior from an individual or within the work group perspective. A majority of these theories stem from our cognitive and social need to categorize ourselves and others on the basis of surface-level or readily perceivable characteristics such as race. Some of the basic assumptions made about people and human nature contained in many of these theories are that: humans judge each other on surface-level characteristics, such as race or gender, in the absence of additional information; group membership based on these characteristics implies true similarities or differences between people, which then create the formation of in-group and out-group distinctions; these judgments ultimately result in outcomes that may have negative effects for minority or out-group members (e.g., lack of mentors, stalled careers, lower performance evaluations) or group productivity.

Within the literature on race and ethnic diversity, some theories focus on positive predictions or possible positive outcomes of racial/ethnic diversity. It argues that diversity creates value and benefits for team outcomes. The general assumption that underlies these theories is that an increase in racial/ethnic diversity means that a work group will experience possible positive outcomes such as increased information, enhanced problem-solving ability, constructive conflict and debate, increased creativity, higher quality decisions, and increased understanding of various ethnicities/cultures. Another underlying assumption is that surface-level diversity, such as race, is indicative of deeper level differences, such as cognitive processes/schemas, differential knowledge bases, different sets of experiences, and different views of the world.

Extension Workers' Responsibility Toward Racial Diversity

A project/program that is racially diverse consists of beneficiaries who are from any racial background. There should be no restriction on the type of work that can be done or compensation based on race. To go along with ensuring racial diversity, diversity with regard to ethnicity should also be included. To make sure that racial diversity is a priority in his/her work, an extension worker must:

i.   Develop, implement, and disseminate a comprehensive policy that promotes racial diversity.

ii.   Involve individuals/groups of different racial backgrounds.

iii.   Not segregate beneficiaries in a project on the basis of race.

iv.   Use inclusive language in all policies and meetings.

v.   Impose consequences on anyone who does not adhere to this policy.

2. Gender Diversity

Gender refers to the socially, culturally, and politically constructed roles of women and men in their societies. Gender diversity consists of a fair and equitable representation of people

of different genders, usually referred to as an equitable ratio of men and women. Achieving gender equality, promoting gender justice, and fostering an inclusive society should be one of the core objectives of agricultural extension. Therefore, it is important to acknowledge the gender gap and gender diversity in the agricultural extension environment and eliminate every form of discrimination based on gender. It is easy for an organization to state that it supports equal opportunities, but it is crucial that there is a solid framework in place to highlight exactly what the organization is doing to promote diversity. Having women, men, and youth clients in agricultural extension programs means benefitting from the different points of view and approaches that come from different life experiences and getting a fuller picture of needs at the local and household levels. A multiplicity of perspectives can spark creativity and innovation and help the organization spot and seize new opportunities. It can also encourage organizations to challenge gender stereotypes.

Extension Workers' Responsibility

i.   Challenge stereotyping and unequal power relations between women, men, boys, and girls to promote gender equality and inclusion. If all people feel welcome and are treated equally, engagement and productivity will be unhindered.

ii.   Gather gender- specific needs and feedback to inform program plans from the earliest interactions with communities and households. Comparing what women, men, and youth express they need, their assets, and their ideas can inform inclusive services that are not gender biased.

iii.   Remove barriers to the full and equal participation of men, women, boys, and girls in agricultural extension work. For example, pregnant and lactating women are considered a protected class. Women should not be prohibited from participating in agricultural extension programs because they are pregnant or lactating mothers; rather, they can be assigned light duties. The extension worker can provide modifications so that they can fully participate but in less strenuous activities. However, it should be ensured that women willingly want to participate in extension activities. In some cases, programs and projects have unknowingly or knowingly coerced women into attending trainings and other activities to meet a gender quota, which can deepen gender divisions and add to women's already heavy workloads and time burdens.

iv.   Build an inclusive environment and ensure that everyone feels heard. This does two important things. First, it makes sure that people feel important enough to be heard. But second — and more critically — it gives them a chance to be known for their ideas and skills, not their gender.

v.   Use inclusive language in all your policies and meetings.

vi.   Make sure that everyone has access to every aspect of agricultural extension programs, including leadership roles, regardless of gender.

3. Age Diversity

Age is an expression of an individual commonly measured in whole years since birth. It is a complex dimension, and it operates in different ways throughout a person's lifetime. Age diversity means working with people of different ages and, most importantly, generations. For example, millennials, GenZers and GenXers can coexist in the same environment. An important issue in the age of diversity literature is the role of stereotypes. Stereotypes about older workers have been primarily negative, including such views as older people are less productive, flexible, creative, and harder to train, more rigid and resistant to change, and less comfortable with technology.

An agricultural extension worker faces another age-related dilemma: with farmers being old men and women, the challenge is attracting younger generations to become part of the organization. Having a mix of members of various generations interacting and working together provides for a variety of perspectives and approaches to problem solving, which could deliver optimal results. If agricultural extension hopes to solve the world's most pressing agricultural issues, it will need the creativity and innovation that comes with the variety of viewpoints that age diversity provides. For example, older employees are likely to have knowledge and experience that is useful within groups, but such human capital may be utilized only in an environment in which positive relations exist among members who appreciate different types of contributions.

Extension Workers in Age Diversity

    i.   Age diversity is among the most crucial factors that strengthen an organization. For extension work to prosper, an extension worker should ensure that older and younger farmers are supported equally, and that their strengths are equally utilized. The young farmers can boost technology and contribute to the latest trends and techniques. At the same time, the older farmers can offer a broader perspective and knowledge in decision-making through their experience.

    ii.   A variety of viewpoints and approaches to problem solving will give your company a holistic approach to decision making.

    iii.   Use inclusive language in all your policies and meetings.

4. Disability Diversity

The term "persons with disabilities" is used to apply to all persons with impairments that, in interaction with various attitudinal, environmental, and institutional barriers, hinder the full realization of their rights as well as their full and effective participation in society on an equal basis with others. Disabilities may be developmental, physical, sensory, or mental health conditions. Taking a broad view of disability as something that may not be visible is important in boosting efforts toward inclusion in a project/program. As with other forms of diversity, disability inclusion goes much further than just making sure an extension worker is meeting a quota. Disability inclusion means understanding and addressing the causes of all these types of exclusion. It is about creating an inclusive environment where people feel welcome and comfortable and where they

are seen, valued, and appreciated for what they bring to the table, not despite their differences but including their differences, as no one wants to be tolerated or pitied. People with disabilities, just like those without disabilities, want to be recognized for their talents and accomplishments. Extension workers should not hold lower expectations of a person with a disability, such that the person would be rewarded for performing better than expectations rather than for his or her level of performance. It is crucial as a respectable organization to equip disabled employees with the required tools.

Having effective and courageous conversations about disability inclusion may be uncomfortable and new. It requires sensitivity and care plus a healthy dose of transparency to unlearn implicit bias and become more aware. It requires support for leaders to be more confident and empathetic as they create environments inclusive of disability. It requires support for those with disabilities so that they do not have to be the sole advocates and standard bearers to fight for inclusion.

Extension Agent's Responsibility in Disability Diversity

i.   Make sure that areas where extension programs are to be held are accessible for persons with disabilities. There should be designated handicapped parking spaces, entrances and exits that accommodate wheelchairs, ramps for smooth travel, etc.

ii.   Provide diverse options for project participants to choose from when applying to be part of a program/project so that persons with disabilities will not be marginalized (e.g., consider methods that include individuals who are hearing- impaired, sight- impaired, etc.).

iii.   When advertising a program, advertise where a diverse population can have access to it, not just a small group. Also, avoid using language that automatically discourages certain individuals from applying, even though an individual meets the basic education/ experience requirement. Do not ask applicants if they have a disability.

iv.   Employ a variety of extension teaching methods when carrying out extension projects so that no one is left out or left behind. Provide the latest technologies, such as screen readers or other software.

v.   Use inclusive language in all your policies and meetings. Be on the lookout for language that may exclude people, even if you think the meaning is clear. Avoid referring to people with disabilities as "physically challenged," "differently abled," or "special needs." Never use the word "normal" to describe people without disabilities.

vi.   Create safe spaces, and embrace diversity, not just tolerate it. People want to be welcomed, not just tolerated. The agricultural extension program environment should reflect sensitivity and inclusivity, and celebrate people's differences, both visible and invisible. No matter what, stay transparent and humble, and keep trying to do better. The goal is not to be beyond reproach -- it is to develop an environment where everyone is treated the way they want to be.

vii. Hire an expert: When it comes to disability and inclusion, extension workers do not have to know everything -- they just have to be willing to learn. Do not hesitate to hire a professional who is familiar with laws and accommodation you may not be aware of. He/she can provide resources for practical, disability-inclusive solutions, such as captioning, braille, or sign language interpretation.

viii. Talk to the people. At some point, the extension agent will need to actually reach out to the people involved and find out what they need. People will appreciate you making accommodation for them, but leaving them out of the decision-making process is insulting. It may also result in frustration if you make well-intentioned changes that no one actually needed. Including people with disabilities in your decision making is necessary.

5. Sexual Orientation Diversity

Sexual orientation is a continuum that refers to each person's capacity for profound emotional, affectional, and sexual attraction to and/or intimate and sexual relations with another individual, who may be of a different gender or the same gender or more than one gender. Sexual diversity refers to all the diversities of sex characteristics, sexual orientations, and gender identities without the need to specify each of the identities, behaviors, or characteristics that form this plurality. It includes intersex people, those born with a variety of intermediate features between women and men. It also includes transgender and trans-sexed people, gender- fluid people, and so on. Lastly, sexual diversity also includes asexual people, who feel disinterest in sexual activity; and all those who consider that their identity cannot be defined, such as queer people. Sexual orientation is a protected characteristic relating to a person's sexual orientation toward people of:

i. The same sex (the person is a gay man or a lesbian).

ii. The opposite sex (the person is heterosexual).

iii. Both sexes (the person is bisexual).

Sexual orientation diversity is about acknowledging and respecting that there are many ways to identify outside of the binary of male and female. Theories related to sexual orientation involve relational demography, stereotyping, and stigma. A stigmatized group is viewed as non-normal by those who are in the majority. When a stigmatized characteristic is less visible, which is often the case with sexual orientation; the individual possessing that characteristic may choose not to disclose this fact to others. Safety and inclusiveness should be foundational to the extension workplace and engagement in communities. This means embracing diversity, openness, and protection of marginalized and underrepresented people – ensuring no one is pushed to share highly personal and sensitive information.

Extension Worker's Responsibility

i. An extension worker should make the environment conducive for everyone. People thrive in an environment wherein they feel accepted, heard, and secure. A hostile work

culture will not allow farmers/stakeholders to express themselves, eventually hampering their progress. Also, people having to hide aspects of who they are in fear of alienation is stressful and may lead to individuals not giving their best.

ii. Promote transformative workplaces and programs that constantly shift conditions toward greater inclusion while also carefully examining and being respectful of the cultural and social norms of each extension context before setting up policies for diversity and inclusion. For example, in some countries and even some communities, it may be more acceptable to be openly gay; in others, this could be risky for a person's safety and social status.

iii. Use inclusive language in all your policies and meetings.

iv. Acknowledge same-sex relationships and give partners equal access to services and benefits available to heterosexual couples.

v. When asking questions about marital status, also include civil partnership (as one question, such as "are you married or in a civil partnership?") but only if this is relevant (i.e., applying for a civil partnership ceremony). Ask questions that may reveal marital/ partnership status or sexual orientation only if it is essential, and do not force people to disclose such information. Where relevant, use "spouse/partner" instead of just "spouse" or "husband/wife". Information about sexual orientation may be collected as part of diversity monitoring as long as it is anonymous.

vi. Encourage a culture of openness about sexual orientation, recognizing at the same time that some people may not be "out" for family reasons or for fear of how they may be treated, or they may just choose not to be out, either at work or out of work. This is a legitimate personal choice which should be supported by the organization policies and practices. It does not need or invite justification.

vii. Everyone should avoid the assumption that people are heterosexual until forced to prove otherwise.

viii. Services should be delivered in a way that does not automatically assume or require identity of sexual orientation (unless unavoidable because of the nature of the service, such as civil partnership ceremonies, or the individual has particular social needs).

ix. Learn more and educate yourself. Learn the basics of queer culture just as you would learn about the culture of another country. Understand you will have to deal with such people at some point.

6. Cultural and National Origin Diversity

Culture is broadly defined as characteristic ways of thinking, feeling, and behaving shared among members of an identifiable group. While some elements of culture are visible and observable (e.g., accent, religious apparel), others are subtle. Cultural diversity is the existence of a variety of cultural or ethnic groups within a society.

Cultural and national diversity in organizations can be seen from a pessimistic view or an optimistic view. The pessimistic view is derived from social identity and similarity-attraction paradigms, which postulate that individuals prefer their own group. Cultural diversity generates in-group allegiance and distractions that are detrimental to group performance. An alternative, optimistic view contends that cultural diversity facilitates information processing, learning, and problem-solving capacity and reduces group thinking. Under this optimistic view, cultural diversity is conceived to be beneficial to group performance.

Thomas et al. (2001) proposed three reasons why an organization would encourage cultural diversity. First, an organization could adopt cultural diversity as a moral end to correct historic discrimination (i.e., discrimination-and-fairness perspective). Second, an organization could embrace cultural diversity to gain access to the markets of a cultural or national group (i.e., access-and- legitimacy perspective). Third, an organization could promote cultural diversity as a resource for learning (integration-and- learning perspective).

Extension Worker's Responsibility

i.   Inclusive language: Use inclusive language in all your policies and meetings.

ii.   Allow time for varying holidays and traditions: It is important to be mindful of holidays, festivals, and traditions that may be celebrated by people from other cultures, and to allow them to take time off, if needed, to participate in and feel connected to those celebrations.

iii.   Listen more than you speak: Being a culturally competent leader means becoming an excellent communicator who can identify not only what someone says but also what is left unsaid (the context). A good way to be mindful of cultural differences is to make sure you do more listening than speaking. In recurring one-on-one meetings, take the time to understand the feedback, both the cultural and the personal circumstances of the individual surrounding that feedback, what the person is most excited or worried about, and more.

iv.   Lead with humility: Every leader stands to learn from the people they lead. Studies consistently show that diverse and inclusive teams perform better. Let your people teach you and inspire a new way of thinking.

7. Intersectional lens

Rather than only looking at all the discussed forms of diversity separately, intersectionality is an analysis approach to account for overlapping and intersecting dimensions of identity: variables are not considered in isolation nor using binary categorization like men versus women (Crenshaw, 2017). For example, you can observe how being a young woman compares to being an older woman or being a mother compares to being a university student and the opportunities that are limited or created from these multidimensional identities. For your extension program, it should not be assumed that all women want the same things from agriculture, and thus an intersectional lens can be critical to separate those needs for unique subgroups.

8.4　Understanding Gender and Gender Analysis

A variety of notions and assumptions are made about the term "gender". In some cases, gender is misunderstood to mean sex – the biological differences between males and females. However, the definition of gender extends beyond the biological and physiological differences between males and females. Extension professionals need to have a clear understanding of the difference between sex and gender so that they can adequately address the socially constructed barriers and gaps related to gender in extension. Box 8.3 clarifies the differences between gender and sex.

Box 8.3: Differences Between Gender and Sex	
Gender	**Sex**
1. It is rooted in the society and ideas of "what it means" to associate with a gender category (e.g., man, woman, nonbinary). 2. It varies from culture to culture and can change over time. 3. It can be changed. 4. Gender may be biased and is based on local customs and norms. 5. It is a social construct and is learnt through socialization.	1. It is the differences between males and females based on their born biological characteristics. 2. It tends to be less changeable. 3. Sex is not based on local customs and norms. 4. It is not a social construct and cannot be learned through socialization.

What is Gender?

The Food and Agriculture Organization (FAO, 1997) defined gender as the relations between men and women, both perceptual and material. Gender also refers to the characteristics of women, men, girls, and boys that are socially constructed. This includes norms, behaviors and roles associated with being a woman, man, girl, or boy, as well as relationships with one another. As a social construct, gender varies from society to society and can change over time. It is a central organizing principle of societies, and it often governs the processes of production and reproduction, consumption, and distribution. Given the changeable nature of gender, extension workers can use a gender lens in their programs to identify and shift unique barriers, gaps, and opportunities of men, women, and youth clients.

Generally, addressing gender is misconstrued as being the promotion of women only. This assumption has led some extension professionals to thinking that gender issues can be addressed by including only women in trainings and trials. However, the FAO (1997) definition clarifies that gender issues focus on women and on the relationship between men and women, their roles, access to and control over resources, division of labor, interests, and needs. Therefore, to understand the gender concept, it has to be viewed from the perspective of a social and cultural construction as well as the allocation of roles and expectations of men and women in any given society. Using a relational perspective – to

engage the clientele by bringing together both women and men (and often boys and girls, too) – is more effective to address the root causes of norms that cause gender inequality and demonstrate to men the benefits of caring about gender.

8.4.1 Basic Gender Concepts

In all cultures and societies, gender plays a very important role. It defines the expectations and beliefs that people have about men and women, and these differ from one culture to another. Thus, extension professionals need to clearly understand some basic gender concepts or terminologies. This will enable them to understand who does what, with what resources, where and why, within different rural livelihood contexts. Box 8.4 provides definitions of basic gender concepts.

Box 8.4: Definition of Basic Gender Concepts

Gender equality describes a situation where there is no discrimination on the grounds of gender in access to social services or resource allocation.

Gender equity refers to the distribution of resources in such a way to account for gender gaps that exist between men and women in the society, generally meaning fairness in accessing and benefiting from opportunities and activities.

Gender norms refer to expected characteristics of gendered identity or behaviors, varying with point in time or a specific society or community; for example, a norm may paint women as responsible for household and childcare duties while men take jobs outside of the home.

Gender bias refers to making decisions on the basis of gender that result in favoring one gender over the other. This often results in contexts that favor men and/or boys over women and/or girls.

Gender disparities/gaps refer to differences between men and women, boys and girls that reflect an inequality in various dimensions -- for example, differences in access to extension services, finance, inputs, or land ownership.

Gender socialization refers to the process of girls and boys, women and men learning social roles based on their sex, which leads to different behaviors and creates differing expectations and attitudes based on gender. An example is that girls and women do more household chores, such as cooking and cleaning, while boys and men do more work out of the home.

Gender stereotyping refers to ascribing certain attributes, characteristics, and roles to people on the basis of gender.

Patriarchy refers to a social system in which men hold the greatest power, leadership roles, privileges, moral authority, and access to resources and land, including family.

Empowerment implies that women and girls must not only have equal capabilities (such as education and health) and equal access to resources and opportunities (such as land and

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employment), but they must also have the agency to use these rights, capabilities, resources, and opportunities so as to make strategic choices and decisions (such as those provided through leadership opportunities and participation in political institutions).

Gender discrimination refers to "any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on the basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field" (United Nations, 1979 Convention on the Elimination of all forms of Discrimination Against Women [CEDAW], Article 1).

Gender blindness refers to the failure to recognize that the roles and responsibilities of men/boys and women/girls are given to them in specific social, cultural, economic, and political contexts and backgrounds. Projects, programs, policies, and attitudes which are gender blind do not take into account these different roles and diverse needs, maintain status quo, and will not help transform the unequal structure of gender relations.

Gender-sensitive programming and policies are those that are aware of and address gender differences.

Gender-responsive extension refers to intentionally employing gender considerations to influence the design, implementation, and results of extension programs and policies.

Gender-responsiveness means paying attention to the unique needs of women and men, valuing their perspectives, respecting their experiences, understanding developmental differences between girls and boys, women and men, and ultimately empowering girls and women.

Gender awareness refers to being informed or conscious about the differences in roles, responsibilities, constraints, and needs in society.

Gender mainstreaming refers to the integration of gender perspectives into all program and project activities, such as budgeting, policy formulation, resource allocation, and privileges.

Gender transformative approaches describe approaches that go beyond addressing the most obvious and visible gender disparities to identify and tackle underlying and often invisible norms and power structures, using participatory and reflexive facilitation methods.

Sources: IRRI and CRISP (2021); Hillenbrand et al. (2015);

National Open University of Nigeria (2016)

8.4.2 Gender Roles in Agriculture

Gender roles are the social definition of women and men. They are the functions that are culturally allocated to individuals on the basis of their gender, and they vary among societies and cultures. They are shaped by social, economic, religious, ideological, ethnic, and cultural factors, and they also

determine the distribution of resources and responsibilities between men and women. Although gender roles are ascribed specifically to men and women in relation to each other, men and women each often carry out multiple roles in agricultural communities, as seen in Box 8.5. For instance, "While men typically play their roles sequentially, focusing on a single productive role, women must usually play their roles simultaneously, balancing the demands of each within their limited time constraints.The gender-based division of labor ascribed in a given socioeconomic setting determines the roles that men and women actually perform. Since men and women play different roles, they often face very different cultural, institutional, physical and economic constraints, many of which are rooted in systematic biases and discrimination" (ILO, 1998).

Box 8.5: Men's and Women's Multiple Roles in Agricultural Communities

Reproductive role: Childbearing and rearing responsibilities and many domestic tasks often done by women are required to guarantee the maintenance and reproduction of the labor force and to ensure that the sick and elderly are cared for. This includes not only biological production but also the care and maintenance of the workforce (male partner, oneself, and working children) and the future work force (infants and school-going children). This work is usually unpaid.

Productive role: Work often done by both men and women for pay in cash or kind includes both market production with an exchange value and subsistence or home production with actual use value and also potential exchange value. For women in agricultural production, this includes work as independent farmers, peasant wives, and wage workers. The work is both paid (but often underpaid) and unpaid. Usually, men's productive work takes place outside the home.

Community managing role: Activities often undertaken primarily by women at the community level, as an extension of their reproductive role, to ensure the provision and maintenance of scarce resources of collective consumption, such as water, energy sources, health care, and education. Often, these roles carried out by women are considered as "natural" and are often invisible at national and economic levels. This is unpaid work, undertaken in "free" time. Community management activities performed by men tend to be more visible and of higher social value (e.g., administration of local justice).

Agricultural leadership role: Beyond membership in different associations, cooperatives, or producer groups, leaders of these groups have greater decision-making power that can impact involved agricultural actors as well as the whole community through economic and/or food security benefits, linkages to outside information, technology, and market opportunities, and social/gender status of people promoted to these roles.

Community politics role: Activities often undertaken primarily by men at the community level, organizing at the formal political level, often within the framework of national politics. This is usually paid work, either directly or indirectly, through status or power.

Sources: Moser in ILO (1998); ITCILO (2013)

In most settings, however, gender roles function in a way that discriminates against women -- in their choices in life, their access to resources, and decision-making power. This discrimination usually permeates social institutions. Nonetheless, UNFPA (2005) notes that gender roles are amenable to change in ways that can make societies more equitable and just.

In agricultural systems, farm tasks are often assigned to specific genders. For instance, while men primarily produce commercial crops, women are usually responsible for the production of subsistence crops. This does not mean that women do not engage in the production of commercial crops and men do not work on subsistence crops. Within the crop production system, men and women often carry out different tasks. For example, in many contexts, men are usually responsible for land clearing, plowing operations, irrigating crops, harvesting, and transporting products to the market. In the livestock production system, men usually own and trade large animals such as cattle, and they are responsible for cutting, hauling, and selling timber from forests. In fishing communities, men have the responsibility of capturing fish in coastal and deep-sea waters (FAO, 2011).

Rural women, on the other hand, have the primary responsibility of carrying out domestic roles and providing household care. They raise children, grow and prepare food, manage small livestock -- poultry, pigs, sheep, or goats -- and collect fuelwood and water. Within the crop production systems, women play important, largely unpaid, roles in generating family income by providing labor for planting, sowing seeds, weeding, harvesting and threshing crops, and processing and marketing of food products (Mollel and Mtenga, 2000; FAO, 2013). However, gender roles depend on local contexts and can change over time (see Box 8.6). Women are now performing roles that were traditionally assigned to men, and men are traditionally performing roles that were ascribed to women. For example, men are increasingly engaging in food crop production more than cash crop production because of a fall in the exportation of cash crops.

Extension professionals may better understand gender roles in a community by visiting, observing, and staying in the community for some time. By doing so, they will discover who does what and when in the production of crops and livestock in that community. They may also observe differences in individuals' and agricultural households' range in their gender attitudes and dynamics. It can be important to start to identify the "gender champion" individuals and households that are breaking from traditional social norms that may limit opportunities for women or men. For instance, a household that meets to openly plan their farming activities and involve family members' ideas for using income or harvesting produce could be a gender champion household. These positive examples can help you promote shifts in norms and narrowing of gender gaps through peer-to-peer influence.

Box 8.6: Case Studies of Gender Roles in Farming Systems

In Tchenzema ward in the Western Uluguru mountain Morogoro, Tanzania, it was reported that men and women were equally involved in sowing, cultivating, weeding, and harvesting in both cash and food crop production.

In Seychelles, men participated in nursery management, land preparation, planting, weeding, fertilizer application, and spraying more than women. However, women were involved in processing activities more than men.

In Imo state, Nigeria, men were engaged mainly in land clearing, applying agro-chemicals, and purchasing planting materials. On the other hand, women mainly engaged in sowing, processing, and storing crops.

Sources: Mollel and Mtenga (2000); Uzokwe (2009); Asadu et al. (2013)

8.4.3 Access to and Control of Production Resources in Agricultural Livelihoods

Access to and control over production resources are essential for small-scale farmers. In agricultural livelihoods, productive resources include:

(1)   Physical inputs (land ownership, livestock, fertilizer, and mechanical equipment).

(2)   Human resources (such as participation in farm labor).

(3)   Social resources (access to education, knowledge, and skills related to agriculture).

(4)   Institutional resources (financial and extension services).

Access to and control over these resources are critical for small-scale farmers to increase their productivity and improve their livelihoods. For instance, farmers need access to quality seeds, fertilizers, and machinery to increase their yields and produce high-quality crops. They also need access to finance to invest in these resources and to manage their farms efficiently. It is important for extension professionals to understand the difference between access to and control of productive resources. "Access" refers to the ability and permission to use and benefit from specific resources (GFRAS, 2016; IRRI and CRISP, 2021). For example, a farmer could have access to a plot of farmland to cultivate maize. However, access to this farmland does not mean that the farmer has the liberty to use it for any other purpose. For instance, the farmer may not be able to allocate the farm to someone else, in which case the farmer may have limited or no control over the land.

"Control of resources" refers to the ability to make decisions over the use of resources (for example, decision on whom a piece of land is allocated to, what is produced on it, and who can sell or trade the land) (GFRAS, 2016). When a farmer has control over farmland, he/she can allocate parcels of the land to other farmers, set conditions on how the land can be used, and switch plots of land with other farmers.

Small-scale farmers face many challenges in accessing and controlling production resources. One of the major challenges is the lack of access to land. Many small-scale farmers do not own land or have limited access to land because of land tenure issues. This limits their ability to produce enough food for their families and to generate income. Another challenge is the lack of access to credit and finance. Small-scale farmers often have limited financial resources and cannot afford to purchase production resources such as seeds, fertilizers, and machinery. This limits their ability to invest in their farms

and improve their productivity. This is especially true for small-scale women farmers. Therefore, a key element of women's empowerment is access to and control over productive resources.

Generally, women are disadvantaged in access to and control over productive resources compared with men because of gender-specific constraints. For example, in most countries, fewer women than men own agricultural land, livestock, or other agricultural resources, and the resources owned by women tend to be of smaller size. In patriarchal societies, women face inequalities in land titling and tenure rights. The implications are that women hold smaller farms than men, keep fewer livestock that are of smaller breeds and lesser value, and use fewer inputs such as fertilizers, improved seeds, and mechanical equipment. Furthermore, women tend to have lower access to credit and extension services than their male counterparts. Because of their roles within the household and disadvantages in access to education, women are more likely than men to be involved in seasonal and low-paying agriculture-related jobs and to receive lower wages for the same type of work, even if they have similar experience and qualifications as men (FAO, 2011).

Evidence also shows that commercialization (increased market and profit focus) of farming and value chain engagements can impact gender dynamics and widen gender gaps. As commercialization increases the value of crop or livestock activities, men tend to take control of these activities while women are left to manage more marginal activities, such as poultry or vegetable gardening activities. Similarly, the men in farming households usually control the income and other benefits from commercialization (Fischer and Quaim, 2012; Tavenner et al., 2019). Therefore, extension professionals should carefully promote commercialization to understand gender issues that can arise. Diversification – including a variety of crop and livestock activities in the design of commercialization programming -- has been shown to be one avenue for more gender equity, as women and men can both have more openings to engage and benefit (Tavenner et al., 2019). Promoting intensification and commercialization of a single cash crop or activity on a larger scale should be done with caution because control and benefits will likely fall into men's hands in many developing contexts.

These inequalities in access to productive resources tend to limit the capacity of women to contribute substantially to agricultural productivity, security of livelihood, economic growth, and food security (Paul, 2014). It has been estimated that the number of hungry people in the world could be reduced drastically if women in rural areas were given equal access to the same resources as men (FAO, 2011). The reasoning is that this would provide for increased possibilities for food production by women. Women with access to higher quality (and not marginal) resources are able to produce more. Also, closing the gender gaps (illustrated in Figure 8.1) in access to productive resources would increase women's empowerment and lead to other social and economic benefits..

In agricultural communities, extension professionals need to have a clear understanding of gendered access to and control of productive resources. This will help them to target farmers who need specific information and technologies and therefore reduce barriers to the successful adoption of agricultural innovations.

Assets (Land and other agricultural assets)
*Reform laws to guarantee equal rights of men and women.
*Empower women to ensure that they are aware of their rights and are able to claim them.
*Educate community leaders and government officials to uphold lawson gender equality in access to assets.

Labor markets

*Provide labor- saving technologies for women as well as public services.

*Improve women's access to education.

*Eliminate discriminatory employment practices.

Gender gaps

Financial services (Credit and insurance)

*Legal and institutional reforms to meet the needs of women and improve their financial capacity.

*Provide innovative financial delivery services and social networks for rural women.

Agricultural technology

*Participatory gender-inclusive research and technology development programs

*Provision of gender-sensitive extension services

Figure 8.1: Closing Gender Gaps in Access to Productive Resources

8.4.4 Understanding Gender Analysis

Gender analysis is an important tool that examines how the roles, responsibilities, and rights of men and women are determined, and how these interact to achieve the expected outcomes (Doss, 2013). In agriculture, gender analysis provides insights into how socially constructed roles and responsibilities shape the myriad decisions around the agricultural value chain -- production, storage, processing, marketing, and consumption. It also provides information regarding the divisions of labor, resources, constraints, needs, opportunities, and interests of men and women, and how these can create either opportunities or obstacles to improve agricultural productivity and rural livelihoods (GFRAS, 2016).

Gender analysis is therefore an important tool for extensionists to use in obtaining relevant information from both men and women on agricultural tasks that are carried out individually and collectively within the context of their culture. This is necessary to ensure that appropriate information and technologies are provided to the right individuals. Using participatory methods, gender analysis can also facilitate clients' identification of gender disparities they notice in their lives and the benefits of working together with extension workers to move toward equity.

Extension professionals should know the difference between gender role analysis and gender relations analysis. Gender role analysis engages with questions such as who does what and who has what. These questions are often linked to the gendered division of labor and distribution of resources. On the other hand, gender relations analysis focuses on the bargaining power and interests of men and women. For instance, an analysis of gender relations includes an assessment of:

- *Rules: How are things done?*
- *People: Who is in? Who is out? Who does what?*
- *Resources: What is used? What is produced?*
- *Activities: What is done?*
- *Power: Who decides? Whose interests are served?*

Gender role analysis and gender relations analysis are important and complement each other. Focusing on roles alone runs the risk of neglecting the fact that relationships between men and women are continuously (re)negotiated and structured through power.

Tools and Techniques Used in Gender Analysis

1. Gender-disaggregated data: Collecting and analyzing data that is disaggregated by sex is essential in identifying the different needs, roles, and responsibilities of men and women.

2. Gender analysis frameworks: A gender analysis framework is a tool that helps to identify the various ways that gender influences a given situation, including gender roles, relations, and power dynamics.

3. Participatory methods: Participatory methods involve engaging with men and women in a given context to understand their perspectives, experiences, and needs.

4. Gender transformative gender analysis: Using highly participatory methods, transformative analysis involves various community members, including power holders (e.g., leaders or chiefs) and those at the margins, in deep reflection activities about the norms and structures that impact gender relations. Then, through visioning and action planning, the community takes ownership in initiatives to transform norms and gender relations toward equality.

5. Gender budgeting: Gender budgeting involves analyzing the budget of a policy, program, or project to identify how it affects men and women differently and to ensure that it is gender- responsive.

By using these tools and techniques, extension professionals can ensure that policies, programs, and projects are gender-responsive and do not perpetuate gender inequalities.

8.4.5 Gender in Agricultural Extension and Research

As noted in the previous section, women play prominent roles in agricultural production and fundamentally contribute to food security. However, gender-specific constraints affect their agricultural production activities. One way to tackle the hurdles that women face in agricultural production is providing agricultural extension services -- information, training, and advice to improve their production techniques, organize themselves, and improve their access to inputs and markets.

Empowering women with such information and training improves their income stability and food security. However, evidence points to gender inequality in access to extension service delivery (Box 8.7). Agricultural extension services are usually carried out within specific socio-cultural

settings that are subject to power dynamics which often limit women's access to resources and support. Women face a couple of gender-specific obstacles that limit their access to extension services. For instance, childcare responsibilities and a heavy domestic workload make it difficult for them to attend training and other extension-related activities. Additionally, in a number of African cultures, women are prohibited from working outside their homes or even talking to male agricultural extensionists (GIZ, 2013).

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Box 8.7: Evidence of Gender Inequality in Access to Agricultural Extension Services

In Ethiopia, men were reportedly more often visited and received advice from extension agents than women. The men also perceived the advice from extension agents as more useful than the women. As a result of limited extension visits to women in the regions, they used smaller amounts of inputs and were also less likely to adopt improved agricultural technologies. This affected the agricultural productivity of the women.

In the Awutu Senya West District of Ghana, access to agricultural extension services was gendered – men had more access to extension services than women. Socio-cultural norms, class, and education shaped women's differential access to agricultural extension services.

In post-conflict Liberia, women farmers were more marginalized in access to agricultural extension services than their male counterparts. Their limited extension contact was attributed to prevailing gender norms and systemic power structures.

In southeast Nigeria, women had unequal access to agricultural extension training because of their domestic workload and institutional factors. Limited access to extension services contributed to the challenges the women faced in the agricultural sector cooperatives in the region.

Sources: Ragasa et al.,(2012); Ankrah et al. (2020); Witinok-Huber et al. (2021);

Obianefo et al. (2021).

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Generally, women and men have different information needs and preferences. As a result of the gender-specific roles of women within the household and the community that limit time available for participating in extension-related activities, technologies, information, and services and their dissemination are usually tailored for men. Usually, the roles, responsibilities, assets, activities, and decision-making power of women within the household are barely considered. It is tacitly assumed that any knowledge acquired by men during extension trainings is transferred to women in their households. Also, the topics covered during such trainings do not necessarily meet the needs of women. This could result in gender bias, which affects both the content and delivery of extension services (IRRI and CRISP, 2021). As a result, women farmers do not adopt most technologies. In some other cases, when technologies are tailored to meet the needs of women without considering men, they usually do not support women in their households to adopt the technologies (GFRAS, 2016).

Therefore, considering multiple factors that contribute to gender inequality in various contexts, gender equality is required to achieve gender-equitable agricultural extension service delivery that empowers women to efficiently contribute to increased agricultural production.

Why should gender concerns be integrated in agricultural extension service delivery?

Extension professionals need to incorporate gender concerns in the delivery of agricultural extension services for the following reasons:

1. Women have the potential to increase crop and livestock yields and overall agricultural production, for broad food security and economic impacts, if they have the same access to productive resources as men.
2. The information, knowledge, and skill needs of men and women farmers vary considerably because they are often involved in different activities.
3. Women play crucial roles in agriculture – they are agents of change in their households and communities in transforming the food system -- and as such they should be recognized as an integral part of extension programs.
4. Increased access to extension services can help women to be more productive, increase their income, and expose them to more income-generating activities that could guarantee their food and nutrition security as well as that of other members of their households.

Women have the right to receive extension services because they are a significant part of the agriculture workforce, and as such they should participate actively in the formulation of agricultural extension programs and policies. Gender consideration is critical in agricultural extension and research because it promotes inclusivity, equity, and social justice. Therefore, gender consideration is essential to ensure that agricultural extension and research are responsive to the needs and priorities of both women and men.

8.4.6 Women's Empowerment and Equal Access to Decision Making

Several definitions of empowerment have emerged as a result of the subjective nature of the concept.

Empowerment is the expansion in people's ability to make strategic life choices where this ability was previously denied to them (Kabeer, 1999).

Empowerment is a socio-political process, where social, political, and economic power shifts between and across both individuals and social groups (Batliwala, 2007).

In view of the above definitions, Mosedale (2005) identified four dimensions of empowerment:

1. Empowerment arises because of the prevalence of disempowerment.
2. The urge for empowerment comes from within and cannot be bestowed by a third party such as government or international agencies.
3. Empowerment reinforces individuals with the ability to make and implement decisions regarding aspects that matter most to them.

4.   Empowerment is an ongoing process in which people are empowered or disempowered relative to others or themselves in the past.

Because of their essential role in agricultural production, women need to have power to make and exercise choices over various dimensions of agriculture. As agents of change, women should have the ability to formulate strategic choices and have equal decision-making power and control over productive resources as men. Depending on the context, it may be typical for men and women to have different spheres of decision making, or they may share decision making. An individual's decision making is shaped by the information and knowledge they possess, their level of participation (this may be dictated by social norms), the options available to them, and their perception of the urgency and risk the decision poses.

In fact, empowerment of women farmers is recognized as a fundamentally important element in the process of social and economic development. In a farm household, gender roles shape men and women's agricultural decision making in diverse areas such as what crops to cultivate, what inputs and technologies to use, how to manage these crops throughout the season, when to harvest, and what foods to eat. Taken together, women's multiple roles in decision making have important consequences for labor, food, nutrition, health, and many other facets of a household's livelihood strategies (Lecoutere et al., 2020). Despite this, women often have less access to information about productivity-enhancing agricultural technologies and practices than men. This constrains women's informed participation in decision making on crops, technologies, and practices. This may worsen as a consequence of the fact that agricultural extension programs usually target male farm household heads. Extension professionals should view women as significant actors in agricultural production and communities and facilitate opportunities for empowerment for inclusive food system transformation (See Box 8.8).

Box 8.8: How Can Extension Programs and Policies Support Women's Empowerment?

1.   Increase women's knowledge about suitable agronomic practices and other technologies that can improve food production, processing, and marketing.

2.   Assist women to have independent decision-making power by inviting them to participate in extension programs and contribute to the formulation of extension policies.

3.   Encourage women to adopt agricultural technologies by giving the necessary information directly to them.

4.   Gear extension programs and policies toward influencing perceptions and norms about gendered roles in the household by engaging women and men together in exercises to identify gender disparities and shared visions toward greater equality.

Do extension agencies reach, benefit, empower, and transform women farmers?

Another important way extension professionals can support women's empowerment is to adopt the Reach-Benefit-Empower-Transform (RBET) framework in carrying out extension activities targeted at women farmers (Figure 8.2). The Reach-Benefit-Empower-Transform (RBET) framework was first proposed by Johnson et al. (2018) to assist project and program designers to identify the activities targeted to empower women and analyze the extent to which gender issues would be addressed. While the original framework concentrated on the extent to which approaches contribute to women's empowerment, the more recent, modified version from Kleiber et al. (2019) expands to account for women, men, and youth as well as the enabling environment (e.g., the community) that shapes norms and power relations. As a simplified summary, the framework can be used to contrast extension approaches by whether they reach women, men, and youth through attendance in project activities, benefit women, men, and youth by considering their unique gendered needs and preferences, empower women, men, and youth through increasing their ability to make important life choices and turn their choices into actions, and/or if they transform gender norms and power relations to build an enabling environment (Kleiber et al., 2019).
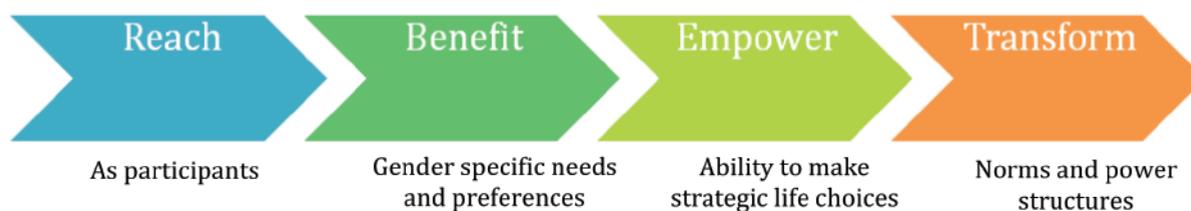
Figure 8. 2: Reach-Benefit-Empower-Transform Framework

Generally, the importance of the RBET framework for empowering women in extension activities as well as guidance on how they can be applied in practice are outlined below:

1. Reach: Identifying and Engaging Women Farmers

The first component of the RBET framework is **Reach**. This involves identifying and engaging women farmers, who are often marginalized and excluded from traditional extension services. Women farmers are an important group to reach as they make up a significant proportion of the agricultural labor force in many countries. However, women farmers often face gender-based barriers that limit their access to information, resources, and decision-making power.

To apply **Reach**, extension professionals should:

- Identify and map women farmers: Develop a comprehensive database of women farmers in the target area.
- Engage women farmers: Conduct outreach and awareness-raising activities to encourage women farmers to participate in extension services.
- Use inclusive approaches: Use approaches that are inclusive of women's needs, interests, and priorities. This may include using gender-sensitive language, providing childcare, and ensuring women are involved in decision-making processes.

2. Benefit: Providing Gender-Sensitive Agricultural Extension Services

The second component of the RBET framework is **Benefit**. This involves providing gender-sensitive agricultural extension services that respond to the specific needs and interests of women farmers. Gender-sensitive extension services can help women farmers overcome gender-based barriers and improve their productivity and income. To apply **Benefit**, extension professionals should:

- Conduct gender analysis: Conduct a gender analysis to understand the specific needs and interests of women farmers.
- Develop gender-sensitive extension services: Develop extension services that respond to the needs and interests of women farmers. This may include providing training in areas such as postharvest handling, access to credit, and market linkages.
- Use participatory approaches: Use participatory approaches to engage women farmers in the development and delivery of extension services.

3. Empower: Building the Capacity of Women Farmers

The third component of the RBET framework is **Empower**. This involves building the capacity of women farmers to improve their productivity and income. Building the capacity of women farmers can help to overcome gender-based barriers and ensure that women have the knowledge, skills, and resources they need to participate fully in agricultural extension services.

To apply **Empower**, extension professionals should:

- Develop training and education programs: Develop training and education programs that respond to the specific needs and interests of women farmers.
- Provide access to resources: Provide access to resources such as credit, inputs, and technology that can help women farmers improve their productivity and income.
- Use peer-to-peer learning: Use peer-to-peer learning approaches that enable women farmers to share their knowledge and experiences with one another.

4. Transform: Advancing Gender Equality in Agricultural Extension Services

The fourth component of the RBET framework is **Transform**. This involves advancing gender equality in agricultural extension services by changing policies, systems, or structures. Advancing gender equality can help to address systemic gender-based barriers and create an enabling environment for women farmers.

To apply **Transform**, extension professionals should:

- Identify areas for change: What policies, systems, or structures need to be changed in order to create a more equitable and just agricultural sector for women farmers?
- Develop strategies for change: Create strategies for advocating for policy change, engaging with key decision makers, or developing new partnerships to create lasting change.
- Measure impact: Develop a system for measuring the impact of the agricultural extension services on the policies, systems, or structures that need to be changed.

- Advocate for policy change: Advocate for policy change that advances gender equality in agricultural extension services. This may include advocating for gender-sensitive budgeting, gender-responsive policies, and gender parity in decision-making positions.
- Strengthen institutions: Strengthen institutions to ensure that they have the capacity to deliver gender-sensitive extension services and respond to the needs and interests of women farmers.
- Promote women's leadership: Promote women's leadership in agricultural extension services by supporting women within organization.

Summarily, the RBET framework provides a comprehensive approach to creating lasting change through social impact initiatives. By applying the four components of Reach, Benefit, Empower, and Transform, extension professionals can develop effective strategies for addressing complex gender issues and measuring their impact over time. By integrating the RBET framework into their work, extension professionals can create a more equitable and just society for all.

8.5 Gender and Development Indicators

Gender and development indicators are measures that help to assess the status and progress of women and men in a given society. These indicators are used to identify the gaps and disparities between genders and to measure the effectiveness of policies and programs aimed at promoting gender equality and women's empowerment.

Some of the commonly used gender and development indicators are:

1. Gender development index (GDI).
2. Gender empowerment measure (GEM).
3. Social institution and gender index (SIGI).

8.5.1 Gender Development Index (GDI)

The Gender Development Index (GDI) is a measure of gender-related development that was introduced by the United Nations Development Programme (UNDP) in 1995. It is designed to measure gender inequalities in three key dimensions of human development: health, education, and income.

The GDI is calculated using the same formula as the Human Development Index (HDI), which is a composite measure of human development based on life expectancy, education, and income. However, the GDI adjusts the HDI to account for gender disparities by factoring in the differences between females and males in these dimensions.

The GDI ranges from 0 to 1, with higher values indicating a more equal distribution of human development achievements between females and males. A GDI value of 1 indicates complete gender equality; a value of 0 indicates complete gender inequality. The GDI is a useful tool for assessing progress toward gender equality and identifying areas where gender disparities persist. However, it

has been criticized for not capturing all aspects of gender inequality, such as violence against women and discrimination in the workplace. As a result, it is often used in conjunction with other gender-related indicators to provide a more comprehensive picture of gender inequalities.

8.5.2 Gender Empowerment Measure (GEM)

The Gender Empowerment Measure (GEM), also introduced by the United Nations Development Programme (UNDP) in 1995, is designed to measure gender disparities in economic and political decision making as well as in access to education and health care.

The GEM focuses specifically on three key dimensions of gender empowerment:

1. Political empowerment: This dimension measures the proportion of women and men in parliamentary and ministerial positions, as well as the number of women in high-level managerial positions.

2. Economic empowerment: This dimension measures the percentage of women in the labor force and the gender wage gap, as well as the proportion of women who hold positions of economic power.

3. Education: This dimension measures the gender parity index in primary, secondary, and tertiary education.

The GEM ranges from 0 to 1, with higher values indicating greater gender equality and women's empowerment. A GEM value of 1 indicates complete gender equality and women's empowerment; a value of 0 indicates complete gender inequality. The GEM is a useful tool for identifying areas where gender disparities in economic and political decision making exist and for monitoring progress toward gender equality and women's empowerment.

However, like the GDI, it has been criticized for not capturing all aspects of gender inequality, such as violence against women and discrimination in the workplace. As a result, it is often used in conjunction with other gender-related indicators to provide a more comprehensive picture of gender inequalities.

8.5.3 Social Institutions and Gender Index

The Social Institutions and Gender Index (SIGI) is a measure of gender-based discrimination in social institutions. It was introduced by the Organization for Economic Cooperation and Development (OECD) in 2009. "Social institutions" refers to formal and informal rules, norms, and practices that shape gender roles and relations within a society.

The SIGI measures discrimination in five key areas of social institutions:

1. Family code: This area measures discrimination in laws and practices related to marriage, divorce, custody, inheritance, and property rights.

2. Physical integrity: This area measures discrimination in laws and practices related to violence against women, including domestic violence, sexual violence, and harmful practices such as female genital mutilation and child marriage.

3. Son preference: This area measures discrimination in preferences for male children over female children, which can result in sex-selective abortion, female infanticide, and neglect of female children.

4. Resources and assets: This area measures discrimination in access to and control over economic resources and assets such as land, credit, and employment opportunities.

5. Civic rights: This area measures discrimination in laws and practices related to women's participation in public life, including their representation in government, access to justice, and freedom of movement and expression.

The SIGI ranges from 0 to 1, with higher values indicating greater gender-based discrimination in social institutions. A SIGI value of 1 indicates complete gender-based discrimination; a value of 0 indicates no discrimination.

The SIGI is a useful tool for identifying areas where gender-based discrimination is most acute and for guiding policy interventions to promote gender equality and women's empowerment. It is often used in conjunction with other gender-related indicators, such as the GDI and GEM, to provide a more comprehensive picture of gender inequalities.

8.6 Gender and Sustainable Development Goals

Gender plays a crucial role in achieving sustainable development goals (SDGs) because it affects every aspect of social, economic, and environmental development. The United Nations' 2030 Agenda for Sustainable Development recognizes that gender equality and women's empowerment are critical components of sustainable development and are essential for achieving all SDGs.

Here are some ways in which gender intersects with sustainable development goals:

1. *Goal 1: No poverty:* Women are disproportionately affected by poverty, and gender inequality is one of the key drivers of poverty. Achieving gender equality is essential for reducing poverty and improving the economic status of women and girls.

2. *Goal 2: Zero hunger:* Women play a vital role in food production and nutrition. Gender inequalities limit women's access to land, resources, and agricultural technologies, which can affect household food security and nutrition outcomes.

3. *Goal 3: Good health and well-being:* Gender inequalities can affect health outcomes, including maternal and child health, sexual and reproductive health, and mental health. Gender-sensitive health policies and programs are essential for achieving this goal.

4. *Goal 5: Gender equality:* This goal explicitly addresses the importance of gender equality in sustainable development. Gender inequalities and discrimination limit women's opportunities, economic participation, and decision-making power. Promoting gender equality can improve the well-being of women and girls and contribute to achieving other SDGs.

5. *Goal 8: Decent work and economic growth:* Gender inequalities affect women's access to decent work, fair wages, and safe working conditions. Addressing gender-based

discrimination and promoting women's participation in the labor market is essential for achieving this goal.

6. *Goal 13: Climate action:* Climate change affects women and men differently, with women often being more vulnerable because of gender-based discrimination and social norms. Addressing gender inequalities can help to build resilience and adapt to the effects of climate change.

In summary, gender equality is essential for achieving sustainable development goals. Addressing gender inequalities can contribute to reducing poverty, improving health outcomes, promoting economic growth and decent work, and addressing climate change. By prioritizing gender equality and women's empowerment, we can ensure that sustainable development is equitable and inclusive for all.

8.7 Building Inclusive Programs

Integrating gender and diversity issues in agricultural extension is critical to ensure inclusivity, equity, and social justice in the sector. Here are some ways in which gender and diversity issues can be integrated into agricultural extension:

1. **Conduct gender analysis:** Conducting gender analysis is an essential step to identify gender differences in access to resources, knowledge, and decision making in agriculture. A gender analysis can help extension workers understand the different needs, priorities, and constraints of men and women in agriculture.

2. **Design gender-sensitive programs:** Designing gender-sensitive programs that take into account the different needs, priorities, and constraints of both men and women in agriculture are critical. Extension programs should ensure that women and men have equal access to resources, training, and information.

3. **Promote women's participation:** Promoting women's participation in agricultural extension is essential to ensure gender equality and women's empowerment. Extension programs should adopt strategies to increase women's participation in training, meetings, and decision-making processes.

4. **Use gender-sensitive language:** Extension workers should use gender-sensitive language that is inclusive and does not perpetuate gender stereotypes and biases. Using gender-sensitive language can help create a more inclusive and welcoming environment for both men and women in agriculture.

5. **Incorporate diversity considerations:** Diversity considerations should be incorporated into agricultural extension programs to ensure that the needs and priorities of various communities are taken into account. Extension workers should understand the cultural norms and values of diverse communities and adapt their programs accordingly.

6. **Collect gender-disaggregated data:** Collecting gender-disaggregated data is essential to monitor and evaluate the impact of agricultural extension programs on both men and women. Gender-disaggregated data can help extension workers identify gender

differences in access to resources, knowledge, and decision making, and design interventions to address these differences.

8.7.1 Identifying the Needs of Small-Scale Farmers

Small-scale farmers are typically individuals or families who own or rent small plots of land and engage in agricultural production for subsistence and/or commercial purposes. Small-scale farmers play a significant role in global food production and livelihoods. Small-scale farmers can be found in both rural and urban areas, and they play a critical role in global food systems, producing a significant portion of the world's food supply. According to the Food and Agriculture Organization (FAO) (2013), small-scale farmers produce over 70% of the world's food. Despite their crucial role, small-scale farmers often face several challenges in accessing resources, services, and markets. They often work with limited resources -- including land, labor, and capital -- and rely on traditional farming practices and low-input technologies to grow crops and raise animals.

Small-scale farmers are an important focus of agricultural development programs, which aim to support their efforts to increase productivity, improve livelihoods, and reduce poverty. These programs often involve providing small-scale farmers with access to finance, inputs, and markets, as well as training and technical assistance on sustainable farming practices and innovative technologies.

Extension agents play a critical role in providing technical assistance and training to small-scale farmers. They act as intermediaries between research institutions and small-scale farmers, helping to disseminate information on best farming practices, new technologies, and other innovations that can improve productivity and profitability. Here are some specific ways that extension agents can help small-scale farmers:

1. Provide technical assistance: Extension agents can provide technical assistance to small-scale farmers on a range of issues, including crop selection, land preparation, soil management, pest and disease management, and postharvest handling. They can also provide guidance on water management, irrigation, and other aspects of farm infrastructure.

2. Disseminate information: Extension agents can help to disseminate information on new farming technologies, techniques, and best practices to small-scale farmers. They can also help farmers to access weather forecasts, market information, and other data that can inform their decision making.

3. Provide training: Extension agents can provide training to small-scale farmers on a range of topics, including soil fertility management, integrated pest management, sustainable agriculture practices, and recordkeeping. They can also provide training on postharvest handling, processing, and marketing to help small-scale farmers improve the quality and value of their products.

4. Facilitate access to inputs and markets: Extension agents can help small-scale farmers to access inputs such as seeds, fertilizers, and pesticides, as well as to connect with

markets and buyers for their products. They can also help farmers to negotiate better prices and establish business relationships with other stakeholders in the value chain.

5. Provide support for group formation: Extension agents can help small-scale farmers organize into groups or cooperatives, which can provide collective bargaining power, access to finance and inputs, opportunities to meet quantity minimums for markets, and other benefits.

Identifying the needs of small-scale farmers can help extension professionals develop targeted interventions that support their production and livelihoods. Identifying the needs of small-scale farmers entails the following.

1. Understand the Local Context:

Understanding the local context is the first step in identifying the needs of small-scale farmers. The local context includes the social, economic, and environmental factors that affect small-scale farming. Some of the questions to ask about the local context are:

- What are the main crops grown in the area?
- What are the weather patterns?
- What are the soil types?
- What are the market opportunities for small-scale farmers?
- What are the existing support services for small-scale farmers?

2. Engage with Small-Scale Farmers:

Engaging with small-scale farmers is crucial in identifying their needs. Small-scale farmers have unique knowledge and experiences that can help identify their needs. Some of the ways to engage with small-scale farmers are:

- Conducting surveys or focus group discussions.
- Holding community meetings.
- Conducting on-farm visits.

When engaging with small-scale farmers, it's essential to use simple and understandable language and to listen actively to their needs.

3. Identify the Needs:

Identifying the needs of small-scale farmers involves understanding their challenges, opportunities, and aspirations. Some of the common needs of small-scale farmers are:

- Access to credit: Small-scale farmers often face challenges accessing finance, which limits their production capacity and market opportunities.
- Access to inputs: Small-scale farmers require quality inputs such as seeds, fertilizers, and pesticides to improve their yields and productivity.

- Access to markets: Small-scale farmers often face challenges accessing markets, which limits their market opportunities and bargaining power.
- Access to information: Small-scale farmers require timely and relevant information on weather, markets, and production technologies to make informed decisions.
- Capacity building: Small-scale farmers require training on various aspects of farming such as soil management, postharvest handling, and marketing.

4. Develop Targeted Interventions:

Developing targeted interventions involves developing solutions that address the identified needs of small-scale farmers. Possible solutions include:

- Developing financial products such as microfinance and insurance that target small-scale farmers.
- Providing subsidized or affordable inputs such as seeds, fertilizers, and pesticides.
- Establishing market linkages and creating market access opportunities for small-scale farmers.
- Developing extension services that provide small-scale farmers with timely and relevant information on weather, markets, and production technologies.
- Providing training and capacity- building opportunities to small-scale farmers.

Extension agents can play a critical role in helping small-scale farmers to improve their productivity, profitability, and livelihoods. By providing technical assistance, disseminating information, providing training, facilitating access to inputs and markets, and supporting group formation, extension agents can help small-scale farmers to overcome the challenges they face and achieve their goals. Also, identifying the needs of small-scale farmers is crucial in developing targeted interventions that support their production and livelihoods. Understanding the local context, engaging with small-scale farmers, and developing targeted interventions are crucial steps in identifying the needs of small-scale farmers. By supporting small-scale farmers, we can contribute to food security, poverty reduction, and sustainable development.

8.7.2 Engaging Marginalized and Vulnerable Groups in Agricultural Extension

Extension programs have the potential to improve the lives and livelihoods of all farmers, including marginalized and vulnerable groups. These groups often face additional barriers to accessing extension services and may require tailored approaches to effectively engage them. Extension recognizes that not all farmers in any one area will have the same problems. Some will have more land than others and will be keen to try out new ideas. Others, with fewer resources, will probably be more cautious. Extension cannot offer a single "package" of advice suitable to all farmers. Different groups need to be identified, and the agent will have to develop programs appropriate to each group.

In the past, much extension effort was concentrated on progressive farmers, who were expected to spread new ideas to others. It has been seen, however, that this does not always work because

progressive farmers often have different problems. They tend to have more land and more education, and they are usually more involved in the marketing of their produce. Extension must, therefore, be aware of the existence of different farming groups and plan its programs accordingly. The smallest and poorest farmers will need particular attention because they may lack the basic resources needed to become involved in extension activities. The point to stress, therefore, is the existence of farmer groups with different resources and skills in any one community, and the need for extension to respond to these groups accordingly.

Extension agents can play a crucial role in supporting marginalized and vulnerable groups, including small-scale farmers, women, youth, and people with disabilities. To effectively engage marginalized and vulnerable groups in extension programs, it is important to understand their unique needs and challenges. Key factors to consider include:

1. Limited access to resources: Marginalized and vulnerable groups may have limited access to land, capital, and other resources needed to start and grow their businesses.

2. Limited literacy or education: Some marginalized and vulnerable groups may have limited literacy or education levels, which can make it difficult for them to access and understand extension materials.

3. Language barriers: Marginalized and vulnerable groups may speak a different language or dialect than extension service providers, which can create communication barriers.

4. Cultural barriers: Marginalized and vulnerable groups may have cultural beliefs or practices that differ from those of extension service providers, which can create barriers to effective communication.

Here are some specific ways that extension agents can help these groups:

1. Tailor services to specific needs: Extension agents can tailor their services to the specific needs and circumstances of marginalized and vulnerable groups. For example, they can provide training on gender-sensitive and inclusive farming practices that take into account the roles and responsibilities of women and other marginalized groups in agricultural production.

2. Increase access to information: Extension agents can help to increase access to information and knowledge for marginalized and vulnerable groups through the use of technology and other innovative approaches. This can include providing information on climate-smart agriculture, nutrition, and health, as well as on market opportunities and financial management.

3. Build capacity and skills: Extension agents can help to build the capacity and skills of marginalized and vulnerable groups through training on topics such as business management, leadership, and communication, and assistance with technical aspects of farming and livestock production.

4. Facilitate access to resources: Extension agents can help to facilitate access to resources for marginalized and vulnerable groups, such as access to land, credit, inputs, and

markets. They can also help to connect these groups with other stakeholders in the value chain, such as buyers, processors, and traders.

5. Foster social networks and support systems: Extension agents can help to foster social networks and support systems for marginalized and vulnerable groups, through the formation of farmer groups, cooperatives, and other types of associations. These networks can provide social and emotional support, as well as opportunities for collective action and advocacy.

6. Use participatory approaches: Participatory approaches, such as participatory rural appraisal, can help extension service providers to engage marginalized and vulnerable groups in the planning and implementation of extension programs. This approach allows marginalized and vulnerable groups to share their perspectives and priorities and can lead to more effective and relevant programs.

7. Use appropriate communication methods: Extension service providers should use communication methods that are appropriate for the needs and preferences of the target group. This may involve using visual aids, local languages or dialects, and non-verbal communication.

8. Build trust and establish relationships: Building trust and establishing relationships with marginalized and vulnerable groups is essential for effective engagement. This can be achieved through regular communication, transparent and honest dialogue, and demonstration of a genuine interest in the needs and concerns of these groups.

9. Partner with local organizations: Partnering with local organizations that have established relationships with marginalized and vulnerable groups can be an effective way to engage them in extension programs. These organizations can provide valuable insight into the needs and preferences of the target group and can facilitate communication and trust-building efforts.

In summary, extension agents can help to support marginalized and vulnerable groups by tailoring services to their specific needs, increasing access to information, building capacity and skills, facilitating access to resources, and fostering social networks and support systems. Engaging marginalized and vulnerable groups in extension programs is critical to ensuring that all farmers have access to the information and resources they need to succeed. By using participatory approaches and appropriate communication methods, building trust and establishing relationships, and partnering with local organizations, extension service providers can effectively engage these groups and improve their livelihoods. By doing so, extension agents can help these groups to overcome the challenges they face and achieve greater resilience, productivity, and well-being.

8.7.3 Identifying the Needs of Women Farmers

Rural women often have unique information needs and preferences related to their agricultural production activities, and it is crucial to recognize how these differ from those of their male counterparts. Therefore, extension workers need to help rural women to identify their real needs and how they can be addressed efficiently for sustainable outcomes. It is important to note that

appropriate methods for reaching women farmers could differ in various contexts. Extension workers need to be prepared to make choices about appropriate methods and techniques on the basis of gender and social norms that influence women's time, mobility, and education (Manfre et al., 2013). Table 8.1 summarizes strategies that can be deployed by extension workers in identifying the needs of women farmers.

Table 8.1: Extension Strategies for Identifying the Needs of Women Farmers

Extension Techniques	Extension Strategies
Using farmer groups	• Identify and consult existing women's groups that could serve as vehicles for identifying women's needs. • Employ and encourage women extension agents who often can interact more appropriately with women farmers. • Organize single-sex group meetings if social norms limit women's ability to speak in men's presence or when discussing sensitive issues and always if gender-based violence may be discussed.
Accounting for time and mobility	• Schedule trainings/meetings at times when women can attend. For example, the Kenya Horticulture Development Program held training outside of lunch hours to avoid conflicts with women's household responsibilities. They also limited the length of trainings so that women could attend and still see to other activities. • If conducting long evaluations or surveys, allow people to do other tasks, such as preparing food, while they verbally respond. Show you value their time and provide incentives when possible. • Visit the demonstration plots of women farmers. • Provide transportation and daily stipends and/or encourage women farmers to stay at the on-site residential facilities when they are attending trainings so that they can freely express themselves.
Adapting to differing levels of education and literacy	• Adapt methods to numeracy and literacy levels. For example, in Mozambique, the International Potato Center used colors instead of words to allow women to indicate preferences among sweet potato varieties. • Incorporate ICTs to deliver messages to women and identify their needs.

Source: Adapted from Manfre et al. (2013)

8.7.4 Identifying the Needs of Youth Farmers

Rural youths form a substantial share of the global population. Although rural youths have been recognized as the future of agriculture, few of them see a future for themselves in agriculture or rural areas. In developing countries, older farmers, who produce most of the foods consumed globally, are less likely to adopt new agricultural technologies than younger farmers. With a growing world population and decreasing agricultural productivity in combination with a rural exodus, sustainable food production and supply are threatened. Young farmers play an important role in ensuring food security for future generations, so actively engaging them in agricultural activities and programs is essential to achieve sustainable food production.

However, rural youths face significant challenges that could inhibit their agricultural productivity. According to FAO et al. (2014), some of the principal challenges affecting rural youths' participation in the agricultural sector are:

1. Insufficient access to knowledge, education, and information, which limits productivity and acquisition of skills, and hinders the development of entrepreneurial ventures.

2. Limited access to land. It is often difficult for young people, especially young women, to gain access to land, which is fundamental to starting a farm. This is so because of cultural norms, especially in developing countries, that make it difficult for land to be transferred to women.

3. Inadequate access to financial services. Because rural youths tend to lack collateral and financial literacy, most financial service providers are reluctant to provide financial services (savings accounts, credit, and insurance) to them.

4. Difficulties gaining employment in "white- collar" jobs. White- collar jobs are skill- and labor-intensive and could provide sustainable livelihoods in the long run. Rural youths, however, do not always have the requisite skills -- or even access to the necessary skills-upgrading opportunities -- to be employed in such jobs.

5. Limited access to markets, which makes it difficult for rural youths to engage in viable and sustainable agricultural ventures. In developing countries, young rural women are particularly constrained from accessing markets because of persisting cultural norms.

6. Limited involvement of rural youths in policy dialogue. In many cases, rural youths are excluded from participating in policy dialogue. The result is that their voices are not heard during the policy process, and their complex and multifaceted needs are not addressed.

These challenges, though quite complex and interwoven, are not without viable solutions. Developing youth- specific programs can be effective in providing youths the opportunity to be actively engaged in agricultural activities. Extension services play a critical role in addressing these challenges, and well-functioning extension and advisory services are best placed to connect with youths and link them with agriculture-related opportunities. Thus, extension professionals should work with youths to develop extension programs that directly engage them.

In summary, identifying the needs of women and youth farmers is critical to developing effective agricultural extension programs that can improve their productivity and livelihoods. Here are some key steps to consider when identifying their needs:

1. **Conduct a baseline survey:** A baseline survey helps to identify the current situation of women and youth farmers, their farming practices, access to resources, market opportunities, and their constraints to agricultural production. This data will help in designing interventions that are relevant and effective for their specific needs.

2. **Conduct focus group discussions:** FGDs are a powerful tool for gathering information on the experiences, perceptions, and attitudes of women and youth farmers. They allow for a deeper understanding of their challenges and opportunities, as well as their aspirations, and help to identify potential interventions to address their needs.

3. **Consult key stakeholders:** Engaging with key stakeholders such as community leaders, agricultural extension workers, and government officials can provide insights into the needs of women and youth farmers. Their knowledge and experiences can help to identify potential interventions that are relevant and effective.

4. **Conduct needs assessment:** A needs assessment is a comprehensive process for identifying the specific needs of women and youth farmers. It can help to prioritize interventions that address the most pressing needs and ensure that resources and efforts are targeted toward areas where they will have the most significant impact.

5. **Analyze data:** Analyzing the data collected from the survey, FGDs, and needs assessment is a crucial step in identifying the needs of women and youth farmers. It helps to identify patterns, trends, and challenges that need to be addressed to improve their productivity and livelihoods.

6. **Design and implement interventions:** On the basis of the data collected, design interventions that target the specific needs of women and youth farmers. Ensuring that the interventions are context-specific and involve the participation of the target group improves the likelihood that the intervention will be sustainable.

7. **Monitor and evaluate:** Finally, monitor and evaluate the effectiveness of the intervention in meeting the needs of women and youth farmers. This feedback helps to improve the intervention design and implementation and ensures that resources are utilized effectively.

8.7.5 Developing Extension Programs to Benefit Women Farmers

Developing extension programs that benefit women farmers requires a deep understanding of the challenges and opportunities that women face in agriculture – an understanding that should come from the voices of the target women clients themselves. Women farmers play a crucial role in agricultural production, contributing significantly to food security and economic development. However, they often face discrimination and inequality in accessing resources, technologies, and markets.

To develop effective extension programs for women farmers, it is essential to understand the context and challenges that they face.

Some of the common challenges faced by women farmers are:

- Limited access to land and property rights.
- Lack of access to credit and financial services.
- Limited access to technology and information.
- Gender-based discrimination and cultural barriers.
- Lack of representation and participation in decision-making processes.
- Limited access to markets and market information.

Understanding these challenges is critical to developing extension programs that address the specific needs of women farmers. Once extension agents have a foundational understanding of the context and challenges faced by women farmers (this may come from reviewing background and existing information sources), the next step is to identify their specific needs. This involves conducting a needs assessment, which involves consulting with women farmers, extension agents, and other stakeholders.

The needs assessment should focus on identifying the following:

- The specific agricultural practices and technologies that women farmers need to improve their productivity and income.
- The information and training that women farmers need to adopt new practices and technologies.
- The financial and credit services that women farmers need to invest in their farms and businesses.
- The social and cultural barriers that limit the participation of women farmers in decision-making processes and access to resources.
- Who are key powerholders in the community (some call these "norm holders"), and how they can be engaged to speed up positive changes through their endorsement and promotion.

The needs assessment should be conducted in a participatory and gender-sensitive manner to ensure that the voices and perspectives of women farmers are included in the process. On the basis of the needs assessment, you can develop extension programs that meet the specific needs of women farmers. Extension programs should be designed to provide women farmers with the knowledge, skills, and resources they need to improve their productivity, income, and well-being.

Extension programs for women farmers may include:

- Training and capacity building on agricultural practices and technologies.
- Information and education campaigns on nutrition, health, and hygiene.

- Financial and credit services for women farmers.
- Support for women's participation in decision-making processes and access to resources.
- Networking and market linkages for women farmers.

Extension programs should be designed to be gender-sensitive, taking into account the specific needs and constraints faced by women farmers. This may involve developing targeted programs that address the specific needs of women farmers, such as those related to nutrition and health. Once extension programs have been developed, they should be implemented in a systematic and participatory manner. This involves engaging with women farmers and other stakeholders to ensure that the programs are effectively meeting their needs. Evaluation is a critical component of extension programs -- it allows you to assess the impact of the program and identify areas for improvement. Evaluation should be conducted in a participatory and gender-sensitive manner, involving women farmers and other stakeholders in the process.

Ensuring Sustainability and Scalability of Extension Programs

Extension programs can play a critical role in addressing the challenges faced by women farmers and promoting their empowerment. However, it is important to ensure that these programs are sustainable and can be scaled up to reach more women farmers over time. To ensure the sustainability and scalability of extension programs, it is important to consider the following factors:

1. Community engagement: Extension programs should be developed in close collaboration with the local community to ensure that they meet the specific needs and challenges of women farmers in the area. Involving the community in program development and implementation increases the likelihood that programs will be sustainable and accepted over time.

2. Partnership building: Building partnerships with local organizations, government agencies, and other stakeholders can help to ensure that extension programs have the resources and support they need to be sustainable and scalable.

3. Use of appropriate technology: Extension programs should make use of appropriate technology to ensure that they are effective and efficient. This may include the use of mobile technology, online resources, or other tools to reach women farmers.

4. Capacity building: Extension programs should focus on building the capacity of local organizations and community members to ensure that they have the skills and resources they need to continue providing support to women farmers over time.

Strategies to Ensure Sustainability and Scalability of Extension Programs for Women Farmers

1. Develop a clear program strategy: Extension programs should have a clear strategy that outlines the goals, objectives, and activities of the program. This strategy should be developed in close collaboration with women in the local community and other stakeholders.

2. Establish a monitoring and evaluation system: Extension programs should have a monitoring and evaluation system in place to track progress and identify areas for improvement. This system should involve regular data collection and analysis, disaggregated by gender, to ensure that the program is meeting its objectives.

3. Build local capacity: Extension programs should focus on building the capacity of local organizations and community members to ensure that they have the skills and resources they need to continue providing support to women farmers over time. This may involve providing training, mentoring, and other support.

4. Foster partnerships: Extension programs should foster partnerships with women in local organizations, government agencies, and other stakeholders to ensure that they have the resources and support they need to be sustainable and scalable.

Developing gender-responsive extension programs for women and men farmers is essential improve gender relations and ensure equitable outcomes from agricultural and household activities. By taking into account the unique needs and challenges faced by women farmers and using participatory methods, extension programs can build community members' sense of ownership over the activities promoting equality. Ensuring the sustainability and scalability of extension programs for women farmers is critical to promoting their empowerment and addressing the challenges they face. By focusing on community engagement, partnership building, appropriate technology use, and capacity building, extension programs can be developed and scaled up to reach more women farmers over time.

8.7.6 Developing Extension Programs for Youth Farmers

Extension programs can play a critical role in supporting the development of youth farmers and helping them to succeed in agriculture. It is important to ensure that these programs are designed in a way that is relevant and engaging for young people.

To develop effective extension programs for youth farmers, it is important to understand their needs and challenges. Key factors to consider include:

1. Limited access to resources: Youth farmers may have limited access to land, capital, and other resources needed to start and grow their businesses.

2. Lack of knowledge and skills: Many young people may have limited knowledge and skills in agriculture, which can make it difficult for them to succeed.

3. Limited market access: Youth farmers may struggle to access markets for their products, which can make it difficult for them to generate income.

4. Limited social support: Youth farmers may face social and cultural barriers that make it difficult for them to succeed in agriculture.

Strategies for Developing Effective Extension Programs for Youth Farmers

To develop effective extension programs for youth farmers, it is important to consider the following strategies:

1. Incorporate experiential learning: Youth farmers may learn best through hands-on, experiential learning opportunities. Extension programs should incorporate practical training and on-farm experiences to help youth farmers develop the skills and knowledge they need to succeed.

2. Use technology: Many young people are comfortable with technology and may prefer to learn through online resources or mobile apps. Extension programs should incorporate technology to make learning more accessible and engaging for youth farmers.

3. Foster mentorship and peer learning: Youth farmers may benefit from mentorship and peer learning opportunities to help them develop the skills and knowledge they need to succeed. Extension programs should incorporate mentorship and peer learning opportunities to help youth farmers build social networks and gain support.

4. Build market linkages: Extension programs should focus on building market linkages for youth farmers to help them access markets for their products. This may involve connecting youth farmers with buyers or helping them to develop value-added products that can command higher prices.

Case Studies

To illustrate the importance of developing effective extension programs for youth farmers, we will review two case studies:

1. The Young-Agropreneurs Program in Nigeria: The Young Agropreneurs Program is a training and mentorship program that supports young people in Nigeria to start and grow successful agricultural businesses. The program provides practical training, mentorship, and market linkages to help young farmers succeed.

2. The 4-H Program in the United States: The 4-H Program is a youth development program that provides hands-on learning opportunities in agriculture and other areas. The program has been successful in helping young people develop the skills and knowledge they need to succeed in agriculture and other fields.

Developing effective extension programs for youth farmers is critical to supporting the development of the next generation of agricultural entrepreneurs. By incorporating experiential learning, technology, mentorship, and market linkages, extension programs can help young farmers overcome the challenges they face and succeed in agriculture.

8.8   Paradigms for Managing Diversity

According to Hamza (2019), the paradigms for managing diversity include the following:

8.8.1 Discrimination and Fairness Paradigm

This approach laid the basis for the fair treatment of clients. The organization deflects attention to the involvement of diverse beneficiaries -- in particular, the undervalued groups, such as women, persons with disabilities, and ethnic minorities. The motto behind this paradigm is "We are all the

same, differences do not matter." Top-down rules order such organizations; there is pressure to assimilate. This is not pleasant for any of the beneficiaries, who may feel alienated as a result, and subsequently it restricts productivity. In a way, it is undermining.

8.8.2 Access and Legitimacy Paradigm

This paradigm entails valuing all individual differences, thus celebrating diversity. It can be argued that this paradigm encompasses mainstream practices such as talent attraction practices; gender targets, in view of the benefits of gender differentiation in the organization; the creation of group networks, etc. It is about differences emphasized but not used as leverage. Diversity in this paradigm is used to connect with clients: it is a resource. However, as a result, careers are marginalized.

8.8.3 Learning and Effectiveness Paradigm

The last approach is a combination of the previous two paradigms., The main difference is that the third paradigm consists of not only seeking and valuing differences but using them with consciousness for the broader benefits of the organization, its culture, leadership, and transformation. The idea is that the organizational efforts are committed to learning. This incorporates a wide range of approaches to diversity management to tackle discrimination and diversity-related issues. This "learning-effectiveness" paradigm reflects the resources theory that advocates that diverse employees/clients should be considered as resources for the organization. The most powerful point to this paradigm is that progress is measured by the power of traditionally underrepresented groups to change the organization.

The philosophy behind this is "We are the same with our differences, not in spite of them". Differences are acknowledged and their value recognized. Cultural competences are learned and shared. It informs and enhances work through experimentation. Perspectives and experiences are shared, and with this paradigm, diversity is a resource for learning. But this paradigm is more than just talking about our differences -- it is where differences are embraced, discussed, and disputed. Without doubt there is conflict in this paradigm, but it is constructive conflict. And these need to be managed well, with honest discourse, courage to have conversations about unfamiliar situations, and the ability to resolve conflict swiftly and sensitively. So that is our challenge as managers: moving to a paradigm where diversity is used as a learning resource.

8.8.4 Resistance Paradigm

This approach translates into organizational resistance to change the status quo, and this attitude contributes to the enlargement of inequality in the workplace. It may also apply to employees/clients resisting changing and rejecting the management practices implemented by the leadership.

Eight Preconditions for Making the Paradigm Shift

Eight preconditions help to position organizations to use identity-group differences in the service of organizational learning, growth, and renewal:

1. The leadership must understand that a diverse group will embody different perspectives and approaches to work and must truly value that variety of opinion and insight.

2. The leadership must recognize both the learning opportunities and the challenges that the expression of different perspectives presents for an organization. In other words, the second precondition is leadership that is committed to persevering during the long process of learning and relearning what the new paradigm requires.

3. The organizational culture must create an expectation of high standards of performance from everyone. Such a culture is not one that expects less from some groups than from others. Some organizations expect women and persons with disabilities to underperform. This negative assumption too often becomes a self-fulfilling prophecy. To move to the third paradigm, a company must believe that all its members can and should contribute fully.

4. The organizational culture must stimulate personal development. Such a culture brings out people's full range of useful knowledge and skills -- usually through the careful design of jobs that allow people to grow and develop but also through training and education programs.

5. The organizational culture must encourage openness. Such a culture instills a high tolerance for debate and supports constructive conflict on work-related matters.

6. The culture must make its workers/clients feel valued. If this precondition is met, clients feel committed to and empowered within the organization, and therefore comfortable taking the initiative to apply their skills and experiences in new ways to enhance their performance.

7. The organization must have a well-articulated and widely understood mission. Such a mission enables people to be clear about what the organization is trying to accomplish. It grounds and guides discussions about work-related changes that members might suggest. Being clear about the organization's mission helps keep discussions about work differences from degenerating into debates about the validity of people's perspectives. A clear mission provides a focal point that keeps the discussion centered on accomplishment of goals.

8. The organization must have a relatively egalitarian, non-bureaucratic structure. It is important to have a structure that promotes the exchange of ideas and welcomes constructive challenges to the usual way of doing things from any individual/group with valuable experience. Forward-thinking leaders in bureaucratic organizations must retain the organization's efficiency-promoting control systems and chains of command while finding ways to reshape the change-resisting mindset of the classic bureaucratic model. They need to separate the enabling elements of bureaucracy -- the ability to get things done -- from the disabling elements of bureaucracy -- those that create resistance to experimentation.

8.9 Cultural Differences

"Culture" refers to the values, norms, and traditions that affect the way a member of a group typically perceives, thinks, interacts, behaves, and makes judgments. It even affects perceptions of time, which can impact day-to-day scheduling and deadlines. Cultural diversity is a system of beliefs and behaviors that recognizes and respects the presence of all diverse groups in an organization

or society, acknowledges and values their socio-cultural differences, and encourages and enables their continued contribution within an inclusive cultural context which empowers all within the organization or society. Seven important actions are involved in the definition of cultural diversity:

- Recognizing the abundant diversity of cultures.
- Respecting the differences.
- Acknowledging the validity of different cultural expressions and contributions.
- Valuing what other cultures offer.
- Encouraging the contributions of diverse groups.
- Empowering people to strengthen themselves and others to achieve their maximum potential by being critical of their own biases.
- Celebrating rather than just tolerating differences to bring about unity through diversity.

Benefits of Cultural Diversity in Agricultural Extension Work

The world is naturally multicultural. Approaching cultural diversity with a mindset and actions that embrace this fact leads to many benefits, such as:

- **Compassion:** Communication and understanding of differences lead to increased compassion instead of judgment.
- **Innovation:** Varied perspectives and ways of looking at the world lend to innovative thinking.
- **Productivity:** People who come together and bring their own style of working together tend to support team productivity.
- **New opportunities:** Diversity opens the door to new opportunities and the blending of ideas which would otherwise have been homogeneous.
- **Problem solving:** Challenges are layered, so having people with different backgrounds brings a richness of opinions that can lead to better problem solving.

Cultural Diversity Competence

Cultural diversity competence is possibly the most important skill for effective work performance in the 21st century. Cultural competence refers to your ability to interact with people from different cultures and social and economic backgrounds. It is the combination of cultural knowledge, awareness, and social skills. It enables people to communicate effectively and collaborate with individuals of various cultural backgrounds. This ability depends on awareness of one's own cultural worldview, knowledge of other cultural practices and worldviews, respect or appreciation for cultural differences, and cross-cultural skills. The more different cultures work together, the more cultural competency training is essential to avoid problems. Cultural problems can range from miscommunication to actual conflict, all endangering effective worker productivity and performance. Cultural competency training both models and provides educational instruction that outlines positive behaviors, attitudes, and policies.

Benefits of cultural competency training include:

- Developing cultural sensitivity and respect.
- Recognizing differences in values and priorities and learning how to deal with them.
- Learning how to bridge differences and create a balanced approach to respecting the culture of others.
- Improving and encouraging active listening, empathy, and overall communication.
- Gaining awareness of and sensitivity to religious beliefs, holidays, etc.
- Understanding that awareness is a two-way street --people of all cultures need to adapt.
- Understanding the challenges of managing multicultural teams in the workplace.
- Developing an effective cross-cultural leadership plan.
- Learning how to communicate effectively with those of other cultures.
- Discovering how to build effective working relationships.
- Fostering appreciation of a variety of diverse perspectives, ideas, and strategies.
- Enhancing productivity and cooperation.

Components of Cultural Competency

i. **Awareness:** This is one's reaction to people who are different from him,her. It is important that extension workers are aware of how they will react in such situations and, if needed, can work on changing their thoughts and reactions to create a more positive culture during programs/projects.

ii. **Attitude:** Examine any cultural biases that you may have, as well as beliefs about cultural differences. An example is the belief that Community A has strange cultural norms and Community B is peaceful. Such attitudes will affect how an extension professional will work with the people from both communities.

iii. **Knowledge:** The beliefs and values that people hold regarding equality may affect their behaviors. It has been proven that those with prejudices display behaviors that reveal their prejudices, though they may be unaware of that connection. For example, an extension worker must entrust the key to the stock room to a community member. Rather than giving the key to the individual who resides close to the stock room – a traditional worshipper -- he/she gives the key to an individual who is a Christian and lives far away.

iv. **Skills:** This component requires working on and striving to improve one's cultural competence. Communication is the most critical skill extension workers can have in the workplace because this is the main way they interact with colleagues, beneficiaries, stakeholders, etc. It includes verbal and non-verbal communication and knowing how these tend to vary from culture to culture.

Managing Cultural Diversity in Agricultural Extension Projects/Programs

Developing cultural competence results in an ability to understand, communicate with, and effectively interact with people across cultures, and work with those of varying cultural beliefs.

1. Teamwork

Teamwork is one of the soft skills or professional skills that are essential competencies to succeed in a work environment. It is about building positive and healthy working relationships that help everyone to achieve personal goals. It is important for an extension agent to have an open mind toward new cultures and to embrace teamwork activities and sharing of tasks rather than focus on individual differences. He/she should see other people's opinions as an opportunity to expand his/her horizons. Communication is also essential to establish good teamwork, whether in the daily basis activities, in a meeting, or during a specific project. Another value that is appreciated among team players is trust, which is built from an honest attitude and transparency, especially in hard situations such as when one is not sure about something, is having difficulty carrying out a certain task, or will not be able to deliver on time.

2. Model the Right Behavior

The extension agent should lead by example in embracing and respecting diversity. He/she should put harmony and common sense before being "right" and use a sense of humor and/or a positive approach to relate with diverse people. Do not take things to the personal side; sometimes people are just having a bad day or are going through a difficult situation.

3. Awareness

Cultural awareness is understanding how we react to people who are different from us and how our behavior might interfere with effective working relationships. There is a great need to learn to overcome stereotypes, to see people as individuals, and to focus on actual behavior rather than our preconceived and often biased notions. A good way to build a healthy work environment is to celebrate cultural differences and make everyone aware of other perspectives, habits, and ways of life. Learning a new language might be a good start to get along with your clientele.

4. Communication

The best way to practice effective communication in a multicultural environment is to keep an open mind, have some knowledge of cultural differences, practice active listening (getting used to different accents), and watch your nonverbal communication as well your voice tone. Kindness and empathy are much appreciated in this context. Providing information accurately and promptly is critical to effective work and team performance. This is particularly important when a project is troubled and needs immediate corrective actions. We need to understand that people from different cultures vary in how, for example, they relate to bad news.

5. Schedules

Extension work can be impacted by cultural and religious events. The business world generally runs on the Western secular year, beginning with January 1 and ending with December 31. But some cultures use wildly different calendars to determine the beginning of a new year or specific holydays. For example, Eastern Orthodox Christians celebrate Christmas on a different day from western

Christians. For Muslims, Friday is a day for their major prayer. These and other variations affect the workplace as people require time off to observe their holidays.

6. Attitude

This is the companion skill to awareness. Attitude enables people to examine their values and beliefs about cultural differences and understand their origins. It is important to focus on facts rather than judgment and avoid suggesting that some people are more biased and prejudiced than others -- this can quickly sabotage cultural training. The goal is embracing cultural diversity in the workplace and creating effective working relationships.

7. Knowledge

Social science research indicates that our values and beliefs about equality may be inconsistent with our behavior. Ironically, we are often unaware of this. Knowledge about our own behavior – and how it relates to fairness and workforce effectiveness – is an essential skill. It's also essential to be knowledgeable about other cultures, from communication styles to holidays and religious events. The minimum objective is tolerance, which is essential for effective teamwork. Differences are what make tolerance necessary, and tolerance is what makes differences possible.

8. Skills

The goal of training – in awareness, attitude, and knowledge – should be skills that allow extension workers to make cultural competence a seamless part of the workplace. The new work environment is defined by understanding, communicating, cooperating, and providing leadership across cultures.

Box 8.9: How to Create Cultural Competency Training

To add or boost cultural training in an agricultural extension project/program, consider these six keys as a layout for your program and build from there.

1. Define diversity: Ground your entire cultural competency program with an initial discussion about diversity. What is it? How has it impacted your organization? How does it affect others with different identities? How do we develop an understanding of ourselves in relation to others? The process of socialization deeply influences our behaviors, values, and interactions with the world.

2. Improve self-awareness: Spend some time exploring social groups and how they affect the lives of their participants. This can be an interesting part of your session. Some people deeply identify with their social groups; others have hardly thought about how they belong to them. Either way, boosting self-awareness will allow your participants to see how they are connected to a greater system.

3. Unpack cultural baggage: Though most people do not like to admit it, we all have biases, stereotypes, and prejudices. Discuss your unconscious biases, unpack your cultural biases, and understand the unintended impact that comes with them, especially as they pertain to someone's individual professional role.

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4. Explore "isms": "Isms" are attitudes, actions, or institutional structures that can oppress certain individuals or groups. What are the most common "isms"? What is the relationship between these systems of oppression and the assumptions that people make about others?

5. Understand privilege: Spend some time unpacking the complex web of privilege. Various types of privilege interconnect, and most have a systemic origin. Start broad with these details, and then get specific about the types of privilege that benefit some – and not others.

6. Create allies: Cultural competency training seeks to create allies. Spend some time discussing ways that you can address issues when they arise or if they threaten diversity, equity, and inclusion.

8.10 Dialogue Skills

Obstacles to Achieving Dialogue

Dialogue is easily spooked. Many common obstacles can prevent dialogue from emerging. Removing sources of fear, suspending the exercise of power, eliminating external influences, removing distractions, and providing excellent communication conditions can all promote dialogue.

i. Fear

Fear prevents dialogue. People are often afraid to trust other participants, consider new ideas, and open to new possibilities. People hold back and fail to participate fully and genuinely because of their fears. Suspending judgment is often an act of courage. Remaining open to new ideas; doubting, questioning, or abandoning beliefs held for many years; adopting a new viewpoint; releasing attachments; really hearing someone for the first time; abandoning the status quo; thinking in a new way; allowing for change; acknowledging old habits and beliefs; abandoning stubbornness; admitting you do not know or do not understand; admitting you may have been wrong; exposing vulnerabilities; anticipating the ramifications and future consequences of new ideas and agreements; becoming authentic rather than merely polite; and confronting assumptions, issues, and people can all be scary. These obstacles require courage to overcome. Speaking truth to power and challenging the opinions and beliefs of others require courage. Finding your voice requires courageous thinking. Speaking your voice requires courageous action. Have the courage to dialogue.

ii. External Constraints

Dialogue requires autonomy. Speaking your voice requires thinking for yourself and making your own decisions. Dialogue requires adopting an internal locus of control and rejecting an external locus of control. Repeating the opinion of others, deferring your own judgment to someone outside the room, appealing to the views of your chosen experts or luminaries, defending a special interest, holding conflicting interests, running a secret agenda, reciting dogma, going along to get along, deferring to fate or luck, or introducing external constraints such as "my boss requires . . ." or "everybody knows. . ." all prevent you from making decisions and speaking your own voice. It is important to shed

these external constraints so you can think for yourself, represent yourself, speak for yourself, and participate in the dialogue. Speak in the first person about your own experiences and beliefs.

iii. Distractions

Dialogue requires focus. Multitasking seems to be emerging as the new status symbol. But dialogue is hard work that requires full and present attention. Listening for meaning requires focus and full attention. Suspending judgment requires self-discipline. Speaking your voice requires presence and thoughtfulness. Respect often requires patience and cannot be rushed. Reading an email, talking on the phone, text messaging, surfing the net, holding side conversations, watching the clock, preparing for the next meeting, writing notes, or wishing you were elsewhere are all distractions that will prevent one from fully participating in dialogue. Lack of attention and concern also distracts others and may prevent them from participating in dialogue. Either focus your full and undivided attention on the conversation or leave the room. Expect this focus of others.

iv. Poor communication

Dialogue requires careful, detailed, delicate, and nuanced communications. Poor room acoustics, physical distance, language differences, accents, jargon, local vernacular, unfamiliar vocabulary, cultural differences, unshared abstractions, logical fallacies, intentional and unintentional distortions, hearing difficulties, and poor sound systems can all prevent dialogue from emerging. Gathering participants in a private space free of distractions and sitting comfortably in a circle where everyone can easily see and hear everyone else promote communication that can help dialogue emerge. If language differences exist, then effective translation services, including cross-cultural translations, are required.

Box 8.10: Exercises to Achieve Dialogue in Extension Programs

- Organize the physical space so participants are in a circle as much as possible. Whether people are seated at a table or tables is not as important as the sense of equality that comes from sitting in a circle.
- Introduce the general concept of dialogue, and then ask everyone to think about an experience of dialogue (in the sense of "good communication").
- Ask people to share with their neighbor what the experience was and to think about the characteristics of that experience.
- Ask group members to share what aspects of such past experiences made for good communication and write these characteristics on a flip chart.
- Ask the group to reflect on these characteristics by having each person talk about his/her reactions.
- Let the conversation flow naturally once everyone has commented (this requires 1 ½ to 2 hours or more).
- Intervene as necessary to clarify, using concepts and data that illustrate the problems of communication.

Close the session by asking everyone to comment in whatever way they choose.

Dialogue is not a quick-fix approach; it is a process requiring thought, skill, and effort. It is not a panacea for all that ails the performance of groups and organizations, but it provides a solid foundation for the development of sustainable change. The most important variable for the successful exercise of dialogue is an effective leader, skilled in applying it to many situations. Therefore, to achieve a successful dialogue in agricultural extension programs, it is important for the extension agent to remove the obstacles described above, assemble and engage the stakeholders, create the space, increase safety, build trust, level power, defer decision making, demonstrate empathy, invite the group to do something truly important, and then stand back. Perhaps an important dialogue can emerge, and meaning will begin to flow.

8.11 Conclusions

In this chapter, we defined terms such as gender, basic gender concepts, and diversity. We also discussed the requisite skills needed by extension professionals for addressing the needs and opportunities for women and youth farmers. We examined the dimensions and importance of diversity for an agricultural extension worker. Finally, we discussed dialogue skills required by extension professionals for carrying out extension work.

8.12 Self-Assessment Exercises

1. Explain the differences between sex and gender.
2. Define these terms: (a) gender bias, (b) gender norms, (c) gender stereotype, (d) empowerment, (e) gender equality, and (f) diversity.
3. List four tools and techniques used for gender analysis.
4. Discuss five reasons why gender concerns should be integrated into agricultural extension delivery.
5. How can extension programs and policies empower women? Illustrate with examples.
6. Enumerate three commonly used gender and development index indicators.
7. List five ways in which gender intersects with sustainable development goals.
8. How can extension workers incorporate diversity in their extension delivery services?
9. Discuss six dimensions of diversity.
10. List extension workers' strategies for developing extension programs for women and youths.
11. As an extension professional, elaborate on key steps to take to identify the needs of women and youth farmers.
12. Discuss eight steps needed to manage cultural diversity in an extension program.
13. Discuss four dialogue skills required by extension professionals.

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Extension Soft Skills and Competencies

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9.0   Learning Outcomes

- Explain the concept of soft skills with implications to extension work.
- Identify important soft skills useful in extension work.
- Apply various soft skills in extension work/in delivery of extension advisory services.

9.1   Introduction

Traditionally, the role of the extension worker has largely been that of an educator – disseminating relevant agricultural technologies to rural people and helping them to adopt the same for improved agricultural production and economic well-being. However, in recent years, the roles of agricultural extension and advisory services (EAS) have expanded significantly because of the increasing complexity of the needs of the current agricultural food systems. In addition, agricultural extension is now seen to operate within the context of agricultural innovation systems (AIS). New roles have, therefore, been introduced for the agricultural EAS (Suvedi and Kaplowitz, 2016).The extension system is challenged to serve as the connecting actor in complex agricultural innovation systems (Kaynacki and Boz, 2019), to go beyond technology transfer to facilitation, beyond training to learning, assisting farmers to form groups, dealing with marketing issues, addressing public interest issues in rural areas such as resource conservation, health, monitoring of food security and agricultural production, food safety, nutrition, family education, and youth development, and partnering with a broad range of service providers and other agencies (Chikaire et al., 2018). This calls for new skills and competencies for extension professionals, apart from those they traditionally possessed.

Agricultural extension professionals need both hard (technical/job- specific) and soft skills to perform the increasing roles effectively and efficiently among clients and relevant actors and agencies. Hard and soft skills complement each other, and their combination ensures good

results and sustainable long-term success (Tripathy, 2021). Similarly, Lussier (2012) reiterates that good job performance depends on technical (hard) skills as well as social competence (soft skills), and that professional development is more determined by social skills and social values than technical skills. Most training contents in the universities emphasize developing hard skills (technical abilities/job- specific abilities) of professionals and have minimal contents for training on soft skills.

This chapter comprises a set of soft skills identified as important but minimally covered in the curricula for agricultural extension training. The chapter is, therefore, a resource material aimed at building capacity of extension professionals in the identified soft skills.

Meaning of Soft Skills

The term "soft skills" is used interchangeably in literature to describe concepts such as generic skills, key/core competencies, transferable skills, transversal skills, life skills, 21st century skills, future work skills, social and emotional learning skills, and non- cognitive skills, among others. The concept has many definitions which vary with interest and local conditions. Some of the definitions considered in this chapter are:

- Soft skills are a collection of qualities, habits, personality traits, attitudes, and social graces which everyone possesses in varying degree and are needed for everyday life as much as they are needed for work (Maniscalco, 2010).
- Soft skills are intangible, non-technical, personality-specific skills that determine one's strength as a leader, facilitator, mediator, and negotiator (Robles, 2012).
- Soft skills is a term used to indicate personal transversal competences such as social aptitudes, language and communication capability, friendliness and ability of working in teams, and other personality traits that characterize relationships between people (Cimatti, 2016).

Soft skills are both self-oriented/intrapsychic/personal (what one must understand and develop by him/herself) and other-oriented/interpersonal/social skills (what one learns relating to others). The personal skills are cognitive skills (knowledge and thinking skills (e.g., desire to continue learning, plan and achieve goals, resilience, self -motivation, flexibility, responsibility etc.); the social skills refer to relationship with others (communication, networking, teamwork, negotiation, problem solving, etc.).

Shakir (2009) categorized soft skills into three categories: personal attributes, interpersonal skills, and problem- solving and decision- making skills. Soft skills are also classified into personal, social, and methodological skills. Personal skills include resilience, motivation, self-reflection, responsibility, etc.; social skills include empathy, communication, teamwork, and knowledge of human; and methodological skills are analytical, organizational, problem solving, stress resilience, etc. Soft skills may also be broadly divided into communication skills, critical thinking and problem-solving skills, teamwork, lifelong learning and information management, entrepreneurship skills,

ethics and professional moral skills, and leadership skills (Ministry of Higher Education Malaysia [MOHE], 2006).

Soft skills that are crucial in the agricultural sector and agricultural communication include creativity, "thinking out of the box", teamwork, reliability, assertiveness, good problem- solving skills, good communication skills, flexibility, good time management, responsibility, and leadership (Juhász and Horváth-Csikós, 2021). Strickland (2011) also identified three categories of agricultural communication skills important for graduates: networking; relationship- and team-building skills, communication and social skills, and leadership skills. Other related skills identified are collaboration, personal and professional networking, negotiation skills, teamwork, public speaking, verbal and non-verbal communication, active listening, critical and strategic thinking, self- awareness, etc.

Link between Soft Skills, Personal Mastery, and Emotional Intelligence

Soft skills are important in helping individuals to attain personal development, in addition to determining their performance in the workplace. Very often with regard to personal development, the term "personal mastery" is used.

Personal mastery refers to the discipline of personal growth and learning, through which individuals seek to expand their ability to create results in life that they desire (Senge,1990; Canbrera and Canbrera, 2021). It is seen as a journey, whereby individuals live and work purposefully towards a personal vision, guided by personal values, and it involves constant learning and striving for improvement. Personal mastery thus involves understanding how we think and why we do things the way we do, having clarity of purpose and direction in life, and moving towards constant learning and development so as to keep improving yourself. Knowing oneself is the foundation of the journey towards personal mastery. This self-knowledge enables individuals to know themselves in terms of their personality, beliefs, values, motivations, strengths, weaknesses, and areas of improvement. Positive thinking and ability to harness and utilize talents, strengths, and skills are important aspects in personal mastery.

Emotional intelligence plays an important role in helping individuals to know themselves better. It is defined as a social intelligence that involves the ability to monitor one's own and others' emotions, to discriminate among them, and to use the information to guide one's thinking and actions (Serrat, 2009). A person with high emotional intelligence is likely to understand themselves better and, therefore, attain higher personal mastery than one with low emotional intelligence. Emotional intelligence is often categorized as a soft skill, although it is more of a collection of soft skills, such as intrapersonal and interpersonal skills. Many of the soft skills discussed in this chapter fall under emotional intelligence.

The chapter covers 16 soft skills, which are divided into two broad categories: intrapersonal skills and eight (8) interpersonal skills (Box 9.1).

Box 9. 1: Soft Skills and Competencies

To be relevant, every extension professional should have these soft skills and competencies:

Intrapersonal Skills	Interpersonal Skills
1. Creativity and innovativeness	1. Collaboration
2. Critical thinking	2. Networking
3. Problem solving	3. Conflict management
4. Flexibility	4. Negotiation
5. Positive work attitude	5. Leadership
6. Self -motivation	6. Teamwork
7. Stress management	7. Group formation and development
8. Time management	8. Facilitation

Each soft skill is presented in a separate section. The sections discuss the meaning of the soft skills, their importance, applications, and tips on how to enhance these soft skills. It is important to note that these soft skills are transferable - meaning they can be applied across disciplines. This chapter, therefore, is useful not only for agricultural extension professionals but for anyone wishing to improve their performance and achieve better results in their work and life in general.

The 16 soft skills covered in this chapter are not exhaustive -there are many more soft skills that are important for extension professionals. However, these were selected on the basis of gaps identified through a study, *"Strengthening Agricultural Extension Training in the Michigan State University (MSU) Alliance for African Partnership (AAP) Consortium Partners in Africa"* (Suvedi et al., 2023). Communication skills, which are critical for extension professionals, are covered on their own in a separate chapter.

9.2. Creativity and Innovativeness

Creativity and innovativeness skills enable an extension worker to develop and adapt to change in the ever-evolving working environment. They enable extension staff to make use of current knowledge to find novel ideas that are advantageous to effective agricultural EAS. Creativity and innovativeness are crucial in building a formidable personality and organization. These skills help to make things better and easier for the functional and operational management of affairs in an extension organization. Generally, an organization can become more efficient by enhancing employees' creativity skills, providing support for those who are intrinsically motivated, and building domain-specific expertise within the establishment. Creativity is certainly a desirable attribute that extension educators should have in support of innovation.

Meaning of Creativity

There is still no clear, widely agreed-upon definition of creativity, despite increased scholarly interest in the subject (Amabile and Pratt, 2016). However, research from the 1970s represents the most widely

recognized definitional metrics of creativity. To quantify creative thought, Torrance (1974), whose work created metrics for creativity, focused on the following factors when building his scale: fluency, flexibility, originality, and elaboration. Using these criteria, creative thinking gives people the capacity to generate an endless supply of ideas, which involves transforming ideas, imagination, and dreams into reality. But what about their application and use? This is the point at which innovation starts to go beyond creativity.

Importance of Creativity in Extension

At the core of a successful extension professional's life lies creativity skills. These are important in the following ways:

- Ideation.
- Incubation.
- Discovery.
- Problem solving process.

Innovativeness

Innovativeness is the capacity to come up with ideas that add value and enhance operations, such as developing a new machine or figuring out a quicker way to get to work. Innovative skills allow you to solve difficulties and improve your knowledge in the workplace. According to Abdusalam et al. (2017), innovation is the creation of new or noticeably enhanced goods (products or services), processes, or marketing strategies. When creative ideas are transformed into a business, it is said to be innovative (Njeru, 2017). It also involves the process of transforming original concepts into practical products or working methods.

Given that creativity is a fundamental component, there must be additional individual orientations and talents (beyond creativity alone) that can either contribute to or hinder the success of individual-level innovativeness. Theoretically, increased employee innovativeness should support all elements of the innovation framework, boosting efforts for breakthrough discovery, incubation, and acceleration.

What are the Qualities of Innovation?

The knowledge and skills an extension professional uses to develop and adapt to change are known as innovativeness skills. They enable him/her to draw on prior expertise to generate novel ideas that are advantageous to both the person and the team. Innovation encourages you to consider problems from all angles and think creatively about the best solution. Strong innovativeness skills at work indicate that you possess the personality traits, social intelligence, and technical knowledge necessary to advance in your career.

Creativity and Innovativeness Skills

According to Abdusalam et al., (2017), the following are some of the top innovativeness abilities and examples of how they can be applied:

- **Imagination:** Innovative people are those who can imagine new, more effective ways to carry out jobs. An imaginative extension worker can forecast the results of his/her ideas and think of original approaches to accomplish the set goals. Creativity abilities motivate individuals and their teams during brainstorming sessions, contribute to new discoveries, and advance the organization.

- **Problem solving skills:** Innovative extension specialists view difficulties as chances to come up with fresh ideas for solutions or products. Understanding and the ability to recognize typical issues and choose the most effective solution for them is a necessary component of innovation. One can apply Problem solving techniques at work to save costs, boost productivity, and resolve client problems.

- **Design:** Designing innovation involves coming up with original ideas and choosing practical implementation criteria. Creating new items and procedures is how innovative ideas are put into practice. To create working prototypes, an individual can leverage technical design abilities such as product development and engineering.

- **Critically analyzing:** You must consider the logic behind business procedures critically if you want to change the way your workplace runs. Extension professionals can assess a problem and find opportunities for improvement via critical thinking. In the job, critical thinking can help a person stay proactive in adjusting and keep a growth-oriented perspective.

- **Flexibility:** An individual can find creative uses for his/her skills when he/she feels at ease adapting to his/her environment and being adaptable. Flexibility enables you to test your limits, assist others, and use your previous knowledge in novel situations. Being adaptable can also help you succeed no matter what the situation and adapt to shifting trends in the environment.

- **Persuasion:** As an extension employee, you must use persuasion to get others - co-workers and clients - to implement your ideas. In EAS, innovation involves teamwork. Clients can be persuaded to adopt innovative ways when you outline the reasoning behind your suggestions and appeal to their aims. you can accelerate the innovation process and increase the possibility to evaluate the effects of the discoveries by persuading others to invest in the concepts.

- **Entrepreneurship:** Finding business possibilities and using one's ideas to add value is what it means to be an entrepreneur. Innovation based on client demand is simple to accomplish when one has an entrepreneurial attitude. In the workplace, an agent can use entrepreneurship to launch fresh initiatives and projects that can boost productivity while offering the public a much-needed service or good.

How to Increase Capacity for Creativity and Innovation

You can increase your capacity for creativity and innovativeness in the following ways:

- **Take chances:** Innovation requires taking chances and experimenting to understand new things. Learn about the benefits and drawbacks of every decision you make and take chances that could have a good impact on the workplace.

- **Search for fresh chances:** Always look for new assignments that will challenge you to improve your expertise. To learn from others and use your skills in a variety of settings, offer to assist with new initiatives.

- **Go against the grain:** To identify areas for innovation, consider the rationale behind existing workplace practices. Consider whether there are more effective ways to complete the same duties and take the initiative to make changes.

- **Set high standards:** Consider the people the inventions will benefit, then make goals to get there. Consider the advantages the ideas might have for you, your place of employment, or your clientele, then look for practical applications.

- **Request input:** When developing a new idea, ask for feedback from others, such as friends, family, peers, or co-workers. Getting input from other viewpoints might help you consider various issues and make ideas more realistic.

- **Show tenacity:** Being innovative requires the capacity to bounce back from setbacks and gain knowledge from errors. By considering the adjustments you can make to your upcoming endeavor to increase its success, you are practicing resilience.

Other ways to improve creative skills in the workplace include:

- **Participate in meetings:** When you have a suggestion for how to make a project better, share it. Speak up at meetings to gain confidence and provide an outlet for your original ideas.

- **Examine market trends:** Reading publications and going to conferences will help you stay up- to- date on advancements in the profession. Also, one can forecast emerging trends and incorporate new technologies into the job by learning about other advancements in one's sector.

- **Try out fresh concepts:** Find ways to test new ideas and gauge their effectiveness. A person can improve the ideas before putting them into practice on a broad scale by carrying out experiments and trial runs. Also, adjusting the working surroundings can encourage creativity. Alternate where you work or make modifications to your workspace to inspire new ways of thinking.

- **Work together with co-workers:** Collaboration with others during brainstorming sessions can increase productivity. Collaborate with others who can give you feedback on your ideas and foster a creative environment.

- **Assemble data:** Learn about the procedures used at the current workplace and keep an eye on how adjustments there affect output. Understanding the outcomes of several procedures might help you spot trends and choose the best approaches for upcoming projects (Abdusalam et al., 2017).

9.3 Critical Thinking

Critical thinking is a universal skillset, which is increasingly valued in all spheres of life, and is needed by all people regardless of their professional field. It is one of the highly regarded 21st century skills. Agricultural extension work today is carried out in complex settings that involve many demands, multiple actors, and many challenges. The role of extensionists has thus evolved greatly in recent years (Suvedi and Kaplowitz, 2016). To successfully carry out their responsibilities, extension professionals need to have the ability to deal with the complexities and challenges involved in their work. This calls for thinking that goes beyond the normal day- to -day thinking. Extension professionals increasingly have to apply critical thinking to be effective in their work.

Critical thinking is defined in various ways:

- The careful application of reason in the determination of whether a claim is true. It is thinking about thinking (Moore and Parker, 2009).
- Thinking that is goal-directed and purposive, "thinking aimed at forming a judgment," where the thinking itself meets standards of adequacy and accuracy (Bailin et al., 1999).
- Reasonable, reflective thinking that is focused on deciding what to believe or do (Schafersman, 1991).
- The ability to think clearly and rationally, understanding the logical connection between ideas; the ability to engage in reflective and independent thinking (Skills You Need, 2023).

Clearly, critical thinking is not the same as the normal thinking that we do on a day-to-day basis.

Characteristics of Critical Thinking

Critical thinking is different from normal thinking, so it is important to understand its distinguishing characteristics. These are:

- Critical thinking is purposeful.
- Critical thinking is responsive to and guided by intellectual standards of relevance, accuracy, precision, clarity, depth, and breadth.
- It supports the development of intellectual traits in the thinker of humility, integrity, perseverance, empathy, and self-discipline.
- The thinker can identify the elements of thought present in thinking about any problem, such that the thinker makes the logical connection between the elements and the problem at hand.
- Critical thinking is self-assessing and self-improving. The thinker takes steps to assess his/ her thinking, using appropriate intellectual standards. If you are not assessing your thinking, you are not thinking critically.
- There is integrity to the whole system. The thinker is able to critically examine his/her thought as a whole and to take it apart (consider its parts as well). The thinker is committed to be intellectually humble, persevering, courageous, fair, and just.

- Critical thinking yields a well-reasoned answer. If we know how to check our thinking and are committed to doing so, and we get extensive practice, then we can depend on the results of our thinking being productive.
- Critical thinking is responsive to the social and moral imperative to enthusiastically argue from opposing points of view and to seek and identify weakness and limitations in one's own position (Noruzi & Hernandez, 2011).

Benefits of Critical Thinking

Critical thinking is a valuable soft skill generally in life but more so in the workplace. The benefits include:

- **Improved Problem solving:** This is because critical thinkers do not rush into making decisions or acting. They take time to understand the situation, gather information, and examine all possible options. Therefore, critical thinking helps people to handle issues and make conscious and well-informed decisions. Remember, the quality of our lives is determined by the decisions we make.
- **Being well-informed.** Critical thinkers tend to gather as much information as they can about situations, which gives them an advantage in handling change or new situations. More information also helps people to form opinions that are unbiased and well- informed.
- **Critical thinking encourages self-reflection:** Self-reflection involves taking the time to think about, meditate on, evaluate, and give serious thought to our behaviors, thoughts, attitudes, motivations, and desires. Self-reflection gives us a better understanding of why we do the things we do.
- **Critical thinking helps avoid assumptions:** Because it involves careful reasoning and reflection, it prevents people from believing anything blindly and taking actions based on assumptions, which can result in costly mistakes.
- **Increased creativity:** Critical thinking not only helps us solve problems but can also help us to come up with new and creative ideas for solving them.
- **Increased level of happiness:** Critical thinking helps you to be in touch with yourself and have a deep understanding of why you think the way you think. This understanding can help you to accept your shortcomings, focus on your strengths, and be happy with who you are.
- **Improved relationships:** Critical thinking enables us to understand the perspectives of others and to be more open-minded about different views. This makes us more accommodating of diversities among people.
- **Promotes curiosity:** Critical thinkers are more curious in life because they want to understand things. They do not accept things at face value but tend to ask questions which can help to increase their understanding.
- **Allows for creativity:** Critical thinkers tend to be more creative because they are always looking for ways to take things further.

- **Enhances problem solving skills:** Critical thinkers are better at solving problems because of their patience and high level of commitment to solving problems. They do not easily give up without finding a solution. They therefore tend to be good at their jobs and have great input into solving societal problems. (University of the People, 2023; Indeed Editorial Team, 2023).

Common Critical Thinking Dispositions

People who engage in critical thinking can be distinguished by certain tendencies or attitudes that are known as dispositions, as outlined by Facione et al. (2000) and Bailin et al. (1999):

- **Open-mindedness and respect for others' viewpoints:** Critical thinkers are receptive to views and knowledge that are different from theirs. They also respect and accept others' viewpoints.
- **Fair-mindedness:** This refers to impartiality, whereby other people's ideas and opinions people are treated fairly.
- **Propensity to seek reasons:** They are not satisfied with things at face value but want to understand the underlying reasons.
- **Inquisitiveness and a desire to be well-informed:** Critical thinkers tend to be curious and have a desire to know more.
- They also seek to get as much information as they can about things.
- **Flexibility:** They are not rigid in their ways or viewpoints but are willing to shift their positions to accommodate others.

Important Critical Thinking Skills

The following are some of the skills related to critical thinking and ways of improving them, as suggested by Herrity (2019):

- **Observation skills:** People with good observation skills are able to sense and identify problems quickly. They are also capable of understanding why something might be a problem and are even able to predict a problem before it occurs.
- **Analysis skills:** This is the ability to analyze and effectively evaluate a situation. One must know what facts, data, or information about the problem is important. Analysis can include gathering unbiased research, asking relevant questions about the data to ensure that it is accurate, and assessing the findings objectively.
- **Inference skills:** Inference involves drawing conclusions about the information that you collect and/or developing an answer based on limited information. To do this effectively, you must have technical or industry -specific knowledge or experience, which will form the basis of your inference.
- **Communication skills:** Communication skills are key in helping us to explain and discuss issues and their possible solutions with clarity.

- **Problem solving skills:** Problem solving is closely linked with critical thinking. The better the skills that one has in problem solving, the better they are likely to be at critical thinking. (Problem- solving skills are covered in Section 9.4 of this chapter.)

Some Tips for Improving Critical Thinking

The following are suggested ways in which you can generally enhance your critical thinking:

- **Improving your self-awareness:** Seek to understand yourself.
- **Define your question clearly:** What do you want to achieve and how do you intend to get there?
- **Collect information that is reliable:** Ensure that all the sources of information that you are using are trustworthy. Remember, you have to use the information, along with previous knowledge and experience, to make an objective judgment. Ask the right questions: The wrong questions will lead you to wrong answers or in the wrong direction. Therefore, ensure that you ask questions that will help you to get the right answers. Always ask questions when you are not sure of something. Do not fear to ask the same questions or rephrase them to ensure you are understood better and get helpful answers.
- **Consider both the short term and the long term:** Consider both the immediate- and long-term consequences of the proposed solutions. Some short-term solutions can lead to negative consequences in the long run.
- **Explore all sides:** Ensure that you explore all options available and think outside of the box before coming to any conclusions. It is also important to apply foresight – think about the possible impacts your proposed solutions could have.
- **Learn from a mentor:** I Identify someone, either in your organization or elsewhere, who has good critical thinking skills, and learn from that person, directly and indirectly, how to improve your critical thinking skills (Birt, 2023).

9.4 Problem Solving Skills

Problems are part and parcel of human life. A quote by Theodore Rubin illustrates this well: "The problem is not that there are problems, the problem is expecting otherwise and thinking that having problems is a problem" (Nezu et al., 2007).

We all face problems of various kinds and magnitudes at all stages of our lives. They affect us at personal, family, work, or community levels. Successful living requires us to be able to effectively handle problems. In recent years, problem solving has received a lot of attention as one of the critical 21st century skills for success in life.

Meaning and Importance of Problem Solving

Problem solving is the process used by an individual or group to find an effective solution for a particular problem. It involves coming up with solutions for overcoming barriers that stand between us and our goals (Skills You Need, 2023).

Research has shown that ineffective problem solving is directly linked to stress and results in negative effects such as high blood pressure, drug and substance abuse, poor health habits, and poor work habits. On the other hand, effective problem solving is associated with optimism, self-esteem and self-confidence, improved health, and emotional well-being, among others (Nezu et al., 2007). It is therefore clear that effective Problem solving skills enable individuals to cope more successfully with the demands and challenges of life.

Approaches to Problem Solving

People tend to use two main approaches when confronted with a problem (Centre for Good Governance (n.d.):

1. The Stop-it Approach

This approach seeks to solve a problem so that the problem no longer exists. The stop-it approach has three forms:

- **Prevention:** This involves preventing a problem from occurring or recurring. It is the most desirable solution because there will be no need to deal any further with the problem or its consequences.
- **Elimination:** This involves getting rid of the problem once and for all.
- **Reduction:** Here we seek to reduce the magnitude of any problem, thereby lessening its effects.

2. Mop-it Approach

This approach is aimed at dealing with the effects of a problem.

- **Treat It.** Deal with the damage or effects of the problem.
- **Tolerate It.** Put up with the effects of the problem -- learn to live with it.
- **Redirect It.** Direct the problem elsewhere or redefine it so that it is no longer seen as a problem.

For every problem we face, we need to identify the most appropriate approach to deal with it. Some problems can be solved and done away with, there are those that we just have to live with and adjust our attitude towards them. It is important to remember that problem solving is a continuous activity. Though every problem may have a solution, the solution may introduce a new problem. Problem solving therefore involves continuous adjustment.

Stages in Problem Solving

The following stages are involved in problem solving (Kapur, n.d.; Skills You Need, 2023):

1. **Problem identification:** The first step is to detect and recognize that there is a problem, identify the nature of the problem, and get a clear picture of the problem. Identifying a problem is not a straightforward process. You have to critically assess the situation and ask yourself questions such as: Does the problem really exist or is it just perceived? Is it a single problem or multiple?

Is there anything to be gained by solving the problem? What would happen if nothing was done to the problematic situation? It is important to identify the problem well because that determination will form the basis of future actions in problem solving.

2. **Defining the problem:** This involves careful analysis of the problem. The following are suggested steps you can follow to correctly define a problem:

    i.   Seek available facts.

    ii.   Describe the facts in clear language.

    iii.   Separate facts from assumptions.

    iv.   Set realistic goals.

    v.   Identify the obstacles to overcome. (Nezu et al., 2007, p.52).

3. **Looking for possible solutions:** This stage involves coming up with a number of possible solutions to the problem. It is best to involve input from a number of people so as to get as many views as possible.

4. **Deciding on the best solution:** Here all possible solutions are carefully evaluated, and a decision is made on the best possible solution. Considerations include any possible unanticipated outcomes; acceptability; feasibility; and alignment with existing circumstances.

5. **Implementation:** Once you have selected the best possible solution, the next step is to act upon it.

6. **Monitoring:** You need to keep track of the implementation of the solution and get feedback from the people affected by the solution to determine the success of the problem solving process.

Effective Problem Solving Skills

The following skills are important in effective problem solving:

Creativity: Problems are usually solved either intuitively or systematically. Intuition is used when no new knowledge is needed - you know enough to be able to make a quick decision and solve the problem, or you use common sense or experience to solve it. More complex problems or problems that you have not experienced before will likely require a more systematic and logical approach to solve, and for these you will need to use creative thinking.

Researching skills: Defining and solving problems often requires you to gather information that can be used to understand the problem and also identify and decide between alternative solutions. This information has to be collected in a systematic way using basic research skills.

Teamwork: Many problems are best defined and solved with the input of other people, especially those within your organization or team. You therefore need good teamworking skills so as to work effectively with other people in identifying and solving problems.

Emotional intelligence: This is the ability to recognize and manage your emotions and also recognize the emotions of others. This enables us to consider the impact of the problem and/or solution on

ourselves and other people. Applying emotional intelligence enables us to come up with appropriate solutions.

Risk management: Solving a problem involves a certain amount of risk. The alternative solutions to a problem have to be considered in terms of their merits and demerits so as to come up with the most suitable solution. The merits and demerits of the selected solution also have to be weighed against the consequences of not solving the problem to decide whether it is worth implementing the solution.

Decision making: Making decisions is a key part of problem solving. Good decision-making skills enable us to be good at problem solving.

A positive problem orientation: This refers to how you approach problems, and how you position them into your context and perspectives. People with a positive problem orientation tend to see problems as challenges that can be overcome or opportunities to gain something. They have a strong belief that problems can be solved; confidence in their ability to solve the problems successfully; ability to motivate themselves to solve problems promptly; and resilience (Skills You Need, 2023).

Tips for Improving Problem Solving Skills

The following are possible ways that you can improve your problem solving skills:

- Building your knowledge and skills by attending training and using other sources, such as online resources and written materials.
- Building your experience in problem solving by doing more of it. Take opportunities that allow you to strengthen your problem solving skills.
- Learning from others who are good in problem solving.

9.5   Flexibility Skills

Flexibility refers to the ability to adjust to changes in life without stress or negative consequences (Indeed Editorial Team, 2023). A flexible person is able to adjust their positions and accommodate new situations. Flexibility involves offering more or taking less than what you had planned or expected. People who are flexible are willing to take on new tasks and deal with new challenges in a composed manner. Flexibility is an important soft skill in the workplace, especially for agricultural extension workers. The nature of their work involves dealing with complexities in the agri-food system, which can challenge the way in which they had planned to work.

Benefits of Flexibility

The following benefits are associated with flexibility (Inc. Africa, n.d.; Indeed Editorial Team, 2023):

- Increased confidence. Flexible people are more confident in life. They are able to embrace failure and learn from their mistakes and do not view failure as a sign of weakness.
- Ability to challenge yourself and thereby achieve more. Flexible people are not rigid in their goals and capacities and are ready to go beyond their capacities.

- Helping you to overcome setbacks: People without flexibility often get stuck when they fail because they are unable to make peace with themselves and move on. Flexibility skills help us to develop a growth mindset–where we embrace our setbacks as lessons learned and forge ahead towards self-improvement.

- Helping us to set aside our personal biases and prejudices and form more objective opinions of people or situations: People with high flexibility do not rush to conclusions but take time to understand other people or situations.

- Making us more adaptable: People who are flexible are able to adjust readily to changes and new situations. Flexibility is often confused with adaptability, but flexibility is what enables a person to be adaptable.

- Helping us to be more open to feedback and criticism. Flexible people do not take offense at criticism but view it as a means of learning. This helps them to keep improving themselves.

- Enabling us to stay calm in the face of challenges. Those with flexibility do not act rashly but take time to gather information and understand a situation before acting.

- Enabling us to listen to others more. Flexible people are more open to new ideas and not afraid of changing their opinion.

- Flexibility promotes creativity and innovativeness. People who have high flexibility skills are likely to be innovative and creative.

How to Improve Flexibility Skills

To improve our flexibility skills, we need to start by developing a flexibility mindset. Some important tips to achieve this, as suggested by Todd (2023), are:

1. **Having a strong set of personal core values** which we adhere to even as changes come that call for us to be flexible. We will then not be afraid of embracing changes because of the confidence of knowing we are doing so within the boundaries of our core values.

2. **Developing open-mindedness:** This is the ability to think outside of the normal way of thinking and willingness to consider new ideas. Open-minded people tend to be willing to try out new ideas.

3. **Being optimistic but grounded:** Optimistic people are able to look at challenges in a positive way and seek ways to navigate through them. They are therefore more likely to take the risks of looking for solutions but able to stay grounded and realistic even when trying out new ideas.

4. **Willingness to embrace failure:** Failure is part of the journey towards success. By embracing failure, people can learn from their failures and keep trying until they succeed.

5. **Being proactive:** People who are proactive anticipate change and prepare for it, so when change happens, they are more in control of the outcomes. Reactive people wait for

changes to happen and then respond to them. This leaves them at the mercy of the situation and limits their ability to control their course of action.

6. **Build flexibility:** Here are two suggestions for building flexibility:

- **Have mentors:** Identify people who are considered to have high levels of flexibility. By watching them and interacting with them, you can build your own flexibility skills.

- **Consciously practice flexibility:** Look for opportunities to volunteer This removes us from our rigid schedules and programs and teaches us to be more flexible. The more you do it, the better you become.

9.6   Positive Work Attitude

Attitude forms part of the character of an extension educator, and an extension worker's credibility suffers if his/her attitude and therefore character are perceived to be unacceptable, negative, or unfavorable. The relative success of an extension system can be determined by assessing, in part, the attitude that extension workers hold toward their work (Ilevbaoje, 2004). Hence, one of the most admired traits in extension workers is a positive attitude. An extension professional's attitude toward work is as important as the services, innovation/technology, or approach or strategy used to deliver services. That positive attitude should extend to clients and the innovation/services to be disseminated before actions for service delivery begin.

Concept of Attitude

Attitude is a psychological concept with various meanings. One definition sees attitude as a mental and neutral state of readiness, organized through the experience exerting a directive or dynamic influence on the individual's response to all objects and situations with which it is related (Fishbein & Ajzen, 1975). It is further viewed as an idea charged with emotion, which predisposes a class of actions to a particular class or social situation (Adeel et al., 2016). Attitude portrays an organized predisposition that relates to the way a person thinks or behaves towards another person, or situation or object, which can be either positive or negative. Thus, an individual's activities in any situation show his/her attitudes to things, which is a function of belief, values, and experience. The above definitions suggest three main major elements of attitudes: beliefs, feelings, and a tendency to behave in a certain way towards a person or situation or object.

What is Positive Attitude?

An employee's attitude to his/her work affects every aspect of the work, morale, job satisfaction, organizational commitment, and relationships with co-workers and clients. Attitude toward work can be negative or positive. A positive attitude is a state of mind that foresees and expects favorable results, recognizes and explores opportunities, and builds good relationships at work, with team members and clients. It leads to a spirit of enthusiasm, hopefulness, and belief among employees.

Extension workers are expressing a positive attitude when they do not just carry out policies or routine services but have empathy and a real desire to help rural families to attain a higher quality

of life. Extension workers with a consistently positive attitude tend to have higher energy levels to improve productivity than those who are less positive. Also, positive people usually have something good or encouraging to say about a situation, motivate others around them, and find happiness and contentment in all aspects of their lives. They are good motivators, resilient, cheerful, and optimistic, and exhibit they a "can do" attitude in their work.

The ability to look on the bright side and bounce back from setbacks or negative situations is the foundation of positivity in the workplace and in other areas of life, and optimism, cheerfulness and resilience are the biggest signifiers of this. https://www.virtual-college.co.uk/resources/demonstrate-positive-attitude-at-work

Characteristics of Positive Work Attitude

1. Respect for Clients/Clientele/Management

Extension professionals interact with famers, their groups, communities, and other stakeholders who have diverse goals and knowledge, and represent diverse cultures, beliefs, and values. Such diversity requires a positive attitude of respect for people -- respect for who they are, and respect for their ideas, views, and backgrounds. Respect also extends to the way extension workers interact with other employees and management. They treat other people politely and professionally, even if they disagree with the other person's point of view. It helps to build and sustain good relationships at work.

2. Infectious Enthusiasm About Life

This means taking up one's job or assignment with interest and commitment, and showing zeal to learn new things and aptly apply them. Extension work can sometimes present unexpected challenges and frustration, but positivity at work means renewed energy to confront situations with vigor. Extension professionals should be passionate about their work, approach situations as a challenge and an opportunity, and show readiness to try new ways of addressing issues with determination to produce results. Such attitudes rub off on everyone around-- clients, colleagues, and team -- and make the system function harmoniously.

3. Commitment to the Job

This is demonstrated by willingness to do all that is required to get work successfully carried out. Extension professionals are accountable to farmers and their organization. They should be committed to meeting the needs of farmers as well as the goals of the extension organization. This involves engaging their attitudes, skills, knowledge, and competencies to satisfactorily deliver quality services to farmers.

4. Innovative Ideas and Finding New Ways

Extension as an educational process evolves over time following the dynamics of the food and agricultural system. Extension professionals need to adapt to challenges associated with the changing trends. This requires an innovative attitude and readiness to try new options or ways of

achieving results. It involves the capacity to try something new and do things differently in the face of challenging tasks or issues. A positive attitude of going out of the norm or tradition to accomplish tasks and achieve goals is central to sustaining the relevance of extension systems.

5. Helpfulness to Others

One of the principal objectives of extension is to assist farming households to increase income and improve their livelihood and standard of living. Extension professionals should be predisposed to help farmers meet their diverse needs, and to support co-workers in achieving larger organizational objectives. The more helpful an attitude people have, the more others want to relate with them at work, and the more willing they are to partner with those people on key projects and initiatives. https://smallbusiness.chron.com/five-attitudes-important-workplaces-19114.html

Traits related to positive attitude:

- Honesty: maintaining transparency at all times.
- Respect: respect for everyone.
- Communication: having open and clear communication.
- Integrity: doing what is right and standing on the truth.
- Care: showing deep interest in and concern about the work and clients.
- Accountability: taking responsibility for one's actions, errors, or mistakes.
- Commitment: commitment to the job and professional development.

Reasons Why Extension Workers Should Embrace a Positive Attitude to Work

- ***To create a positive environment:*** Employers often make efforts to keep their employees happy, uphold standards, and attempt to foster a good work environment to increase productivity and, consequently, improve profitability. Positivity of employees at work promotes creativity, innovativeness, morale, and job satisfaction, and it creates an environment that conducive to accomplishing organizational and client goals. Positivity is contagious and affects people, systems, and relationships.

- ***A positive attitude aids in the achievement of stated goals/objectives:*** When extension workers approach their work with a positive mindset, their clients' knowledge, aspirations, skills, and attitudes improve quickly. A person is more likely to take action to fulfill their goals and successes if they have a positive attitude about them. Even after the objective is reached, it continues to reap advantages.

- ***It increases productivity levels:*** A positive attitude may be attained through fostering constructive connections with co-workers and clients. Extension workers with a positive attitude about reaching out to farmers and collaborating with stakeholders and co-workers are committed to providing quality and improving productivity at the workplace. A positive attitude -- reacting to challenges and taking up tasks with an optimistic and resilient disposition -- results in high output and and encourages the team or co-workers

also work with the same energy and motivation, thus further boosting overall productivity of the system.

- ***It helps in team building:*** Extension organizations believe that encouraging and fostering optimistic thinking at the workplace will aid in team development. Team members will get along with one another have fewer disputes when their ideas are welcomed and a positive attitude prevails. That helps to facilitate group processes and mutual interest in the team, and builds and sustains team spirit in moments of challenges and conflict among team members. Generally, the ability to think positively is essential for happiness in life, and successful employees will love their work more and accomplish their goals at work more quickly and easily if they have a positive outlook.

How to Develop and Maintain a Positive Attitude to Work

Positive attitudes are developed and tweaked to suit the environment, clients or customers, or group of people or team. This is achieved by practice in the following ways:

- ***Adjust your vocabulary:*** Good communication either verbally or non- verbally is key to effective performance of extension professionals at work - among teams, stakeholders, and communities. This means being conscious of the words used when speaking, facilitating, or training clients or at work with colleagues because language says much about how one sees him/herself, the work, others, or clients. Extension professionals should adopt positive words in communication. These are words that are encouraging, engendering greater participation, innovative ideas, and overall performance of the team or clients. It may also include avoiding use of technical jargon when interacting, particularly with farmers and team members.

- ***Be empathic:*** Consider the feelings of others at the workplace, team or group members. Do not dominate discussion; rather, be a good listener and encourage others to share their ideas and avoid undermining them.

- ***Proffer solutions to issues:*** Seek solutions to challenges instead of complaining about them. For example, when a member of a group (farmer) or team is not committed to the assigned task or mutual goal of the group, an extension worker can either privately meet with the individual to help him/her improve his performance or assign to him/her a new role based on his/her ability. This indicates a positive attitude to issues at work.

- ***Show appreciation:*** Do good things for people without necessarily expecting rewards or personal benefit. This involves being selfless in providing services and demonstrating care for team members or clients at the workplace. Such attributes naturally attract appreciation from others, which increases morale and makes one more positive.

- ***Interact with positive people:*** To develop and maintain a positive attitude at work, an extension professional should increase his/her interaction with people who have positive predispositions. This includes people who enjoy their jobs and have new and interesting

ideas to share. This works because what an individual is regularly exposed to influences hisher thought and mindset and subsequently his/her attitude.

- **_Practice gratitude:_** Focus on the best aspects of the day, the good in one's work and personal endeavors, and be thankful. This helps to respond to stressful situations more patiently and positively. A professional may keep a weekly or daily journal of the things the s/he is most thankful for or things considered meaningful.

- **_Reward yourself:_** Learning and developing rewards for oneself can improve positive attitude at work. An extension professional can promise himself a lunch or recreation hours for attaining a certain milestone in executing a task.

- **_Set goals:_** Setting goals – personal and professional -- helps a person to work hard, study, and stay committed to realizing things of great personal or organizational interest. These, in turn, help in overcoming setbacks and reducing negative feelings.They are good boosters of mood swings and low morale at work.

- **_Take breaks:_** Having a break during the day helps to reduce potential stress and negativity and improve mindset. An extension profession who is stressed out can sometimes take one or two days off from work to improve mental and emotional health.

- **_Learn new things:_** Take some time each day to learn new things. This may include participating in an online course, watching a documentary, participating in a discussion or workshop, etc. Learning helps to build a positive attitude, increase self- awareness, and expands an individual's knowledge base.

- **_Think ahead:_** This involves planning ahead, well before a project's actual commencement. This increases productivity, reduces or eliminates stress, and improves one's attitude to task.

- **_Engage in self-reflection:_** Thinking about one's feelings and behavior and the reasons for them helps to improve thought processes and enables a person to react more positively to issues.

- **_Take sufficient rest:_** When a person gets enough rest/sleep at night, they are likely to be in a better mood, think more logically, and stay focused on the job without feeling tired or distracted. Avoiding time in front of the computer or TV screen before bedtime before going to bed promotes good rest.

- **_Smile more often:_** Smiling at work is beneficial in developing and sustaining a good mood and fostering cordial relationship and a receptive work environment. This is important because it creates a free and less stressful environment with team or clients. Practice smiling several times when working and using humor to improve the moods of others.

- **_Keep visual reminders:_** Maintain a good attitude and outlook even in the face of stressful situations at work. One way to promote this is to post small notes on the computer or around the workspace with positive affirmations to improve people's mood. (https://www.indeed.com/career-advice/career-development/positive-attitude-at-work)

9.7 Self-Motivation

There are notable differences among people in their ability to push themselves in the pursuit of their goals. Some people are able to overcome seemingly unsurmountable challenges; others easily give in. In addition, some people require external pressure to achieve objectives, while others are driven from within. These differences among people are tied to their levels of self-motivation.

Self-motivation is defined as the ability to drive oneself to take initiative and action to pursue goals and complete tasks (Christian, 2019). It is the force that keeps people going in the midst of setbacks in an effort to accomplish something (Skills You Need, 2023). Another meaning for self-motivation is being driven by a personal desire to set valued goals and to focus on and move toward these goals despite obstacles (Emamzadeh, 2022). Self-motivation is an important soft skill that distinguishes those who succeed from those who give up on the way.

Agricultural extension professionals need to have high levels of self-motivation to succeed in their work. In many cases, especially in Africa, the demands of the work can be quite high with unfavorable working conditions, and the physical rewards may not be immediate or commensurate with the work they do. Therefore, extension workers need to be internally driven to execute their work professionally and achieve the desired results.

Elements of Motivation

Motivation consists of the following four elements:

Personal drive: This is a strong desire to improve or achieve something or to meet certain expectations. This can also be viewed as ambition – a strong desire and determination to succeed. People with high personal drive have a growth mindset – a strong belief that they can improve themselves through effort and hard work.

Commitment to personal or organizational goals: It is difficult for extension professionals to show commitment if they are not sure of where they are going or what they are aiming at. Therefore, having clear goals is a key aspect of commitment.

Initiative: This is the ability to spot opportunities and act on them instead of letting them pass. This calls for courage because one has to overcome fear of the uncertainty that is associated with new opportunities. The initiative also calls for good risk management to critically assess the risks involved and make suitable decisions. Not all opportunities that come our way are good, and not all opportunities that appear good are necessarily good for us.

Optimism or resilience: This is a positive mindset that gives us staying power to keep working towards our goals despite obstacles.

Types of Motivators

In life, people are driven by two types of motivators:

Intrinsic motivators: These are from within a person. You do something because you see it as naturally satisfying to you; there are no obvious external rewards. Examples of intrinsic motivators include: the joy or fun of doing it; the personal challenge involved and sense of accomplishment; love; the opportunity to express yourself; and the opportunity to move towards self-actualization.

Extrinsic motivators: These come from outside a person. You do something because there is an external reward linked to it. Examples of extrinsic motivators are money or material rewards, promotion or recognition, power, success, and fame (Christian, 2019).

Intrinsic motivators have been found to play a greater role in self-motivation than external rewards. People tend to have more commitment and staying power when internal rewards are involved. Some factors that are extrinsically motivating can also be intrinsic motivators. For example, the extrinsic motivator for an extension worker is usually the salary and benefits attached to their jobs. However, when they derive satisfaction from seeing the farmers' lives change as a result of their work, then it becomes an intrinsic motivator as well. The extension worker will therefore be driven internally in his job and will keep going even in the midst of challenges.

How to Increase Self-Motivation

You can increase your self-motivation through the following means:

- **Set a goal, not a means to a goal:** The focus must be on the ultimate goal you want to achieve and not the means you will use to get there. This is necessary because many times the road towards our goal has many obstacles to overcome.

- **Set goals that are SMART:** The goals should be specific, measurable, attainable, relevant/ realistic and timebound. This makes it easier to work towards the goal and measure the progress or achievements along the way.

- **Set incentives:** These serve as mini-goals or milestones which give you an opportunity to reward yourself along the way as you journey towards your bigger goals.

- **Pursue intrinsic motivation:** There should be an element of intrinsic motivation to your goals, where you do something because you want to and not because you have to.

- **Reflect or focus on your accomplishments:** The achievements are an indication of our commitment towards the goal. Many times, we lose motivation because of focusing on what is yet to be achieved rather than what we have already achieved. Seeing our accomplishments brings a sense of fulfillment and can give us new energy to keep going.

- **Learn from negative feedback:** Do not take negative feedback personally but learn from it and also be willing to share the lessons learned with others.

- **Exercise patience:** This requires discipline, to help us remain committed and focused on goals that may take a long time to achieve.

- **Leverage on social support:** When you involve others in your goals, they keep track of you and serve to encourage or urge you on. In addition, knowing that you are accountable to others helps to keep you on track (Emamzadeh, 2022).

Other ways in which you can improve self-motivation, as suggested by Pettit (n.d.), are:

Simplifying your to-do list: This can be achieved by eliminating or delegating activities that do not motivate you, wherever possible. This will leave you with fewer activities that are more motivating to you, so you focus on things you enjoy. Time management skills are very helpful.

Shifting your focus from receiving to giving. This can be a source of intrinsic motivation, whereby we derive satisfaction from meeting other people's needs and making them happy.

Practice being more grateful: Gratitude is very powerful. It helps us to shift focus from what we do not have to what we actually have. We can intentionally be thankful for the things we have and for the people in our lives. People who are grateful in life are happier and more satisfied than ungrateful people. Happiness and satisfaction then serve as intrinsic motivators.

9.8 Stress Management

Stress is universal. All human beings - regardless of their age, sex, cultural and socio-economic background, and education level - experience some form of stress at one point or another in their lives. Agricultural extension professionals are no exception, and they go through different kinds of stress in their professional and personal lives. Therefore, it is important for them to understand the meaning of stress and how to enhance their stress management skills.

Meaning and Forms of Stress

Stress is defined as a person's non-specific reactions in response to demands placed on them (Melgosa, 2001). It entails physiological, emotional, behavioral, and cognitive reactions in a person in response to environmental demands (Broman-Fulk and Kelso, 2012). Stress can also be viewed as "the sum of physical and mental responses to an unacceptable disparity between real or imagined personal experience and personal expectations" (Parker, 2007).

All definitions of stress indicate that it is based on how a person reacts or responds to demands that are placed on them. The reaction can be physical, psychological, emotional, mental, or physiological depending on the person and the nature of demands. Not all forms of stress are negative. There is a positive form of stress, which is referred to as eustress (Melgosa (2001). This is the mild or moderate kind of stress which alerts us to potential dangers or gives us energy to confront or flee from perceived threats. As emphasized by Broman-Fulk and Kelso (2012), "stress is a natural, adaptive response that serves a protective function". Therefore, eustress is beneficial because it has a positive effect on our health, motivation, performance. and well-being.

A word of caution: although eustress has positive effects, when the associated stressors become too intense or prolonged, they can end up causing negative reactions in the individual and lead to negative stress.

Components of Stress

Stress is made up of the following two components:

i.   The stress agents or factors that produce the stress. These are also called stressors.

ii.   The response to stress-- a person's reaction to the stress factor (Melgosa, 2001).

There are variations among people, based on these two components of stress. For example, what may serve as a stressor to one person may not cause stress to another person (Broman-Fulk and Kelso, 2012). A person who has a higher capacity to handle a potentially stressful situation - in terms of psychological and physical strength and even social support - will not succumb to stress as easily as one who has less strength and social support.

People's reaction to stressors also differs depending on the number and severity of stressors a person is experiencing at the time. This can be compared to the size of load a person is already carrying. When one is under the influence of other stressors, then any additional stressor will easily result in stress. A person with a smaller burden of stressors may not experience a negative effect from the same stressor.

These differences help us to appreciate the fact that stress affects individuals differently. Therefore, people should not be judged in the same way either in terms of what constitutes stress factors to them or in terms of their reactions to the stressors.

Causes of Stress

The causes of stress, also known as stress factors, range from the hassles of daily living to more significant life changes (Broman-Fulks and Kelso, 2012). They can occur as a result of external factors or internal factors, as outlined by Melgosa (2001):

Stress Factors from External Sources

- **Traumatic experiences:** Events such as earthquakes, floods, hurricanes, wars, accidents, nuclear disasters, rape, attempted murder, and others result in high levels of stress during and after the event.

- **Stressful life events:** These can be negative events such as death of a close person, marital separation or divorce, loss of a job, retirement, and drastic change in personal health or health of a family member. However, in some cases, even positive events l such as marriage, getting a baby, moving to a new place, or getting a new job can lead to stress.

- **Day- to -day frustrations:** These are normally small frustrations which, on their own, we can easily manage. However, when they become too numerous or happen in quick succession, they can easily lead to stress.

- **The physical and social environment:** The state of our physical and social environment has an important effect on our stress levels. When the environment is clean, neat, the right temperature, spacious, and with low noise levels, one is likely to be more relaxed. An

external environment with fresh air, beautiful vegetation, clean water, and little crowding has a calming effect on a person and can help reduce stress levels.

- **The demands of life:** These can range from the pressures of meeting basic needs of self and family to lifestyle demands that are driven by competition and consumerism. These days, people are under a lot of pressure to keep up with the demands of life, and this often leads to stress.

- **Work-related stress factors:** These result from our work environment and lead to job stress Parker (2007) refers to job stress as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Job stress not only affects the worker's performance but can also lead to poor health and increased mistakes at work (ibid.). Examples of work-related factors include heavy workload, long working hours, hectic schedules, conflicting expectations, poor communication, and poor interpersonal relations in the workplace (Ornelas and Kleiner, 2003; Parker, 2007). Agricultural extension workers operate under a variety of working conditions, some of which may lead to stress.

Stress Factors from Internal Sources

- **Conflicting choices:** When we are confronted with two or more options which have some similarities between them, making a decision may be quite difficult and can lead to stress. The choices may be equally attractive, equally undesirable, or both attractive and undesirable.

- **Personality type:** Researchers have found a close association between personality type and stress (Gangai and Mahakud, 2013). Some personality types are more prone to stress as compared to others. An understanding of our personality type can help us to gauge how prone we are to stress and to handle it accordingly. It can also help us to understand why people differ in succumbing to stress.

Effects of Stress

Too much stress can affect people physically, emotionally, mentally, and psychologically. These are summarized in Table 9.1.

Table 9.1: Signs and Symptoms of Stress

Physical	Emotional	Behavioral	Mental
Palpitations	Anxiety	Difficulty in speech	Difficulty in concentrating
Dizziness	Frustration and aggression	Loss of interest in activities that one previously enjoyed	Decrease in short-term and long-term memory
Indigestion	Nervousness		
Headaches,	Impatience intolerance, authoritarianism	Absenteeism from work	
Aching muscles			
Diarrhea			

Frequent urination Feeling restless uptight & jumpy High blood pressure Back and neck muscle tension Lack of energy Insomnia Loss or increase in appetite	Reduced self-control Depression	Increased consumption of stimulants such as alcohol, tobacco, drugs Fluctuation of energy levels Change in sleep patterns Increased tendency to blame others. Suicidal thoughts	Inability to reason, to solve problems and make decisions. Delayed response to situations Making unusually high number of mistakes Inability to accurately analyze and evaluate present situations Disorganized and haphazard thoughts

Adapted from Melgosa (2001); Ornelas and Kleiner (2003)

It is important to note that not everyone under stress will show all the symptoms. Individuals manifest stress in different ways. Therefore, it is important for you to realize which symptoms you experience when you are stressed - they may not be similar to those of other people around you.

How to Manage Stress

A number of strategies are useful in dealing with stress. The first step should be to recognize when you are stressed, as indicated by the signs and symptoms you experience. Once you realize that you have stress, you should try to identify the specific causes of your stress. Only then can you apply appropriate stress management strategies.

There are two broad ways of dealing with stress: you can either apply strategies that prevent stress, or you can manage and minimize the stress after it has already occurred. The following are suggested strategies for avoiding, minimizing, or dealing with stress (Melgosa, 2001; Skills You Need, 2023).

- **Looking after yourself physically:** This helps to keep your body strong and healthy. You can do this by eating a healthy diet, exercising regularly, and getting enough sleep.

- **Managing your time well:** Poor time management is one of the factors that lead to stress. (The topic of time management is covered elsewhere in this chapter.)

- **Learning to say "No":** Saying no enables you to set healthy boundaries in relationships and protects your time from being taken up by unplanned and unimportant requests. It also protects us from being taken advantage of, communicates that we value our time, and secures our emotional well-being (Healthprep, 2023).

- **Being more realistic about your capabilities and having realistic expectations:** Many people end up frustrated and stressed because they set unrealistic goals and have unrealistic expectations in life. It is good to understand yourself and know what your limitations are.

- **Making time for relaxation:** No matter how busy your schedule may be, always make time to do things that make you feel relaxed and happy. Identify what works well for you and make time for it, whether it is exercise, reading, listening to music, or watching a movie, among others.

- **Improve your problem- solving and decision-making skills.** This will help you avoid getting overwhelmed and feeling out of control. Research has shown that the single factor that causes most stress in people is the feeling of being out of control.

- **Focus on a few stressors at a time:** In life we face many stress factors, and we cannot deal with all of them at the same time. We need to identify and rank the stressors, and then deal with the most pressing. Once the main stressors are sorted out, then we can move on to the lessor ones.

- **Build healthy and supportive relationships with the right people:** You need people in your life who encourage you and give you social support in life. When you go through challenging situations, having the right people around you makes a big difference. In addition to supportive relationships, you need to intentionally seek support from others instead of dealing with things all on your own. We should not be afraid of sharing what we are going through with the right people and asking for help when the need arises.

- **Use relaxation techniques:** Practices such as meditation, spirituality, and others have been found to have a positive effect on relieving stress or even preventing it from happening.

- **Have a positive attitude in life:** Always try to focus on the bright side of life, despite any challenges you may be facing. Choose to think positively.

- **Seeking professional or medical help:** If the stress persists or if the symptoms are severe, it is advisable to consult relevant medical practitioners. Psychological counselling can also be quite helpful in some cases (Melgosa, 2001; Skills You Need, 2023).

9.9   Time Management

Time is one of the few resources that are assigned equally to all human beings. Everyone gets the same amount – 24 hours or 1,440 minutes or 86,400 seconds per day (Price et al., n.d.). However, some people are able to get more accomplished within the time they have, while others struggle to keep up with the demands of life and accomplish less. The difference is due to how people utilize their time.

Time is a valuable, limited, and non-renewable resource. Once spent, you cannot get it back. It is important, therefore, to protect time, utilize it well, and also plan how you will spend it. This is what time management is about – using time productively and efficiently.

Benefits of Time Management

The many benefits of managing one's time well include:

- Saving time - meaning that you can have free time to do things that you want to do or enjoy.
- Reducing stress.

- Being more productive or getting more done in less time.
- Functioning effectively.
- Having more control over your work and life.
- Having better quality of work or output.
- Being able to prioritize and schedule tasks.
- Being able to discipline yourself.
- Getting things done and delivering on what is promised or expected.
- Having more energy for things you need to accomplish.
- Being able to relate more positively to others.
- Improving your self-esteem and generally feeling better about yourself (Dodd & Subdheim, 2005, as cited in Price et al., n.d.).

Strategies for Good Time Management

A number of strategies can help you improve your time management (Skills You Need, 2013; Kachigan, 2023; Price et al., n.d.; Princeton University, n.d.; Tracy, 2013). They include:

1. **Keeping track of how you spend your time:** Numerous activities take up time each day. By keeping a time log, you can track whether all tasks were completed, which ones took the most time, where you spent most time, and which times of day are your most productive. This helps you to plan your time better.

2. **Setting priorities:** Out of the many activities you do each day, not all are equally important or equally urgent. You should therefore be able to distinguish between the important and the urgent tasks. Important tasks are those that matter; not doing them will lead to serious consequences to ourselves or others. On the other hand, urgent tasks are those that require immediate attention. Not all important tasks are urgent, and not all urgent tasks are important.

You can set priorities through the following ways:

Using a priority matrix: The matrix helps us make a distinction between the important and the urgent tasks (Table 9.2).

All the tasks can be listed and categorized by their level of importance and their level of urgency. Tasks that are urgent and important should be given priority and done first. These can then be followed by tasks that are important even though not urgent. Such tasks should be identified and scheduled for a particular time.

The tasks that are urgent but not important can either be done later or even delegated to other people who may have the ability to perform them satisfactorily. Tasks that are not urgent and not important should be given the least priority. Most of them constitute time wasters and should not be done unless one has extra time that is unscheduled.

Table 9.2: Sample of a Simple Priority Matrix

Important	Do Now	Do Next/Schedule
Not Important	Do Later or Delegate	Do Not Do/Eliminate
Level of Importance/Urgency	Urgent	Not Urgent

Use of 'To-do' lists: These are lists of tasks to be done over a particular period of time. They can be prepared on a daily, weekly, or even monthly basis, depending on the nature of the tasks involved. Be careful not to put too many tasks on the list - they can overwhelm you. The items in the list can then be ranked in order of priority based on their importance and urgency, with important and urgent tasks given priority.

Use a Planning Tool: Personal planning tools such as planners, index cards, pocket diaries, notebooks, calendars and wall charts, among others, are useful for improving time management and productivity. It is important to identify which planning tools work best for you and be consistent in using them.

Organize your Environment: The physical and social environment in which you work affects your productivity. When there is too much clutter (collection of things lying around in a messy or disorganized manner), this can lead to wastage of time in trying to find things that we need. We can achieve a good working environment by avoiding clutter or dealing with clutter as it comes so as to avoid it building up.

Delegate: Delegating means assigning responsibility for a task that you are meant to do to someone else. It is recommended for tasks that are urgent but can be done by somebody else who has the required skill or ability. Delegation helps to free up your time so that you can concentrate on tasks that specifically require your skills or expertise.

To delegate successfully, you need to first identify the right person – one who has the appropriate knowledge, skills, interest, experience, or authority needed to accomplish the task. The next step is to define the task being delegated in a specific and clear manner and clearly communicate your expectations regarding what is to be done and when.

The following tips outlined by Landry (2020) are useful in delegating:

- Be patient: People may not do the task as fast or as well as you expect but will get better over time.
- Allow for failure: When people fail in the delegated task, give them room for learning from their mistakes.
- Establish a clear communication channel so that people feel free to ask questions and seek clarification.
- Provide feedback and also request for feedback about the task delegated.

- Give credit where it is due. Reward people for a job well done. This can be in the form of open appreciation and praise or in any other form that is appropriate.

Avoid procrastination: This is the act of putting off a task to a later time. Procrastination is a great enemy of time and productivity. There are many reasons why people procrastinate, including:

- Viewing the task as unpleasant or overwhelming and putting it off as long as possible.
- Not being sure of how to do the task.
- Not being sure of which task to do – could be due to poor scheduling.
- Being a perfectionist. This makes one reluctant to do the task because they are not sure if they will do it well enough.

Procrastination affects many people. If you have a challenge of procrastination, you need to evaluate yourself and identify what the causes are. This can help you in knowing how to deal with it.

Procrastination can be overcome in two ways:

- Starting with the more unpleasant or bigger tasks. It is best to complete these tasks as our first actions to get them out of the way.
- Breaking down large tasks into smaller, more manageable tasks. Then do the smaller tasks one after the other until the whole task is finished.
- Persist and keep doing unpleasant or hard tasks without procrastinating. The more you do it, the easier it will become.
- Write down the task in a to- do list or somewhere else. When you write a task down, it is difficult to ignore.
- Make yourself accountable to someone or arrange to do the task with someone else.
- Manage time wasters: These are tasks that are not important and are not urgent, yet they can easily eat up time that could have been spent more productively. Common timewasters include social media, small talk, unofficial or unimportant phone calls and messages, lengthy phone calls, unexpected visitors, or visitors who linger too long.
- Avoid multitasking: Multitasking can occur in three ways:
  - Performing two or more tasks at the same time.
  - Switching back and forth from one task to another.
  - Performing a number of tasks in quick succession.

    Many people attempt to do several tasks as a way of saving time. However, this often has the opposite effect. Unlike what was previously thought, researchers have found that the human brain does not have the ability to perform more than one task at the same time.

The negative effects of multitasking include difficulty in concentrating and maintaining focus. People who multitask tend to be easily distracted. Multitasking also slows you down and can result in making more mistakes.

- **Allocate time for any unexpected happenings:** It is a good practice to set aside some unscheduled time to do any unexpected tasks or to finish up tasks that may have been delayed by interruptions. This creates flexibility in our schedules and enables us to still be productive despite interruptions.

- **Take care of yourself:** We need to set aside time to rest, take breaks, and relax. We also need time to take care of our health, spend time with friends and family, engage in hobbies, and get adequate sleep. Together, these help rejuvenate us physically and mentally and enable us to be more productive.

9.10 Collaboration

Agricultural extension is not a stand-alone but an interdependent system that works and cooperates with several organizations/stakeholders in various ways to address and meet the needs of the clients. It is therefore a common practice for extension professionals to partner with other stakeholders to enhance the quality of services delivered and ensure a behavioral change in the people. For instance, the provision of basic needs of the farmers such as improved varieties of crops and animals and training of farmers on various innovations requires collaboration between extension and other educational and service organizations such as research institutes, education, the private sector, and a host of other agencies/bodies in agriculture and food systems. Therefore,eveloping collaboration skills has become critical for extension professionals. Many developing countries have witnessed increasing public/private partnership approaches (joint projects, programs, interventions) to agricultural and food system development. The worldwide scarcity of resources and the resultant need for organizations to limit their spending in many areas, including funding for rural and agricultural development, further necessitate collaboration among agencies. Many rural issues such as natural resource conservation and agroecological and environmental/climate change problems require collaborative efforts of multiple stakeholders and players. Collaboration among agencies has the potential to increase the reach of extension organizations to serve clients in obtaining critical skills and knowledge useful for a sustainable and resilient livelihood.

What is Collaboration?

Collaboration is a buzzword in many disciplines and fields, and it is relevant to all ages. However, it lacks a clear, generally accepted definition and operationalization. Scholars have tried to define the concept in a variety of ways. Three of such definitions are:

- Collaboration is "a process through which parties who see different aspects of a problem can explore constructively their differences and search for solutions that go beyond their own limited vision of what is possible" (Gray, 1989).

- Collaboration is an individual's capacity to work with other people in a process that requires interdependence to solve a problem, achieve a goal, or complete a task. (Lench et al., 2015)
- Collaborations "enable different people and organizations to support each other by leveraging, combining, and capitalizing on their complementing strengths and capabilities" (Lasker et al., 2001).

In a simpler perspective, it means two or more people working together for a common goal, to execute a task or project, develop an idea, or complete a process. In a broader sense, collaboration involves mutually beneficial and well-defined relationships entered into by two or more organizations/ persons to achieve common goals. It is a strategy that can be used in any type of workplace, including non-profits, corporations, government agencies, service providers, and educational institutions.

Collaboration is used interchangeably with cooperation, teamwork, networking, and coordination, but they differ on a continuum of sturdiness and dynamism. While cooperation is informal without structure, coordination is a more formal relationship, and collaboration suggests a more durable and pervasive relationship (Mattessich and Monsey, 1992). A detailed difference in the concepts is presented in Figure 9.1. The framework shows how organizations work together to bring change. The first level of working relationship is networking, and the final one is collaboration.

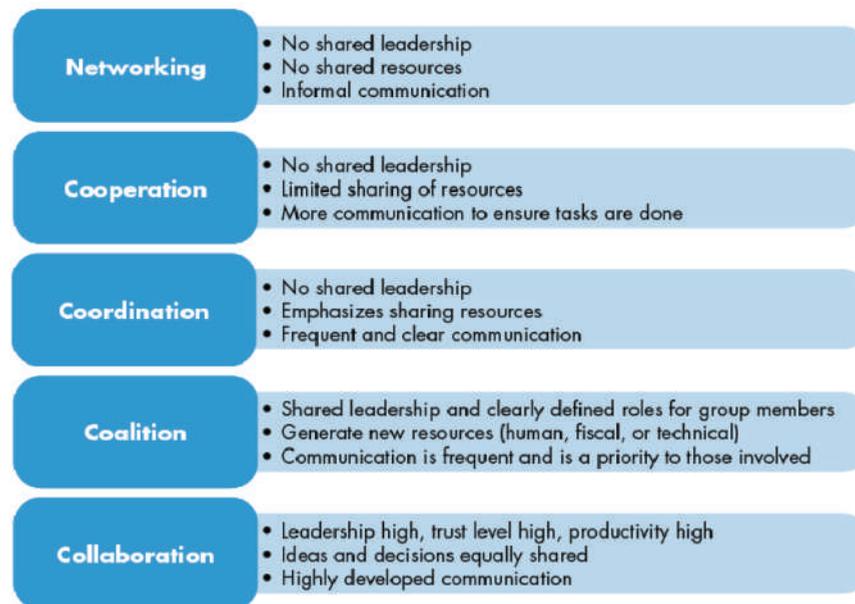| Networking | • No shared leadership
• No shared resources
• Informal communication |
Cooperation	• No shared leadership • Limited sharing of resources • More communication to ensure tasks are done
Coordination	• No shared leadership • Emphasizes sharing resources • Frequent and clear communication
Coalition	• Shared leadership and clearly defined roles for group members • Generate new resources (human, fiscal, or technical) • Communication is frequent and is a priority to those involved
Collaboration	• Leadership high, trust level high, productivity high • Ideas and decisions equally shared • Highly developed communication

Figure 9.1 Differences in the Concepts (Source: Bergstrom et al., 1995)

Features of Collaboration

Collaboration is a process that is characterized by:
- Formulation of common goals.
- Clear division of tasks.
- Accurate individual and group accountability.

- Positive interdependence.
- Depth of interactivity and negotiability.
- Mature group processing.

The collaboration process begins with consensus on common/joint goals and a demonstration of the readiness of the members or individuals to work together. If members of groups or agencies agree to work as a team to accomplish a task or address a problem, they must first assess the issues and harmoniously agree on the goal they want to achieve. Secondly, the team would identify the tasks involved, and negotiate on who is to be in charge of which parts of the problem; and when certain tasks should be completed (timeline for the tasks). A clear understanding of each member's work makes for accurate individual and group accountability, which could limit confusion and unnecessary friction among/between team members or agencies. The team members are to work interdependently because members/agencies are dependent on each other to successfully solve the agreed problem or complete the joint task. Collaboration requires group processes, which need time, practice, and teacher facilitation to foster. Moreover, the collaborating team or organization is open and prepared to consider views or ideas that may be different from their own and willing to share authority and decision-making power, among other potential bottlenecks. The whole process stands on three building blocks trust, communication, and shared vision and purpose.

Why Collaboration in Extension Work?

Every member of an organization has different skills, expertise, and talents. Similarly, organizations or agencies have different physical, human and economic, and social resources. When all the employees/members of an organization or organizations collaborate, they can utilize the various human, social, and physical resources (experience, knowledge, skills, and facilities of others) to achieve the shared goal. Collaboration is beneficial to an organization and its employees, including extension agencies and professionals, in the following ways:

- Provides more innovative solutions to complex issues.
- Eliminates duplication of efforts and provides a decision framework that involves groups in a way that builds support and ownership.
- Brings together multiple human and financial resources, and enables effective use of stakeholders' resources, skills, expertise, and experience.
- Creates higher quality programs and ensures the financial survival of all public -funded extension organizations in the face of scarce resources and dwindling operating funds.
- Helps develop rich pools of knowledge from diverse sources and enables interdisciplinary learning and problem solving.
- Generates a diversity of new ideas and approaches and improves organization outreach abilities (many beneficiaries or group are served).
- Fosters effective exchange of information and ideas across or between agencies, and provides a mechanism for solving uncertainty.

- Promotes techniques for effective decision making.
- Generates mechanism for getting the important task carried out by coordinating cross-boundary activities, encouraging joint management activities, mobilizing an expanded set of resources, and improving organizational cultures.
- Helps to build trust and relationships within and between organizations.

Types of Collaboration

Various types of collaboration that can be established by individuals, organizations, or groups. These include:

Internal collaboration: This exists when people in an organization work together and share knowledge, deploying several opportunities such as working within a team or sharing a task with colleagues. Organizations can also collaborate internally when they set up collaborative virtual or in-person spaces - e.g., when an organization has internal websites or discussion forums where management hosts recent news and receives questions or advice (suggestions). It is useful for exchanging information and ideas required to realize goals and complete a task. Traditionally, such information is exclusive to the organization, unless approved otherwise.

External collaboration: This is a type of collaboration where information or ideas are shared with persons or organizations outside your own organization –e.g., clients, agro-organizations, customers, and competitors. It is used for purposes that enhance goals such as gathering feedback or introducing/launching new products, initiatives, or programs. Private extension organization and NGOs can collaborate with public extension organizations through resource sharing (physical facilities, manpower, etc.) to implement a development program. External collaboration can also take place when an organization engages with clients or customers online, through social media, company websites, or email to solicit and receive feedback on their services and products. This helps an organization to identify areas for improvement.

Team collaboration: Team collaboration is a type of internal collaboration whereby an organization divides its employees into different departments or units based on their responsibilities. The units may further be divided into teams, where every team member has an assigned task and works towards the same goals, sharing knowledge or information relevant to their goals. An extension organization is usually delineated into interdependent departments/units (technical, planning, administrative, etc.) that need to collaborate to achieve a common extension goal and improve efficiency.

Cross-departmental collaboration: In this common type of internal collaboration, the collaborators provide resources or information that the others need, either for a specific project or in response to a request for guidance on a task from an expert in another department. It may also be between two teams in the same or different departments. Sharing resources can help departments complete tasks more effectively and enhance learning that could support them on future projects.

Community collaboration: This exists when individuals with shared interests come together to share knowledge or learn from one another. It can occur both internally and externally. For instance, a member with access to high-level information may share it with other team members to encourage transparency and understanding of the operations of the organization. An individual can also join an online community of professionals in their field, where he improves his knowledge and skills through interaction.

Virtual collaboration: This type of collaboration helps people and groups to work together even when in different locations. It is useful for remote collaboration - where co-workers do not work in the same office. It may include the use of chat software, video conferencing, or email to share information and messages and host meetings and presentations. It enables individuals to communicate with their colleagues in another office/department/unit without leaving their desks and when working remotely.

Cloud collaboration: Another form of virtual collaboration, this it enables individuals to share their knowledge easily from various locations. The tools help teams to work on the same document from different locations. Cloud-based folders allow teams to share and access documents in a central location. A team can share a link where members can comment directly, allowing the creator to review them and respond, instead of mailing individually, receiving, and waiting for an individual before reviewing.

Strategic alliance: This is another type of external collaboration that occurs when two or more organizations work together towards a common goal, often with agreement on for either short- or long term purposes, that specifies the responsibilities of each party. The organizations share knowledge and resources, often to supplement what the others lack or offer. Organizations may form a collaborative alliance for businesses, staff training, and development or publicity.

Network collaboration: Network collaboration enables individuals to work with others in pursuit of personal goals. The network may exist in person or through digital tools, and the individuals may not always know one another personally but share information and expertise for others to benefit. Subsequently, they may build a stronger relationship and depend on one another for solving future problems. Examples include social media platforms.

Collaboration Skills

Collaboration skills cover everything it takes for individuals and teams to work well. They include the interpersonal and intrapersonal qualities and competencies used to collectively achieve a common goal as a team. Collaboration enables people within an organization and outside the organization to work productively and efficiently. Collaboration skills cut across several other soft skills such as communication, brainstorming, Problem solving, critical thinking, time management, etc. Three major types of collaboration skills are discussed in this work:

1. **Communication:** Good communication skill is indispensable for a successful collaboration. This includes active listening and written, verbal, and non-verbal communication skills. Members of

a team need to be able to express themselves clearly and distinctively. People communicate differently and share differences in preferred communication styles. A collaborator must recognize the preferred communication style (in a group, written or verbal, etc.) of team members and adapt accordingly. Provide for all types of communication and communicators.

The following guides are useful for effective communication in a collaborative process:

- Use communication styles preferred by individuals.
- Encourage free communication and let everyone be heard.
- Be patient to listen and understand everyone, especially the poor communicators. Such a person can be tactfully handled privately or in a meeting.

2. **Emotional Intelligence:** This is a very important collaboration skill. It is the ability to identify and manage one's emotions, and recognize emotions in others and respond appropriately. This involves being able to read the mood and certain anti-productive behaviors of team members (behaviors such as laziness, stubbornness, and snapping at members) and providing appropriate therapy/response. To increase emotional intelligence, you need to cultivate the following qualities:

- Resilience.
- Not being offended easily.
- Open to criticism and being personal,
- Ability to spot and control strong emotions when needed.
- Inquisitiveness.
- Understanding.
- Compassion.

3. **Respect for Diversity:** Collaboration involves working with individuals from inside or outside an organization, from diverse cultures, and under diverse organizational cultures. Sometimes, it could mean working remotely with individuals from other countries and cultures. To be successful, an individual must remove any implicit biases to work respectfully with all, and behaviors and decisions that could be subtle forms of discrimination. Respect for diversity will include:

- Open communication.
- Being sensitive to ethnic and religious backgrounds.
- Enabling group discussion.
- Establishing consensus.
- Giving voice to all team members.
- Building and managing expectations.
- Assigning rolse based on individual strength.

How to Develop and Improve Collaboration Skills

This means going beyond the theoretical understanding of the skills to evaluating how good you are in a collaborative setting. The following ways are beneficial:

- Conduct or participate in project retrospectives: Take time to reflect on a project and ask questions about what you could have done better, including on the communications front. Also, reflect on the collaborative skills of others, identify qualities in others you want to improve in yourself, commend them, and seek guidance on how you can improve yourself.
- Learn to communicate: Study good books on communication to find out how your default communication habits may land with others and how to twist them for a more collaborative communication style.
- Seek a mentor: This involves bold vulnerability on both sides. This is fundamental to receiving an insightful response crucial to be a more thoughtful collaborator. Thus, effective mentorship and the resulting conversations are vital to improving collaborative skills.
- Leverage collaboration tools: Collaborative tools (such as digital technologies) can be employed to enhance your collaborative skills. However, you cannot depend on them alone to reveal the fundamental weakness in your collaborative skills.

Organizations can build collaborative skills in the workplace in the following ways:

- Have a smart and specific organizational goal and vision.
- Establish explicit expectations.
- Assign clear roles for individuals and teams.
- Consider people's ability.
- Organize consistent team-building retreats.
- Promote a culture of communication.
- Make useful tools and software available to the team.
- Encourage employees to socialize after work.
- Foster transparency.
- Celebrate milestones and wins.
- Treat mistakes as feedback.
- Give employees learning opportunities.

Qualities of a Good Collaborator

People who are good collaborators tend to have the following qualities:

1. **They are ego-less:** A good collaborator is more concerned with assisting the team/everyone to achieve a common goal than with personal interest and recognition for the role performed.

2. **Generous:** Good collaborators freely share resources, knowledge, and expertise, and happily make available what the team needs.

3. **Curious:** A good collaborator asks appropriate questions - the right questions at the right time. Such questions help to determine things required to get a task done.

4. **Appreciative:** Good collaborators are very appreciative and always express thanks to the team and everyone for the work done. They give credit when and where it's deserved.

5. **Good listeners:** They listen attentively to understand what is being said or discussed, and sometimes ask further questions for clarification.

6. **Flexible:** They are not rigid with their plan; rather, they make provision for necessary changes as events demand. They recognize that things may not necessarily work out as planned.

7. **Trustworthy and trusting:** They create and maintain an environment of trust, where team members are safe to share information, knowledge, and ideas, and can work together. They trust and expect the same from others.

8. **Self-motivated:** They are highly inspired persons and keep the team motivated to achieve collective/mutual goals without being pushed.

9. **Disciplined:** Good collaborators are good organizers and time managers. They help the team to deliver efficiently and on time.

10. **Respectful:** Good collaborators have respect for everyone in the team, though not everyone will them, no matter their commitment.

Collaboration Process

Collaborative skills are a generic set of knowledge and skills not tied to any specific content or discipline. The process of collaboration may include:

1. *Plan and facilitate group decisions:* Make decisions with the group/organization on what is to be done (task) and how to carry it out and get the task done, assign roles, and manage conflict, where necessary, as the team progresses in decision making and completing the task.

2. *Communicate clearly with the group:* Seek to understand others' thinking/thought, humbly recognize how valuable their thinking is or what is lacking. Seek alternative perspectives and input from all group members and provide further explanations on the thinking of others.

3. *Contribute resources, ideas and effort, and support group members:* Contribute ideas, knowledge, efforts, and resources; support group members as needed; assign a task to individuals in the group, uphold the quality of work, and provide feedback or report progress on the task.

4. *Monitor, reflect, and adapt all processes for group benefit:* Reflect on the processes and progress made both at individual and group levels, adjust together on the basis of group goals, adapt individual and/or group processes to benefit the group, and check with group members about progress.

In addition, using collaborative skills in a group or team may include:

- Keeping communication open.
- Reaching consensus about goals and methods.
- Recognizing the contribution of others.
- Placing group goals above personal satisfaction.
- Apologizing for missteps and forgiving mistakes.

Barriers to Collaboration

Collaboration among extension workers/organizations can have several positive outcomes; however, some barriers have been identified. These include:

- Some implemented programs are short-lived to encourage and promote meaningful collaborative efforts; e.g., NGO projects for a specific geographical location with a short shelf life of about 3 to 5 years.
- Programs are too sector-focused to attract the interest of possible collaborators.
- A project is expensive and unsustainable when operationalized at the institutional level because organizations have their interest or core business to represent (example: where budget involves cost for organizations that may have limited or no financial resources).
- Collaboration efforts have been supply-driven rather than demand-driven (a response to the efforts of the organizations involved).
- Differences in approach and strategies to agricultural extension and advisory services (e.g., use of participatory versus top-down approach).
- Shortage of resources, which may influence organizations to shift focus from shared activities to their core business/interest.
- Differing approaches to the use of information and time demands.
- Differing approaches to defining problems and solutions.
- Fear of change/lack of flexibility of policy and cultures.
- Weak relationships and lack of trust.

9.11 Networking

The success of an extension agency in service delivery is a function of the establishment and maintenance of social networking and relationships. In participatory theories, relationship building is under emphasized, extension theories, however, should include more explicit references to ways that scientists, researchers, and extension practitioners build relationships as part of extension work (Fleming et al., 2014).

What is Networking?

Networking can be defined as the interconnection and interaction of a group of people for the purpose of sharing information and ideas for the development of professional contacts and relationships

(Lexico, 2019). It can also be seen as making connections among peers for sharing information, ideas, or goals. he capacity to connect and form a network is one crucial strategy for productivity and success. When there is a network, an exchange takes place. Networks are based on collaboration rather than competition. It is a symbiotic relationship of mutual respect for one's ability to help when needed. As extension agents reach out, it is helpful if they have a sense of what they are able and willing to give, as well as what help they want.

On the other hand, a farmers' network simply shows how farmers share information and ideas for socialization, learning, and connecting with contemporaries on a daily basis (Matthewson et al., 2013). Farmer networks can vary from relatively informal discussion groups to more highly organized, farmer-driven initiatives, such as farming systems groups. The only common denominator is that the network is self-directed, and it is driven by farmers' needs. Personal professional networks are those networks consciously built to help source information and knowledge and to develop skills needed to perform professional functions. Every professional needs to seek out and build a network of peers, farmers, and mentors that can help them grow professionally and deliver a quality service (see Figure 9.2).

Types of Networking

Online networking: Online networking is an emerging field in extension that has to do with online network literacy. It relies on the mastery and skills in computer networks and has a linkage with competence in computer and information technologies. Network literacy entails the foundation, experience, and mastery necessary for people to engage in an online network (Beever, 2018).

Social networking: This has to do with the practice of using online communities and social media applications to expand professional and social contacts, and help build and maintain relationships.

Figure 9.2: Illustration of Networking

Importance of Networking Skills for Extension

The importance of networking and building relationships in our daily activities cannot be overemphasized. Extension agents need them for their career growth and success. This can be done through face-to-face visits and interactions, letters, phone calls, and e-mails with old and new colleagues, near and far. It is useful in the following areas:

- Networking brings people together through the establishment of new friends and partners.
- It provides education and mentoring opportunities.
- It provides sources of information, knowledge, and skills.
- It can focus on a particular set of people with common ideologies and interests.
- It equips farmers with opportunities for friendly sharing of ideas for innovation in farming and marketing.
- It can become the platform for interaction between the extension agents and other stakeholders, including farmers, to increase productivity.
- Networking can be an avenue for farmers to converge and share ideas on emerging opportunities that can give rise to an improved standard of living for them (Matthewson et al., 2013).

Figure 9.3 illustrates how Fleming et al. (2014) demonstrated how relationships can be overlaid on traditional extension models. Developing an exact integrated model is not as important as having processes of reflection on relationships, and acknowledgment of those relationships and the important role they play in implementing extension models.
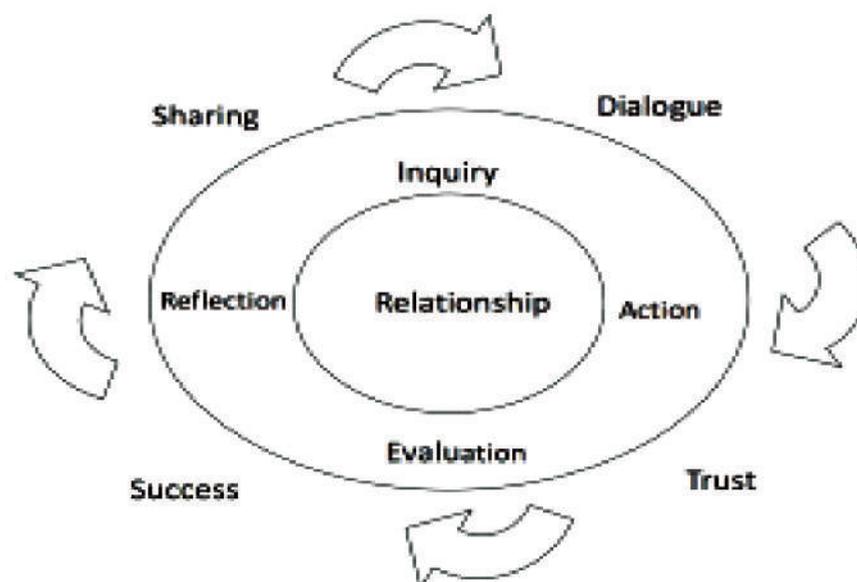

Figure 9.3: Relationship Processes Overlaid on the Traditional Kolb Learning Cycle Model

(Source: Fleming et al., 2014)

Tips for Developing Successful Networks

- Social interactions are key drivers to all networking. Moving from from just being acquaintances to close friends stems from making a first connection over a common interest and/or shared focus. Establishing effective networking opportunities between extension agents and the clientele, extension professionals need skill in using active listening.

- As extension workers focus on linking with the right people and to avoid too many expectations, asking questions, listening, and learning from each other's story is paramount.

- Building relationships and networks requires effort, commitment, and time. It should be a symbiotic relationship for win-win, but it is necessary to invest in the relationship first.

- Be authentic – make the building of connections sincere and meaningful, and be patient as you and others get to know each other.

- Trust that people genuinely care about the well-being and success of others -- this is important for the ongoing success of relationships and networks.

- People enjoy meeting interesting people and extending their networks. They will value meeting you, and you can introduce them to other useful contacts.

- People enjoy helping each other and being helped in return. This is particularly applicable to those involved in extension. As you build relationships and networks, acknowledge this and enjoy helping each other, and make sure you note and celebrate success.

- Don't hesitate to reach out to people that you think will be useful contacts. Make contact, learn what they are doing, and offer assistance. This builds and strengthens your network and makes interactions mutually beneficial. Overcome any reluctance to ask for information, advice, or assistance.

- In your interactions, have or develop a purpose. This increases the likelihood the network will be mutually beneficial for all involved.

- Planning is important, but make sure you take action that results in good outcomes for all.

- Ensure you have key influencers involved in any network.

- Do what you say you are going to do, and acknowledge people who help you.

- Meet face-to-face at least once per year; this is important for maintaining key relationships.

- Video meetings are much better at maintaining relationships than telephone contact. Be patient and master them.

- Participation in networks won't be and doesn't have to be equal (Beever, 2018).

Online Network Etiquette Tips

- In webinars or video meetings, it is not good to speak over people. If you have an immediate comment or question, use the chat box.

- In video meetings, turn your webcam on. Seeing people adds value to the experience.
- Be aware of lighting and background.
- Anything you are not ready to share face-to-face should not be shared online. Respect yourself and others, too. Sometimes you have to be more patient online than in person.
- Be forgiving and validate-- it is easy to misinterpret online communication(Beever, 2018).

Current Situations that Demand Networking Skills for Extension

Agricultural extension has the responsibility to disseminate to farmers research-based information for improvement in farmers' standard of living. It has to do with the flow of knowledge and transmission of information from research institutes through extension agents to farmers (Raison, 2010; Wise, 2017). This method will be effective if there is a definition and quantification of problems and solutions -- for instance, determining how to increase cassava yields, how to boost egg production of layers, how to increase the live weight of broilers, etc. However, this model fails to solve complicated challenges such as malnutrition and the COVID-19 pandemic, flooding, etc. Such challenges are numerous and too overwhelming to be handled by one single organization (Morgan and Fitzgerald, 2014) or traditional stakeholders. The effective management of and solution to these challenges demand synergy and coordination of actions among individuals of diverse backgrounds and perspectives. And that requires networks (Plastrik et al., 2014). Networks have provided an avenue for organizations to survive in this contemporary society with limited resources -- finance, time, raw materials, and mental bandwidth. Similarly, the internet and social media have dismantled the one-way traffic flow of information that we have traditionally relied on. There is a paradigm shift from the vertical flow of information to networking, where information is shared among peers; inter-organizational resource sharing; and innovations related to the open-source concept, such as the massive open online course (Kop et al., 2011). To reach out to clients more effectively going forward, extension agents must embrace this paradigm shift. Aside from the other numerous advantages, networking can curb the funding and understaffing challenges that have bedeviled the public extension organization. It is the role expectation of extension agents to move beyond that of the "expert" of the past to become the change agents of the future. Dissemination of information to rural farmers has been a core mandate of agricultural extension agents, and this can be facilitated through networking.

9.12 Conflict Management

Conflict is inevitable in any social system/ group or organization, and its effects on the effective functioning and productivity of the social system are huge when not addressed. Conflict has a negative connotation, and the belief is that a conflict situation is disturbing and commonly ends in destruction. However, in the actual sense of the word, conflict can be disturbing, disruptive and destructive, but it can also be a source of innovativeness and productive action. In some situations, it is the driver of creative ideas, innovative approaches, previously unseen possibilities, and unexpected breakthroughs. Overall, its effects, constructive or destructive, depend on the handling and management strategies adopted. Effective management of conflict can enhance

group performance. Where it's otherwise, it can severely affect relationships and hinder group functioning.

Conflict is a recurring issue in the work environment of extension workers; thus, extension workers must understand conflict -- "what it is", "where it comes from" (causes), and "how it develops and dissipates" (Suvedi and Kaplowitz, 2016). They need to possess the competencies and skills necessary to manage conflict effectively. This involves the ability to develop and use cognitive, emotional, and behavioral skills that enhance productive outcomes of conflict while reducing the likelihood of escalation or harm (Runde and Flanagan, 2010). This will help extension workers to facilitate group development and sustenance through fostering stronger group relationships, respect, and collaboration in the work environment and among clients.

What is Conflict?

Conflict is defined as an incompatibility of goals or values between two or more parties in a relationship, combined with attempts to control each other and antagonistic feelings toward each other (Fisher, 1990). It is any situation in which people have incompatible interests, goals, principles, or feelings (Capobianco et al., 1999), or situations that put persons in opposition and stern disagreement.

Conflict is a process in which one party perceives that its interests are being opposed or negatively affected by another priority: an interactive process, manifested incompatibility, disagreement, or dissonance within or between social entities. It takes place between groups, members of a group or team, employees in a workplace, organizations, communities, or among members of an organization or a community. In a group or workplace, conflict can result from misunderstanding, miscommunication, misinterpretation, misperceptions, and lack of mutual acceptance or trust among people or group members. Different experiences, expectations, attitudes/beliefs, opinions, history, and lack of communication among persons may result in disagreement which eventually may generate tension/ conflict in a group (Flage, 2022).

Sources of Conflict

 The literature shows that the source of conflict is a function of many factors, including individuals, social systems/groups, the nature or structure, goals or objectives, and the human and physical resources available in the system. It can develop around issues on strategies or tactics, and struggle over resources or differences in views between leaders, or where a group becomes exploitative. In a community, conflict may arise from a fight over scarce and depleted natural resources between communities or among members with incompatible livelihood strategies.

Conflict can result from horizontal and vertical inequalities (Suvedi and Kaplowitz, 2016). Horizontal inequalities are inequalities between culturally defined groups with economic, political, and social dimensions. The groups may be identified by geographical affiliation, gender, class, caste, language, and other characteristics. Vertical inequalities exist between members, sometimes in a group organized around common interests or goals. Lindelow and Scott (1989) identified four primary sources of conflict between individuals and between groups:

1. **Communication problem:** Most conflicts in an organization or group (formal or informal) can be traced to poor communication. A breakdown in communication in the workplace, between individuals or among members of a team/group, can result in conflict. Lack of communication between organizations and units/groups can result in destructive competition, ill-defined expectations, hidden agendas, lack of candor, and absence of trust that can induce conflict.

2. **Organizational structure:** Conflict tends to occur more in an organization where jobs are poorly structured and routinized. The degree to which an organization's structure allows its employees to participate in decision making and think for themselves rather than routinely follow directives affects the degree of conflict. As participation increases, so does the rate of conflict. This is particularly common in groups where the participation of members is encouraged and promoted. Similarly, where a group lacks appropriate structure with tasks and roles defined, conflict from role/task clash is inevitable. Also, where the conduct of members is not regulated or guided by regulations, constitutions, or ground rules, the group is highly vulnerable to conflict situations.

3. **The human factor:** Human factors related to conflict in an organization are authoritarianism, dogmatism, and low self-esteem. Other factors are connected with differing values, goals and expectations. This all relates to the type of leadership in a group or workplace.

4. **Limited resources:** Scarcity of resources engenders competition over access and use of available resources. When resources are limited, equitable distribution becomes problematic and leads to stiff disagreement or conflict. The insatiable nature of human wants, and competition for scarce resources are the foremost causes of community or inter-group conflicts (Manu et al., 2014). Scarcity of natural resources such as land, water, and forest caused by depletion or degradation increases demand or unequal distribution (Barli et al., 2005). Many developing countries have recorded conflicts of various sorts due to competition over natural resources. The incompatibility of livelihood strategies or goals in rural areas exacerbates the situation. Limited resources in an organization also trigger conflict between departments/units, among employees, and between employees and their employers.

Specifically, conflict in a group can arise from the following:

- Lack of smart goals and strategies.
- Unequal distribution of group resources or benefits.
- Lack of shared values and vision.
- Poor leadership.
- Ineffective communication.
- Lack of transparency and accountability.
- Embezzlement of group funds.
- Partiality in the group.
- Non-performance of officers.

- Poor facilitation of group activities.
- Cultural differences.
- Lack of commitment by group members to group activities.

Types of Conflict

Conflicts are classified by scholars using many criteria, such as the situation or operations of the organization or group where it occurs; the source or cause of the conflict, and on the outcomes or effects of the conflict situation on the function of the organization or group. Below are some classifications:

Lamm et al. (2020) describe four types of conflict based on the actions or operations related to conflict situations.

1. **Conflict related to task:** Task-based conflict is disagreement over tasks and what is or is not being done. This is further classified into routine conflict, over simple tasks, or procedural conflict, over more complex issues (Mitchell, 2019).

2. **Conflict related to process:** Process conflict arises as a result of divergent views about how something should be executed or carried out.

3. **Conflict related to status:** This comes from disagreement about who is in charge.

4. **Conflict related to relationships:** This type of conflict occurs when a personal disagreement causes interpersonal conflict in which individuals view themselves as opposed to one another. Relationship conflict is also regarded as emotional or interpersonal conflict. The major sources of such conflict include personal differences or misunderstandings. It is stressful and challenging to manage because of the emotions and personal preferences involved.

Omisore and Abiodun (2014) further categorized conflicts into two types based on the outcomes or effects on a system or groups:

1. **Functional or constructive conflicts:** Functional conflicts are the ones that promote the common interest and objectives of the group or organization and boost its growth and performance. It is believed that if a conflict is preceded by healthy competition and leads to hard work, the conflict is advantageous to the members, groups, or organizations. Also, if conflict promotes varied options, boosts innovativeness, and promotes active participation in an issue, making a group stronger and more productive, the conflict is constructive. Constructive conflict gives group or organization members a chance to identify and prioritize problems and explore opportunities, and inspires new ideas, learning, and growth among members.

2. **Dysfunctional or destructive conflicts:** Dysfunctional or destructive conflicts are conflicts that impede group performance. This happens when conflicts are not effectively managed. Dysfunctional conflict tears relationships apart and interferes with the exchange of ideas, information, and resources in an organization or group, and compromises the organization's goals and performance. It is associated with placing personal interest over group interest.

In addition, Sullivan (2019) identified and categorized conflicts based on the sources as:

(a) **Conflict of interest:** This occurs when members of a group/organization have interests other than that of the group/organization. Individuals concerned about their personal goals create a conflict situation that will hinder the group's success.

(b) **Competition for resources:** Competition for resources in an organization, community, or group -- e.g., natural resources (such as land, water, forest, etc.), money, materials, and time --will cause members to undercut each other, leading to conflict. It can also come from the use of pressure groups by a particular section of the community to gain an advantage over the rest of the community.

(c) **Undefined responsibility/role/task:** When the structure of a group or organization lacks a clear arrangement of roles and relationships of people and resources, conflict is bound to occur. Issues on territory arise when decisions are made that appear to cross boundaries of responsibility. In a farmer group where responsibility is not specified or shared and task execution is voluntary, conflict is unavoidable.

(d) **Interpersonal conflict:** This is the type of conflict that occurs between two individuals in a group or organization. It is expressed in the form of anxiety, hostility, resistance, and/or open aggression as well as opposition and antagonistic interaction and competition. It is a function of the differences in personalities, attitudes, cultures, values, and perceptions.

(e) **Intrapersonal conflict:** This is conflict within an individual when one is in a dilemma between two compelling wants. Intrapersonal conflict is psychological and involves the individual's thoughts, values, principles, and emotions. It leads to restlessness and uneasiness or can even cause depression, and it translates to interpersonal conflict with people around.

Finally, in using a simple definition of conflict as a clash between two different wants that cannot be achieved at the same time and in the same place, CooperaTiVa (2009) states that conflict can be internal or external. Conflict is internal when an individual has two wants that cannot be met at the same time in the same place -- e. g. wanting to go home and rest after work and to go out with a friend. It can also be an external conflict. This is a conflict between two people or groups -- e.g. two farmers wanting to use the same plot of land for different livelihood activities in a particular season.

Concept of Conflict Management

Perspectives on conflict theories are of two groups: conflict management and conflict resolution (Hamad, 2005). Conflict resolution theorists believe that it is possible to eliminate conflict and see conflict management as one of the steps in the handling of conflict resolution. Other theorists, however, believe that conflicts can be managed but not resolved. This group sees conflicts as ineradicable consequences of differences in values and interests within and between communities or groups. The best that can be done is to manage and contain them and occasionally reach a historic compromise in which violence may be laid aside and normal politics resumed (Hamad, 2005). In this module, we have used the two terminologies interchangeably, but with an emphasis on conflict

management, because many agricultural development conflicts are both complex and enduring and may never be completely resolved (Ahmadvand and Karami, 2007). Moreover, the discourse on conflict theories supports the fact that conflict is inevitable in any human system, organization, group, or team, and that management is the best approach.

What is Conflict Management?

Conflict management is a process of preventing the destructive aspects of conflict while strengthening the positive aspects of conflict for all parties. It includes the adoption of ideas and techniques intended to handle conflict fairly and constructively for the parties or individuals involved in the conflict. The process is initiated on four presumptions: there is a conflict of interest, the parties affected in the conflict are motivated to seek a solution, the parties believe there are some solutions, and the parties feel they need to compromise (Ahmadvand and Karami ,2007). These presumptions may exist spontaneously or not; when the latter is the case, extension agents should contextualize appropriate presumptions by providing important information and instructions to stakeholders/parties regarding the solutions before embarking on conflict management.

Extension agents should know that conflict management is not a process of linear thinking, void of disagreement at the beginning of the process. It may need to be repeated severally before achieving suitable conditions. The key strategies and tactics for effective conflict management include:

- Ensuring unhindered information flow.
- Trying to understand the other parties' real needs and objectives.
- Stressing what is common between the parties, and deemphasizing the differences.
- Seeking solutions that are acceptable to the parties.

Principles of Conflict Management

Extension workers need to understand the idea and philosophy of conflict management to facilitate a productive group approach and work environment. These include:

- Conflict is unavoidable and its management determines the outcome. Both positive and negative consequences may occur depending on how the conflict is managed.
- The outcome is likely to be better with active engagement of the conflicting parties rather than avoidance.
- Parties involved should be encouraged to address conflict.
- Ensure a conducive and unbiased environment for conflict resolution (Overton and Lowry, 2013).

Key Targets in Conflict Management

The key targets and goals for conducting successful conflict management are:

- Some common objectives or goals that all parties share equally.
- Confidence of the parties in their problem solving ability.

- The drive and resolve to work together.
- Trust.
- Distinct and accurate information.
- A comprehension of the conflict management dynamic.
- Belief in the validity of one's view and the other's standpoint (Lewicki et al., 2001).

Approaches/Methods for Conflict Management

There are many approaches and methods for addressing conflict when it arises in a group, community, or organization. Six of the approaches are identified and described in this chapter: namely, avoidance, accommodation, competition, collaboration, compromise, and forcing. Scholars have variously categorized and described these approaches, their appropriate use, and advantages as follows (Table 9.3).

Table 9.3. Methods/Approaches for Managing Conflict

Method	Definition	When appropriate	When inappropriate	Disadvantage
Avoidance (denial, ignoring, dodging, suppressing feeling, belief, or being evasive)	Problems are avoided by denying their existence, or one party withdraws from the conflict situation.	Adopted when conflict is minor, relatively unimportant, not worth the time/ energy to respond, or there is no need to go into it, or where time is required to gather information or facts.	When a conflict situation is crucial, serious, and requires urgent/immediate attention. Procrastination or postponing may be destructive.	1.There is limited time to manage the conflict. 2. Relationship deteriorates because communication is affected.
Accommodation (smoothing over, emphasizing commonalities or strong points)	Differences in the group are played down or suppressed. Emphasis on preserving relationships by focusing on areas of agreement or common interest.	Minor or small conflict situation. Also, preserving the relationship is paramount and valued above all.	Conflict needs immediate attention. It leads to dodging the matter when others are prepared to handle it.	1./Reduced self-esteem. 2.One side may be seen as weak. 3. May provide cordial space for the future relationship.

	It involves one side giving in to the other side. Accommodating party counts good relations and goodwill as gain.			
Competition (exercise power)	One's power, position, and strength settle the conflict. It is a win-or-lose situation.	Conflict situation needs to be resolved quickly. The method has been agreed upon by the group beforehand and accepted that one party will win.	Those on the losing side lose confidence to express themselves, their needs or their concerns.	It can destroy the relationship, and commitment to the decision is not guaranteed.
Compromise (negotiation, give-and -take attitude, acceptable solution)	Each party gives up something to gain something. Individuals seek a middle ground.	Compromise is accepted by the parties, where one of them will lose. Parties are willing to reduce demands. It saves time and effort.	Initial demands are too great. Parties are not willing to give up something, conflict negates solution provided, and conflict subsequently builds up.	When the solution falls short of expected outcome, commitment of parties may be partial.
Collaboration (Problem solving attitude)	Parties seek a win-win situation, no winner or loser, emphasis is on a group solution that satisfies the needs of both sides.	Time is available for parties to share their views, and members show a willingness to change their thinking.	Time is limited and there is not enough trust, respect, and communication in the group.	Take time and effort to resolve a conflict situation. Ensuring the participation of parties may be challenging.

| Fighting (forcing) | Parties anchor on their power and the legal system, the stronger side wins, getting what it wants at the expense of the other side. | Both sides have good arguments and good solutions. | | It strains the relationship. It can harm teamwork. Leads to a win-lose situation. |

Adapted from Flage (2022), Ahmadvand and Karami (2007), and CooperaTiVa (2009).

In addition to the above approaches, Blake et al. (1964) identified three strategies for managing conflict in a group; win-lose, lose-lose, and win-win:

Win-lose approach: It involves competition, dominance, aggression, and defense, common in most social relationships. The perspective is that what one party gains, the other loses. One party is forced to submit, sometimes through socially acceptable mechanisms such as a majority vote, the authority of the leader, or the determination of a judge. The major goal of the approach is to have a victor (superior) and a vanquished, who withdraws in shame.

Lose-lose approach: This takes the form of smoothing over conflict or reaching the simplest compromise. The belief is that disagreement and incompatibility are inevitable, and the need to settle the difference in as painless a way as possible is expedient. Each party resigns to partial satisfaction.

Win-win approach: It employs a collaborative Problem solving approach to make the best of the goals of both parties. The approach sees conflict as a problem to be addressed and not a war to be won. The parties target the problem and work harmoniously to achieve common goals. Problems are first defined, developed, and analyzed, and alternatives are stated before parties decide on acceptable solutions. The emphasis is on a quality long-term relationship rather than on short-term accommodation. It encourages the buildup of trust and acceptance and does not increase suspicion and hostility. The strategy, however, requires skills in human relations and problem solving with great patience.

A win-win solution is a solution that enables both sides to satisfy their significant needs, the conflicting individuals shift focus from striving to get what they want to striving to satisfy needs of both parties.

Using "the Cloud" Logic Tool" for a in-win solution

An extension worker can achieve a win-win situation using "The Cloud" logic tool. The Cloud is a logic-based technique used to improve communication, plan strategically, analyze problems, and resolve conflicts (CooperaTiVa, 2009). It is used to resolve conflict at the individual, group, and organizational levels. The Cloud tool is represented in Figure 9.4. It comprises five elements: the wants of the parties; the needs; and the objective of the parties in conflict.
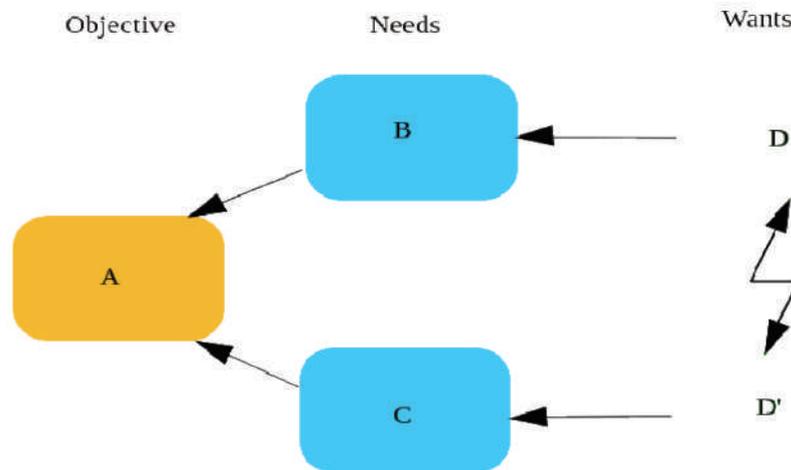
Figure 9.4: Cloud Tool for Resolving Conflicts

Source: Trevithj - Own work, CC BY-SA 3.0,https://commons.wikimedia.org/w/index.php?curid=4898003

In Figure 9.4, the zigzag represents conflict because both parties' "wants" cannot be met at the same time; "needs" explain why each party contends on getting what they want. To satisfy the "need", it is necessary to achieve the "want". The "common objective" is a situation both parties wish to have, but for it to exist, each party must satisfy their needs.

To use the Cloud, extension workers should:

1.   Identify the type of conflict and the sides (parties involved).

2.   Identify the "wants" of each side and verbalize them to show that they cannot be achieved simultaneously. For example, a marketing group has divergent views about the preferred customer (customers A and B) for their products. In this case, one party prefers to sell to customer A, while the other party prefers to deal with customer B. This result in conflict because it is not possible to sell products to the two customers at the same time in this same market.

3.   Identify the   need of each side. This is the most critical and difficult aspect because parties could have various needs for what they want. When needs are identified, a win-win solution becomes possible. The following tips are useful to identify the needs of the parties involved: Ask questions such as *"Why do you want that?; Which need are you trying to satisfy through that want? Why is this "want" important to you? What do you achieve if you get that want? And what need would be jeopardized if your party does not get that want?"*

4.   Identify the common goal of the group. This means common interest or concern of the parties regardless of the conflict. For example, a marketing group may have a common goal of getting good prices for their products. This acts as a driving force in trying to address the conflict. Most times, a clear identification of the needs is sufficient to stimulate the parties to seek ways to meet both needs. When the emphasis is moved from the wants to the needs, in most cases, achieving a win-win solution is fairly easy.

5. Construct the Cloud and read it to check its logic and as part of the process of communication toward resolving the conflict. The Cloud is constructed from right to left, starting with the wants and moving through the needs to the common goal; but when read you start from left to right. Example of the pattern:

    To...... (achieve the common goal), one side needs .... and that's why they want............. On the other side, to...... (achieve the common goal), the other side needs .... nd that's why they want.....................

    Example: To have a steady *good profit* (common objective), party A needs to *reduce the cost of production (Need)* and that is why they want to *sell fresh fish* (Want) to their customer. On the other hand, to have *steady good profit* (common objective), party B need to *add value to the fish* (Need) and that is why they want to *sell dry fish* (Want) to their customer.

Advantages of Using "The Cloud" for a Win-Win Solution to the Conflict:

- Parties gain a better understanding.
- Parties build empathy: understand the other side.
- Observe the extent of emotions involved in the conflict
- Control emotions that might worsen the situation.
- Analyze situations equitably.
- Emphasizes issues central to conflict.
- Creates a bridge for a dialog with the other side.
- Search the guidance required to come up with a win-win solution.

(Adapted from CooperaTiVa, 2009).

Determinant of Choice of Approach for Conflict Management

There are issues to consider in seeking a solution to a conflict situation. Firstly, it is important to discover what will make the sides feel that their needs are being met. As the facilitator, an extension agent needs to isolate the real cause of the disagreement from unfounded perceptions and/or assumptions. Moreover, there is no one best-fit method for handling conflict. Some characteristics of the group and conflict situation or problem will help a facilitator choose the right management approach. Therefore, knowledge of the following factors should inform the choice of the course of action or strategy for managing conflict in a group:

1. Characteristics of the parties in conflict (values, attitudes objectives, resources/information/support/self-esteem).
2. The prior relationship between the parties (attitude and expectations about each other, what has gone on earlier in the meeting).
3. Nature of the issues in contention (parties' perception of the conflict, effect of winning or losing, belief or culture is affected by the conflict)

4. Condition or atmosphere where the conflict occurred (consider the concerns of other members of the group and outcome, evidence of boredom or irritation from members, and the existence of group norms or influences that tend to control conflict).

5. The strategy and tactics employed by the parties in conflict (threat voiced and backed up, tactics stressed—rewarding or punishing? how legitimate to each other? communication between them).

6. Timing of the conflict (do they perceive plenty of time to wage the conflict, or are they under pressure to stop using time for the disagreement?).

Steps in Managing or Resolving Conflicts

Step 1: Acknowledge that conflict exists. Conflict should be aptly addressed when identified to explore its positive effects and undermine the negative consequences on a group or community.

Step 2: Identify the real issue: This step often requires systematic and sustained efforts. Conflict is a product of core and emotional issues, and there is an interaction between the two which can worsen the conflict situation. The core issues have to do with the functions of the community; emotional issues are concerned with threats to self-esteem or jealousy. The core issues must be resolved first to resolve the conflict.

Step 3: Use one or more ways to resolve the conflict. Dunn (2000) has provided multiple approaches to address conflict:

- *Listen to the other:* Be a good listener when ideas differ. Take time to listen thoughtfully to the other person and yourself. Tune into what the other person is feeling.

- *Let it pass***:** It takes two hands to clap, so if you can avoid confrontation, then you can avoid the conflict. Do this either by conceding to the other person's views or simply not commenting. Especially if the other person is angry, choosing another time to express your opinion might be wise.

- *Reflect***:** Consider and have a clear understanding of the views or arguments of the other person (sometimes called active or reflective thinking). Verbalize the points to the other person to ensure you understand correctly. This makes for effective communication and eases the resolution of issues.

- *Venting emotions:* Both parties should express themselves enough to bring out the reason behind the disagreement. Approach the one who seems upset, ask, "Is something bothering you?" to show empathy and give that person space to express his/her feelings. Simply acknowledging the person's feelings may help him/her to calm down, after which the dialogue can continue.

- *Compromise:* Compromise is one of the approaches used in conflict management. It is not very appropriate when both parties are tense over disagreement, a situation of anger, or aggression. Facilitate parties to seek some common points for agreement.

- **_Directly confront feelings:_** Bottling up feelings can lead to disaster because of miscommunication of feelings. Feelings are known only known when they're expressed. The aim is not to confront or attack but rather say, "This is how I feel" about behaviors and incidents. Generalizations can implicate more people than are actually at fault.
- **_Argue productively:_** Identify the issues and address them. Be focused and direct discussion to target the issues and avoid a personal attack. If two individuals are particularly unhappy, perhaps they could sort out the issue separately without taking the time of the whole group.

Extension workers should observe members' behaviors and use appropriate approaches for dealing with conflict.

Advice to extension workers: Do not be personal in arguments, and do not speak when angry to avoid long-term harm to a relationship (Suvedi and Kaplowitz, 2016).

Tips for Managing Conflict in a Group

- Deal with one issue at a time (do not allow distractions, even though many issues may be involved in the conflict).
- Keep emotions in check (focus on issues, not on emotions).
- Avoid easy but not satisfactory resolutions (consider many options/ideas/alternatives), and do not be quick to decide to give equal satisfaction to all.
- Avoid becoming a threat to the other person (uphold respect for dignity and pride).
- Focus on interest, not positions (by asking questions like "Why?" and "Why not?").
- Conflict resolution often has more than one right answer (do not insist on being right; rather, attentively listen and consider all options).
- Use humor when appropriate to help diffuse an uncomfortable situation (note: humor should not be used to insult or belittle anyone and ease tension).
- Discuss the conflict openly (engage in effective communication using listening skills, paraphrasing, neutral language, etc.).

9.13 Negotiation Skills

Negotiation skills are vital abilities required for extension workers or students who will drive change in their careers, organizations, and workplaces. It's a core skill set at the heart of successful extension work as the system becomes more participatory, client- oriented and community -driven. Negotiation takes place between extension agents and community leaders, farmers, and community-based organizations; spouses, parents, and children; managers, employers, and staff, both within and between organizations as well as between agencies and the general public. When people disagree with one another, they gather, talk about the problem in a public forum, bargain with one another, and then find a solution that works for everyone. It is also known as bargaining in common parlance.

What is Negotiation?

Negotiation is "a process of integrating conflicting views into a unified attitude, under a decision rule of unanimity,"(Kissinger, 1969). It is a method for debating problems among parties and coming to an agreement that benefits everyone. Negotiation is among the best methods for preventing disputes and tensions. When overcoming problems through negotiation, two or more parties willingly explore their differences and work to find a solution to their common issues (Abdusalam et al., 2017). To reach an agreement, participants must first discuss the issues they differ on, then educate one another about their requirements and interests, come up with viable solutions, then negotiate the details of the final deal. Successful talks usually result in an exchange of goods or services or an agreement between the parties. The exchange could be for something physical (such as money, a commitment of time, or a certain behavior) or intangible (such as an agreement to change an attitude or expectation or make an apology).

Importance of Negotiation in Corporate Organization

To find a solution that captures everyone's interests and leaves no one behind, people engage in negotiation. Participants in a win-win negotiation make every effort to come to a compromise where everyone benefits and no one loses. In a business setting, negotiation is crucial for preventing conflicts and fostering better employee interactions. An extension employee need not be very strict in the workplace.

Understanding the Importance of Negotiation at an Extension Workplace

Extension organizations work with employees, communities, and multiple stakeholders who have diverse motivations, cultures, policies, and objectives. Negotiation can be around budget approval, selection/siting of a community project, implementing a project, etc. In an extension organization, the negotiation process may start when an employer selects call to an employee. In this case, it is essential that the person in charge of hiring the applicant engages him in fruitful negotiations and offers him the best compensation possible. It is important to additionally consider other aspects, such as one's professional obligations, job security, and brand name. When negotiating on behalf of his or her organization, extension staff needs to be prepared with relevant facts, information, and skills. This is crucial for a fruitful negotiation process.

Negotiation Skills

A successful extension negotiator needs the following skills:

- Effective communication skills.
- Problem solving skills.
- Active listening skills.
- Quick decision-making skills.
- Art of compromise.
- Good persuasion skills.

- Robust emotional intelligent skills.
- Assertiveness.

These abilities will aid the negotiator in setting goals, separating parties from the conflict, focusing on interests rather than positions, developing win-win solutions, and using objective criteria.

Seven Steps to Negotiating Successfully

For an extension agent to have a successful negotiation, seven steps are necessary (Abdusalam et al., 2017):

1. ***Gather background information:*** These include the style, values, ethnicity, culture, demographics (younger negotiators on/using Twitter (X), Facebook, and Linked in and their way of communicating versus those who are slower to use these media), and other details that are relevant to that specific negotiation session.

2. ***Assess your arsenal of negotiation tactics and strategies:*** The more options you have and can carry out throughout the negotiation, the more you will understand how to employ the ideal method with the appropriate strategy, executed at the appropriate time.

3. ***Create your negotiation plan:*** As the extension representative think about the overall approach you will use in the discussion. Analyze potential tactics the other negotiator might use. Red herrings should be used sparingly (Red herrings are items that have little or no value to you that you position as having value, but items that possess real value to the other negotiator). Also, think about how you might leverage throughout the negotiation to put pressure on issues.

4. ***Engage in the negotiation process:*** Pay attention to the other participant's mannerisms and body language. You can do this face-to-face, over the phone, or in writing (email, etc.). Take note of the negotiation style used by the other party, such as friendly ("Let's get along"), reserved ("I'm not sure how this is going to go and I'm nervous"), or hostile ("I'll show you mine only after you show me yours"; "The only way for me to win is for you to lose"; "I'm in control"; "It's my way or the highway").

5. ***Closing the negotiation:*** In some cultures, this is a typical practice, so you should be on high alert for the conclusion of what you believe to be an agreement, functioning as the next stage of the discussion. Put deliverables into the phases of the negotiation if you're not confident of the other negotiator's honesty.

6. ***Conduct a postmortem:*** Examine what went well, what could have been improved, what you learned about the negotiation style of that particular negotiator, and what lessons should be applied to future negotiations. Also consider what went poorly, why it failed, what you might have done differently, and what kept you from employing a more effective tactic or strategy that would have given you control of the negotiation.

7. ***Create a negotiation archive:*** Your negotiation should be archived. Set up keywords to cross-reference parts, tactics, and strategies in your write-ups of negotiations so that they can be used as a resource for future negotiations and for the quick extraction of ideas.

Requirements for Successful Negotiation

To be a successful negotiator, you need to be mentally alert and well-prepared for any talking you must do. You need to understand what the other side wants, both its physical and psychological needs. Even though negotiating often involves trickery, both parties can still come out on top (FAO, 2015). A variety of variables may affect how negotiations turn out. The following conditions increase the likelihood that negotiations will be successful:

- Identifiable parties who are eager to participate. For negotiations to be successful, the parties who stand to benefit from the outcome must be identified and prepared to negotiate. The likelihood of an agreement will decrease if an important party is not present or refuses to participate in negotiations in good faith.

- Interdependence: For negotiations to succeed, both sides must be dependent on the other to fulfill their obligations or further their own interests. The parties require one another's support or restraint from acting negatively in order to satisfy their interests. If one party can get what they want by themselves, there won't be much incentive to negotiate.

- Preparation for negotiation: Before engaging in discourse, both sides must be ready to negotiate. If the parties are not mentally prepared to interact with one another, if there is insufficient information, or if a negotiation strategy has not been developed, people may be hesitant to begin the process.

- Means of influence or leverage: To resolve disagreements, parties need to be able to exert some sort of control over the attitudes and/or actions of the other negotiators. Threatening someone with harm or other undesired consequences is not a good approach to persuade them to change.

- Posing thoughtful questions: Negotiators can exert influence by making inquiries, providing necessary information, requesting expert opinions, appealing to powerful allies, exercising legitimate authority, or offering rewards. Agreement on a few topics and interests: For discussions to advance, parties must be able to come to an understanding of a few common concerns and interests. Participants typically share some concerns and interests, while others are exclusive to one party. Whether negotiations result in an agreement depends on how many and how significant the shared concerns and interests are. To commit to a shared decision-making process, parties must have enough common concerns and interests (Abdusalam et al., 2017),

Why parties choose to negotiate

Some of the most common reasons to negotiate are to:

- Gain recognition of either issues or parties.
- Test the strength of other parties.
- Obtain information about issues, interests, and positions of other parties.

- Ventilate emotions about issues or people.
- Change perceptions.
- Mobilize public support.
- Buy time.
- Bring about a desired change in a relationship.
- Develop new procedures for handling problems.
- Solve problems (Abdusalam et al., 2017).

Why parties refuse to negotiate

Even when many of the preconditions for negotiation are present, parties often choose not to negotiate. Their reasons may include:

- Negotiating confers sense and legitimacy to an adversary, their goals, and their needs.
- Parties are fearful of being perceived as weak by a constituency, by their adversary, or by the public. Discussions are premature. There may be other alternatives available--informal communications, small private meetings, policy revision, decree, elections.
- Meeting could provide false hope to an adversary or to one's own constituency.
- Meeting could increase the visibility of the dispute.
- Negotiating could intensify the dispute.
- Parties lack confidence in the process.
- Jurisdictional authority is lacking.
- Meeting is too time-consuming.
- Parties need additional time to prepare.
- Parties want to avoid locking themselves into a position.
- There is time to escalate demand and intensify conflict to one or both parties' advantage.

Building Negotiation Capability/Competence in an Organization

Negotiation skills are a critical component of success but are typically disregarded (Benoliel et al., 2020). Organizations must invest in the improvement of both individual and organizational negotiation capacities. In most systems, talks are often unorganized, spontaneous, sporadic, poorly recorded, and infrequently scrutinized after a deal has been achieved. The objective is to develop a negotiation ecosystem, which is a set of guidelines and principles designed to help negotiators achieve better results. One approach to do this is to create a negotiation information system that will keep track of details about each agreement that has been negotiated, such as planning and preparation, parties involved, issues and interests covered, conclusion, etc. Over time, a collection of negotiation situations will develop that will be the basis for developing best practices in negotiation and "lessons learned."

Building exceptional core competencies begins with a conscious administrative choice to elevate a certain activity to the status of a strategic thrust and dedicate to it the appropriate resources (Benoliel et al., 2020). Extension professionals should strive to develop core capabilities, which will enhance managerial effectiveness. There are four stages to developing negotiation skills within an organization:

- ***Stage one: ground zero –*** Organizations do not put any effort into enhancing their employees' capacity for bargaining and do not understand the importance of it. Consequently, no negotiation education or training is provided;

- ***Stage two: embryonic –*** Organizations see negotiation as a somewhat important skill but exclusively for a selected group of workers -- mostly sales and procurement staff who have opportunities to develop and use negotiation skills.

- ***Stage three: growth –*** The organization views bargaining as a crucial ability and provides training to staff in a variety of roles. However, only a small number of strong achievers who have been identified as having high potential are eligible for post-training implementation, coaching, and mentoring;

- ***Stage four: core competency –*** Organizations value effective negotiation skills and invest significant resources in leveraging them as a source of competitive advantage. Organizations concentrate on two levels at the core competency level: individual and organizational. At the individual level, comprehensive training in basic and advanced negotiation is provided to all members of the organization, not only those who actively negotiate with customers or suppliers (Benoliel et al.,2020). Training focuses on increasing individuals' tactical and strategic bargaining and persuasion skills. Additional skill development is provided through mentorship and coaching by internal or external negotiating professionals.

Importance of Personality and Communication in Negotiation

An effective negotiation requires both a strong personality and efficient communication.

Personality in Negotiation

Understanding how one's personality features contribute to successful negotiation is crucial. In negotiations, one must try to be authentic. One should not pretend to be excellent, fake things, or act as though she/he is happy with the agreement if she/he is not. It's preferable to voice an issue right away than to complain afterward. Other personality features that make for effective negotiation:

- **Be sincere.** One of the most crucial personality attributes needed in negotiating is sincerity. Do not treat anything lightly. Arrive at your negotiation prepared. Try to thoroughly research any business agreement you are considering ahead. Be extremely clear on the negotiation's agenda. Bring along any supporting documentation you might need when negotiating. Don't just go because you want to.

- **Be honest.** Honesty is critical during negotiations. Never lie or make anything up. Be patient. Persuasion and agreement take time take patience. Impatience can result in anger, which rarely leads to successful negotiation.

- **Learn to be adaptable and to compromise.** While prioritizing one's own interests is OK, being conceited is not. Being the first to accept anything won't make you less significant or cause you to lose anything; instead, it will make the other person look up to you, and both of you will benefit from it.

- **Have faith in the second side.** The other party is only there to conduct business; he is not at all your adversary. Start conversation with a kind grin rather than jumping straight to the point. It will help break the ice and strengthen the relationship between the two parties. Maintain a professional demeanor. When the arrangement is finalized, both parties should witness the signing of a document spelling out the agreement rather than rely solely on verbal exchanges. To ensure clarity, make sure the meeting's minutes are distributed to all attendees.

Communication in Negotiation

Negotiation is nothing more than a conversation between parties to arrive at a solution that satisfies everyone. How is productive conversation possible? Only by means of communication. Effective negotiation directly correlates with effective communication. Good communication makes the bargaining process go smoothly. The discussion does not involve shouting and arguing; rather, it is the sharing of thoughts, ideas, and perspectives that makes for a healthy and productive dialogue. Such discussion requires great communication skills. The way you speak as an extension agent has a big impact. Active listening is advised to enhance communication abilities (Fisher and Ury, 1981). This entails listening "to grasp (the other party) as they view themselves, rather than to formulate a response" (Fisher and Ury, 1981). The best methods to show that you are actively listening are to ask questions, paraphrase without necessarily concurring, and frequently acknowledging what has been said or has not been mentioned.

Tips for Successful Negotiation

An effective way to resolve disagreements and prevent confrontations is through negotiation. People bargain with one another and work to find a solution that benefits everyone. Negotiation cannot take place until both parties learn to compromise to some level and refrain from criticizing one another.

Professionals in agricultural extension must be skilled negotiators to close deals, avoid conflicts, foster improved employee relations, and make their organizations a better place to work. A person spends the majority of his or her time at work, so it is crucial for improved focus and productivity that he or she feels at ease and under no stress while doing so. Negotiation is crucial in corporate settings since one cannot afford to have adversaries within their organization. The following are the tips for a successful negotiation:

- *Adequate preparation for negotiation:* Keep in mind that if your company chose you for the negotiation with an outside party, they must have seen something special in you.

You must work hard to meet the demands of both your organization and your superiors since there is no way you can let them down. Pay close attention to all the pertinent information. If there is anything you are unclear about, make sure to discuss it with your superiors before a negotiation rather than going into it uncertain. You will never be able to persuade the other person if you are not confident in the specifics and facts.

- *Remain vigilant:* While negotiating, keep your eyes and ears open. Keep in mind that the other party would make every effort to persuade you and impose their decisions on you. You don't have to become a victim of the other side. It is usually preferable to put off negotiating if you are not in the right frame of mind than to make a mess of things.

- *Confidence is essential for successful bargaining:* An extension specialist must possess the self-assurance necessary to argue his case. You can't afford to appear uneasy in front of the other person because he is free to ask you anything. Be knowledgeable enough to respond to all of his inquiries. People look up to a confident person because she/he makes a lasting impression on them.

- *Exercise extreme caution when handling your paperwork:* When you go to a negotiation, thoroughly read the papers and make sure you have all the required paperwork with you. Prepare all essential contracts and agreements well in advance, leaving space for the parties' signatures and the terms and conditions. Once the negotiation is over, these procedures should be completed.

- *Avoid delays:* Extension staff should always arrive on time for meetings. Do not hold up the other party. If the negotiation is scheduled to begin at 10 am, arrive at the location no later than 9.45 am. Everyone values their time; therefore, an agent should use it wisely.

- *Understanding the other party thoroughly is essential for a successful negotiation:* Extension employees should be aware of the wants and desires of the other party. It is only normal to care more about one's own affairs, but this does not mean that one should disregard the interests of others. Keep in mind that he is also here on business. It is crucial that both sides engage in a constructive debate and carefully weigh the advantages and disadvantages of the proposed ideas before deciding on a course of action that would be advantageous to everyone. Never undervalue someone. Be certain that everyone is content following the negotiation. Nobody ought to be upset.

- *Be honest throughout negotiations and refrain from deceiving anyone:* An extension staff should only talk when absolutely certain. Do not rely on conjecture or presumptions. They are useless in business settings. Falsehood and truth manipulation are wrong. To ensure a fair negotiation and prevent misunderstandings afterward, one should always be honest in their interactions. You won't get very far by telling lies and being dishonest.

- *Always have backup plans with you:* be prepared to present them in case plan A doesn't work. You shouldn't depend solely on one plan. You can never be sure which plan will work well with others.

- ***One needs to be aware of the negotiation's goal:*** Why do you think you need to negotiate? It is important to be clear about what you want from the discussion. An extension staff must understand the negotiation's agenda. Make sure your expectations are reasonable. Avoid making requests that would cost the other party money. Please refrain from expecting the impossible to occur.

- ***Avoid getting emotionally invested too much during the negotiation by learning to control your feelings:*** No decision should be made based on emotion. Simply because you are interacting with your friend, do not tend to neglect the stuff. Your personal hobbies and professional life must remain separate. Keep the atmosphere polite by refraining from using derogatory or aggressive remarks toward others. Never make fun of others. Discuss with him if the second party is not persuaded, but never descend to insulting behavior.

- ***Be an effective communicator:*** It is crucial to explain ideas and concepts clearly to others. Don't try to mislead them. Make sure you don't take a careless stance. Use language that is appropriate. Pitch and tone should both be used with caution. Pitch should not be excessively high or low. Everyone must be able to hear it.

- ***Be patient:*** Negotiation takes time; therefore, one must have the patience necessary to communicate, comprehend the other side, and clearly state his position. Try not to rush the negotiation's conclusion. Never jump to conclusions or force your opinions on others.

- ***Avoid dragging out the discussion:*** it is better to end the talk when the conclusion has been reached. Don't hold out for additional miracles to occur. Make sure the negotiation is not too routine or the parties may lose interest in the conversation. Everyone should take part in the conversation, which should be engaging. Instead of complaining later, voice your ideas throughout the conversation.

- ***One should not attempt to be someone they are not:*** One should be themselves and try to act normally. Do not treat others badly. Everything will fall into place if you remain relaxed. For a better negotiation, one should feel at ease with the opposing party.

- ***Do not pick a battle with anyone needlessly:*** It is best to disregard trivial matters. Make no big deal out of trivial matters. It's important to learn when to compromise and work diligently to reach an agreement.

- ***Go for a quiet location and record events:*** A conference room, a meeting room, a board room, or a community hall is the best option for conducting negotiation talks. Avoid making the conversation too professional. Always keep a pen and notebook with you to jot down vital information for later use. Make sure the presentation is correctly downloaded onto your laptop if you need to give one. Do a quick check before starting the negotiation. You can feel embarrassed in front of other people. If you want the intended impact, choose formals (Abdusalam et al., 2017).

9.14 Leadership

Agricultural extension and advisory agents by virtue of their roles as change agents exert a lot of influence in the communities they are working with. They endeavor to influence the farming community to adopt modern and improved practices that can lead to improved agricultural productivity, incomes, and livelihoods. To successfully perform their roles as change agents, extension professionals require good leadership abilities. Since the early years, leadership has been recognized as one of the key personal skills that extension agents should have (Oakley and Garforth, 1985).

Apart from their own leadership skills, extension agents also need to cultivate good leadership skills among the community members they are serving. It is therefore important for extension professionals to understand what leadership is and how to exercise good leadership skills.

What is Leadership?

Leadership is defined in a variety of ways:

- Leadership is the process of determining a path that a group will follow, leading a group to reach a goal, and owning the required skillset to mobilize followers with intrinsic motivation (Bickes and Yilmaz, 2020).
- Leadership is the action of leading a group of people or organization, or having the ability to do this (Simpson, 2013).
- Leadership is influence; "a leader is one who knows the way, goes the way, and shows the way." (Maxwell, 2005).

The bottom line is that leadership is about exercising influence over yourself and others.

Leadership Styles

"Leadership style" refers to the approach used by leaders to influence, motivate, and direct (CFI Team, 2022). The style of leadership is affected by factors such aspersonality, life experiences, ways of thinking, and family background. Leadership style is important because it is one of the main determinants of a leader's effectiveness.

There are six common styles of leadership:

Autocratic Leadership: All the authority and responsibility lie on the leaders, whereby they make all the decisions and expect everyone else to follow without questioning. The leader acts as a dictator and often instills fear in the members. Although the leader may get things done, this style of leadership is not very effective in the long run.

Democratic Leadership: This is the opposite of autocratic leadership style. Democratic leadership is a consultative, collaborative kind of leadership -the leaders seek input from all the team members, even though the leaders have to make the final decision. It also involves delegating responsibilities and allowing others to be actively involved. The democratic style of leadership is commonly used and has proved to be quite effective in many situations.

Laissez-faire Leadership: This is the situation when the leader adopts a laid- back or hands-off approach and allows team members to work independently without much supervision and guidance. This style of leadership, if not well-exercised, can lead to the team not achieving intended results.

Servant Leadership: The leader is first a servant and then a leader. This is clearly emphasized by Hesselbein (2012), who asserts that to lead is to serve. The needs of the team members take priority over the leader's own needs, and the leader often seek to lead by example. The leader therefore aims at developing the team members to bring out the best in them and achieve the best results.

Transformational Leadership: The leader seeks transformation by inspiring team members to keep pushing their limits to achieve what under normal circumstances they would not achieve. The leader expects the best out of the people being led. This leadership style involves relationships of mutual trust and has been found to be effective in situations that involve management of change.

Transactional Leadership: This leadership style involves exchange or "give and take", whereby the leader commits the team members to deliver in certain tasks and responsibilities and in return provides the members with certain rewards. With this type of leadership, there is a clear hierarchy in authority - the team members know who the boss is. The leader sets clear goals, has a good understanding of the needs of the followers, and is able to select appropriate rewards for them.

Bureaucratic Leadership: Bureaucratic leadership style involves strictly following established processes and regulations. There is a clear hierarchy of authority, with power flowing from the top to the bottom. Team members' input is acceptable if it's in line with those processes and procedures (Demirtas and Karaca, 2020; CFI Team, 2022; Global Forum Rural Advisory Services [GFRAS], 2016; Dirik, 2020).

All leadership styles have their strengths and weaknesses and may be suitable depending on the situation. In cases where participatory extension approaches are being used, however, the democratic style of leadership is widely applicable.

Levels of Leadership

Apart from the various styles of leadership, there are also levels of leadership. According to Maxwell (2005), everyone is a leader; the difference comes in what stages they are in on their leadership journey. Maxwell (2016) identifies five levels of leadership:

Level 1: Leadership based on position: This is when a person has influence because of the position they occupies. It has nothing to do with personality or what the person does. As long as she/he is in this position with its inherent influence, others must follow.

This is considered the lowest or entry level into leadership. Many people start their journey of leadership by occupying positions that give them influence. Many extension workers start at this level and exercise influence over farming communities because of their professional position. By investing in their growth and potential as leaders, they can move to the next level.

Level 2: Leadership based on permission: At Level 2, leadership is based on relationships. People willingly follow their leader out of choice -they give the leader permission to lead them. This leadership level is reached when a leader invests in building relationships with the followers at a personal level. The leader views people not just as followers but as individuals and works on knowing them and understanding them. After working for a while, extension agents should endeavor to build relationships with their clients by knowing them and understanding them. This builds confidence and trust and increases the extension worker's influence.

Level 3: Leadership based on production: At this level, people follow the leader not only because of position and relationship but also because of the results the leader produces through his/her performance. When leaders are effective in their work and demonstrate tangible results, this builds their influence and credibility among the followers. At this level, the leader leads by example, and the results motivate people to follow. At level 3, the leader truly becomes a change agent. This is what every extension worker should aim for by not only telling and showing farmers what to do but leading by example.

Level 4: Leadership based on people development: This level of leadership is about developing people into leaders by investing in their development. At this level, people follow the leaders because of how they have invested in them. Extensionists are able to attain this level of leadership because leadership development among the clientele is one of their responsibilities.

Level 5: The pinnacle level of leadership: This highest level of leadership is attained by only a few people. At this level, leadership is about building a positive reputation as a leader and creating a legacy that will outlast the leader. People follow the leader because of who the leader is and what he/she represents.

The five levels of leadership clearly demonstrate that one grows in leadership from the lowest level to the higher levels. Therefore, we should not be satisfied with remaining at the lower levels but should strive to attain the higher levels, where we exercise greater influence and serve as change agents.

Qualities of a Good Leader

A good leader is an effective leader. According to Dirik (2020), "leadership effectiveness is determined by the degree to which a leader is capable of resolving conflicts, coping with demands, overcoming problems and identifying challenges and opportunities."

A good leader should have the following qualities:

1. **Integrity:** This is a key quality that enables people to trust and have confidence in the leader. A good leader should be honest and have a strong set of values and principles which guide their actions. They should always be ready to take responsibility for their actions and operate in a transparent manner.

2. **Good communication:** The leader should be able to communicate clearly and create open communication channels with the members of the group. Good communication also involves being a good listener and encouraging feedback.

3. **Self-awareness:** A leader who is self-aware understands him/herself in terms of personality traits, emotions, and behaviors, and recognizes his/her strengths and weaknesses and is willing to improve.

4. **Innovation and creativity:** These qualities help the leader to explore new opportunities, confront challenges, and keep improving. Innovation and creativity enable the leader to look beyond set boundaries or to think outside the box.

5. **Influence:** Although leadership is understood to be about influencing others, such influence does not always come automatically. One can be a leader and yet not be able to influence people toward attaining goals. A good leader should therefore have tactics that can be applied to increase his/her level of influence.

6. **Empathy:** Empathy is the ability to put oneself in another's shoes. Good leaders should not only understand those being led but should have the capacity to feel with them -to acknowledge, understand, and appreciate their emotions and situations and handle them accordingly.

7. **Confidence and courage:** Good leaders should have confidence in their abilities –this inspires others to follow them. They should also have courage so as to deal effectively with challenges and the demands of their situation, and also to chart unfamiliar territories when they arise. Courage also enables them to stand up for what is right, regardless of opposition, and stay focused on goals.

8. **Respect:** Respect is a key ingredient of successful relationships. A good leader respects him/herself and also respects others. The leader should treat others with respect and dignity, regardless of their socio-economic, cultural, age, gender, educational, and other differences.

9. **Reliability and dependability:** For leaders to command their following, people have to see them as reliable and dependable. These qualities build trust and confidence in leaders and enable them to gain cooperation and support.

10. **Humility:** Good leaders should be modest about how they view themselves and how they relate to those that they lead, not use the leadership position to boss others and make them feel inferior. They should not be afraid to show their human side and should value others.

11. **Commitment and passion:** These qualities are important in keeping the leader on course despite any challenges they may face. They also inspire and motivate others to follow the example of the leaders.

12. **Gratitude and appreciation:** There is great power in gratitude. A simple 'Thank you" or other form of acknowledgement of people's contribution can make a big difference. Good leaders should therefore look out for opportunities to express appreciation to their followers, as this inspires and motivates the followers to perform even better.

13. **Openness and transparency:** These qualities are important because a lack of openness and transparency in the way leaders operate creates suspicion and mistrust among the followers and reduces the leader's ability to influence people toward attaining desired goals.

14. **Vision and purpose:** The leader should have a clear vision and purpose for guiding the team or organization and clearly articulate it and communicate it to the members or followers. This gives them a sense of direction and purpose (Indeed Editorial Team, 2022; Simpson, 2013).

Why do Leadership Skills Matter?

The importance of leadership skills is summarized in Box 9.2:

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Box 9.2: Importance of Leadership Skills

- Leadership skills help you to be a more productive team member and contribute more to the team

- Help you maximize your strengths within the workplace, such as knowledge and empathy

- Encourage you to initiate action when action is needed, and no one is stepping up to make changes

- Allow you to provide support and encouragement to others to perform better in their jobs

- Help you instill confidence and inspiration in your team for a more productive output

- Allow you to build morale among your employees or team

- Foster commitment and loyalty to the company

- Improve the overall work environment by increasing performance and function in the workplace

Source: © How To Improve Your Leadership Skills: Steps and Tips | Indeed.com

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How to Develop Good Leadership Skills

It is said that leaders are made, not born. Although some people are born with a natural tendency towards leadership, the truth is that leadership is a skill that can be developed. It is, therefore, possible for one to acquire and grow in the qualities of good leadership even if they were not born with the natural tendencies towards leadership.

The following are ways in which you can grow your leadership skills:

1. **Reading, studying, and learning:** We can take courses or classes on leadership to enhance our leadership skills. This can help us to build on the areas we are deficient in and also enhance the skills we have. Many opportunities for learning more about leadership, including online resources, are available.

2. **Following those who are successful leaders:** This is about having mentors. We can identify people who are good leaders and learn from them, whether we have physical access to them or remote or virtual access to them. We can seek advice from them and learn from them.

3. **Adopt a lifestyle of discipline:** This applies at work and even in our everyday lives. When we are disciplined, we stay committed to pursuing our goals and doing the things that need to be done to achieve better results in life. A disciplined leader inspires discipline in others.

4. **Have a culture of continuous improvement:** The journey towards good leadership never ends. We should always look out for opportunities to make ourselves better. We can learn a lot by participating in events such as conferences and seminars as well as taking up opportunities to lead when they arise.

5. **Learn and understand your leadership style:** Through this we are able to understand what our strengths and weaknesses are and which areas we need to build on. Knowing your style also helps you to know which leadership situations you are suited to.

6. **Increase your capacity by taking on additional responsibilities:** This places new demands on you, which force you to build or stretch your capacity to successfully execute them.

7. **Empower and motivate your followers:** A good leader invests in building capacity among the followers. The leader should provide opportunities for the followers to develop in various ways that enhance their performance and engage his/her motivational and delegation skills to encourage them to use those opportunities.

8. **Set goals and execute them:** A leader has to set clear goals and communicate them effectively. He/she will also follow through to ensure that the goals are executed and intended results are achieved.

9. **Acknowledge and use your mistakes or failures to your advantage:** Good leaders should not be afraid to admit when they fail. Rather, they should be willing to use mistakes as learning opportunities. This calls for humility and the ability to take feedback from peers, followers, and even those who are above you (adapted from Indeed Editorial Team, 2023).

9.15 Teamwork

Agricultural extension work involves working with others -with colleagues in the workplace, and with farmers and other stakeholders in the agricultural food system. All these working relationships – and the overall success of agricultural extension work -call for teamwork. Farmers are also increasingly working in groups. The success of the groups depends on how well the farmers work together as a team. Teamwork skills are therefore important not only for the extension worker's success but also for sharing with farmers to enable them to work successfully in their groups.

Importance of Teamwork

Teamwork is an integral part of human beings since time immemorial, and it remains crucial in today's world (Khawama et al., 2017). The ability to work with others is one of the most important skills in today's world, an essential ingredient for workplace success (ODEP, n.d.). A popular quote by Henry Ford states: *"Coming together is a beginning, staying together is progress and working together is success"* (Hall and Thompson, 2012).

Working together in a team can lead to the following benefits:

1. **Unity among the members:** When people work together in a team, especially over a period of time, they get to know one another better, which can lead to bonding and the development of friendships. Some of the relationships can even last a lifetime and extend beyond the individuals to their families. These relationships create unity in the team and lead to better teamwork. Teamwork also helps people to build professional networks and expand their social spheres.

2. **Greater efficiency in working and better results:** When people work together in groups on a shared task, their efficiency is increased because the work is shared among several people instead of being done by one person. Also, they are more committed to doing their part because of their shared goal as a team. In addition, a team setting enables different minds to come together in performing the same task, which may give better results than when people work separately.

3. **More learning for team members:** When people come together to work on the same task, there are opportunities for them to learn from one another as they interact and share ideas and experiences. Working together and acquiring knowledge and skills can enhance their capacities in various ways and help them get to know and understand one another better.

4. **Improved feedback and continued improvement:** Many people are reluctant to offer feedback, especially if it is negative. Others are sensitive and defensive about receiving such feedback. In a teamwork setting, where people are at ease with one another and focused on the task, they may be more open to giving and receiving feedback.

5. **Better and faster resolution of issues:** When challenges or problems arise, a teamwork environment promotes problem solving because team members can give their perspectives on the problem as well as suggestions for solving it. The group may arrive at much better solutions more quickly than an individual working alone (Khawama et al., 2017; Kalytchak et al., n.d.; ODEP, n.d.).

Characteristics of Good Teamwork

Good teamwork results in high- performing teams. Characteristics that distinguish such teams include:

1. **Good communication between/among team members:** Good communication is clear and is carried out in a mature and respectful manner, which helps to build harmonious working relationships between members. Through good communication, team leaders are able to convey expected roles to team members and generally coordinate the team towards achievement of its goals.

2. **Mutual respect for others:** Teams are made up of people who differ in their backgrounds, abilities, personalities, skillsets and other qualities. Good teamwork involves the creation of a respectful environment where all members are valued and treated with dignity regardless of their differences. In such an environment, each member of the team feels free to express her/himself and share ideas with others. The resulting goodwill and cooperation among the members in turn results in the team working effectively together.

3. **Cooperation and conflict resolution among the members:** Conflicts will always arise, even in the best of teams. Good teamwork is characterized by willingness and commitment of members to resolve issues when they arise. Issues are dealt with head-on -but in a respectful manner - thus ensuring that harmony and cooperation are maintained in the group.

4. **Encouraging equal participation:** In good teamwork, the skills and strengths of each member as well as their unique abilities are acknowledged, and members are encouraged to utilize them in helping the team achieve its goals. There is no one in a team who has nothing when encouraged to participate freely.

5. **Mutual support and positive attitude:** Team members support one another in ensuring that each succeeds in his/her specific tasks or roles. They work in collaborative and complementary ways, and do not engage in unhealthy competition among themselves.

6. **Shared values and common goals:** When team members have common values, they are better able to put aside individual differences and work together towards achieving the goal of the team. This gives them a sense of shared purpose which motivates them in their work and enhances teamwork and cooperation (Dyer et al., 2013; Indeed Editorial Team, 2023).

Teamwork Skills Needed to Work Effectively with Others

Effective teamwork is achieved when the members have good teamwork skills. These skills include:

1. **Organizing and planning skills:** Organization and planning skills enable the team to agree on what needs to be done, how it is to be done, who will be responsible, and by when the work should be done.

2. **Decision-making skills:** The inability to make decisions or excessive delay in making decisions is one of the factors that compromise the success of a team. Therefore, effective Problem solving helps to move things forward and enables the team to achieve its goals.

3. **Communication skills:** Communication skills in teamwork include verbal communication, listening, and questioning.

4. **Ability to build rapport:** Building rapport is about developing a sense of harmony within the group, which is necessary in creating a coherent team.

5. **Persuasion and influencing skills:** Because all members of a team will not always agree on everything, persuasion and negotiation skills are important in getting all members to move in one direction.

6. **Facilitation skills:** Facilitation is about making it easier for a team to achieve its goals. A good facilitator guides the team and enables it to achieve what it wants/needs, rather than what the facilitator wants.

7. **Feedback skills:** In the context of teamwork, feedback is the process of communicating with someone about something that they have done or said with a view to changing or encouraging that behavior. For feedback to be considered effective, it has to be clearly heard, understood, and accepted. Being able to give and receive feedback is essential for the effective functioning of a team.

8. **Conflict resolution:** When people are working together, conflict is inevitable. It is therefore important to have skills in conflict resolution so as to effectively deal with conflict situations.

9. **Reliability:** All team members are expected to have a high level of reliability, since the success of the team depends on each member playing their role.

10. **Respect:** Team members should treat each other with respect to maintain harmonious working relationships.

11. **Honesty:** Honesty helps to promote transparency and trust among the team members. They need to be truthful to each other.

12. **Empathy:** Empathy among team members promotes understanding of one another's feelings and motivations. Empathy demonstrates respect and care, which can lead to higher morale and productivity in the team.

13. **Collaboration:** Effective collaboration among team members helps to achieve the team goals and increases satisfaction of team members, encourages innovation, and improves efficiency of the team. Through collaboration, team members learn from one another and develop good relationships among themselves.

14. **Tolerance:** Teams often consist of people who are diverse in their religious beliefs, cultural and ethnic backgrounds, and other ways. Team members need to embrace diversity by accepting all members, being open-minded and willing to learn from one another (Skills You Need, 2023).

How to Improve Your Teamwork Skills

For extension agents to derive maximum benefits from working in teams, it is necessary for them to build their teamwork skills. This can be done in the following ways:

1. **Learning through training programs and self-study:** Through various resources or training opportunities you can learn more about teamwork and how to improve your teamwork skills.

2. **Obtaining feedback from colleagues and other people we work with.** Sometimes we may not be aware of our weaknesses in the teamwork realm. Asking people close to us to give us feedback can guide us to areas where we need to improve.

3. **Learning from others who have strong teamwork skills:** People with good teamwork skills, either in our teams or outside, can serve as mentors. We can seek the advice and help of such people to help us improve our skills. We can also learn by observing them. Mentors do not have to be physically within our reach, and we can learn from them through the media.

4. **Building trust among the team members.** Trust is an important ingredient for successful teamwork. You should come across as a trustworthy person and should also communicate trust to other team members.

5. **Resolving conflicts quickly.** When different people come together, conflicts are likely to occur. Unresolved conflicts affect the relationship among members and can have a

negative impact on their productivity and performance of the team. This therefore calls for application of conflict resolution skills. Strengthening conflict resolution skills enables quick resolution of conflicts.

6. **Being certain about your responsibilities and roles in the team:** This calls for clear definition and communication of the roles and responsibilities of each team member to avoid confusion and conflicts. Ensure that as a team member you clearly understand what is expected of you, and seek clarification if you are not sure (Indeed Editorial Team, 2023).

9.16 Group Formation and Development Skills

The group approach to extension services institutionally was introduced one of the key elements of the Training and Visit (T& V) system adopted in the late 1970s across many developing countries, which builds on a combination of individual and group approaches. Working with groups is a more decentralized process and less top-down than working with individuals. It is an effective way of empowering farmers (urban and rural) and promotes inclusiveness of the diverse clients.

Using group methods in extension is founded on the popular belief that individuals achieve more as a group compared with individual efforts combined. It is one of the most promising means of scaling up technologies in the new pluralistic extension environment. Extension workers play crucial roles in forming and developing a functional and effective group for extension service delivery, farmer empowerment, capacity building, and boosting productivity and livelihood of farmers and the population in general. Thus, it is imperative that extension professionals understand and acquire the skills and competencies in the "how" of group formation and development processes.

Concept of Group: A group is a collection of persons who have regular contact and frequent interaction and mutual influence, and who work together for a common interest. It is a social entity comprising two or more individuals who work together for a common purpose (Suvedi and Kaplowitz, 2016). Groups converge to meet collective and individual needs and promote the economy of scale.

Purpose of Forming Groups

Groups exist for many purposes and pursue their goals differently. Knowledge of the interest of a group is important for effective group management.

Auvine et al. (2012) identified five major purposes/functions of establishing groups:

1. **Task performance:** This is where a group is organized to carry out a certain job. The job could be specific or general; for example, community mobilization/awareness on climate change or environmental pollution, or disaster response/management.

2. **Setting objectives:** This is a group formed to alternatives to decide and select a direction of action. This feature is common to groups, even groups that are not objective in their setting.

3. **Skill acquisition:** Groups may be formed to acquire skills and enhance the capacities of individuals. They are concerned with the practical application of information and knowledge

--e.g., where new techniques are learned and practiced by participants at workshops. Extension workers form such groups to facilitate the demonstration of technologies disseminated in a workshop.

4. **Actualization:** The group function focuses on the members themselves. The group emphasizes the feelings, awareness, and self-expression of individuals. It is a consciousness-raising and value clarification group.

5. **Imparting information:** A group may be formed for the single purpose of sharing information among members and between resource persons and the group. The emphasis is on knowledge of theories and facts -- e.g., study groups, class assignment groups, etc.

Specifically, in agriculture, farmers' groups are formed for various agriculture-related reasons or purposes, such as:

1. **To facilitate access to affordable and standard production inputs:** Farmers come together to explore the advantages of economies of scale to access most production inputs such as machinery, insecticides/pesticides, and improved seeds, among others. The farmers enjoy the benefit of bulk purchase of inputs or share machinery for production, leading to cheaper and reliable services or not borrowing to afford them.

2. **Access to bulk marketing of farm produce:** Many small-scale farmers face the problem of marketing farm produce at a good price and in the regular market. Bulk marketing helps farmers to jointly negotiate with marketers and processors for a better price.

3. **Social security:** Farmers groups are formed to gain access to social benefits such as power to negotiate the terms of a contract or help themselves to keep the terms of the contract, and strengthen bargaining power for certain services -- e.g., good roads, markets, etc.

4. **Access to credit:** Farmers form groups to improve access to credit, particularly smallholder farmers, who often lack collateral to access credit. Also, groups are more likely to get grants and loans than individual farmers, and the stringent processes of accessing credit are better attended to in a group.

5. **Share knowledge, ideas, skills, resources, and experiences:** Farmer–farmer networking has been an effective mechanism for timely and reliable information and experience sharing among farmers. This has become inceasingly popular with dwindling public engagement in agricultural extension and advisory services.

6. **Capacity building and empowerment:** Farmers join or form groups to improve their knowledge, skills, and resources for enhanced income and livelihood. This works because adults learn better in group and interactive environments.

Types of Groups

Suvedi and Kaplowitz (2016) identified four types of groups:

1, **Primary groups:** Groups whose members have a close affinity, interaction, and meetings are anchored in the interpersonal relationships among the members, and the norms

and values of the society explain their attitudes, values, and orientations. This may include groups based on proximity, religion, values, culture, and beliefs -- e.g., commodity interest groups, town groups/unions, etc.

2. **Secondary groups:** These types of groups have large numbers of members who rarely come together or communicate with one another. Relationships among members are more impersonal. Examples are trade unions, national cooperative societies, associations of farmers, etc.

3. **Planned groups:** Members come together for a specific purpose. Such groups can be mobilized and formed by communities, agencies, NGOs, or development projects.

4. **Emergent groups:** These groups are formed without any prior preparation. Formation could be triggered by sudden occurrences such as natural disasters, an outbreak of epidemics/diseases, or community orientation/training.

Groups are also classified on the basis of legal status, hierarchies, and functions (Anandajayasekeram et al., 2008).

Groups based on legal status: This is further classified into formal, semi-formal, and informal groups.

1. **Formal groups:** These are groups registered by an act of parliament and are legal entities with limited liabilities. They are connotationally established to carry out specific tasks, and members work towards their common goals -- e. g., cooperative societies and national farmers' organizations/associations.

2. **Semi-formal groups:** They are listed through a local development organization or apex group as a formal grouping. The groups have by-laws that guide the behavior of members but enforce them through local arrangements. Also, semi-formal groups have a memorandum of understanding signed and kept with members, local development organizations, and the police. This makes it easier for the group to access funding and other services from registered organizations -- for example, poultry farmers' organizations registered with the national association of poultry farmers or rice farmers' organizations registered with the rice farmers association of Nigeria, etc.

3. **Informal groups:** These are unregistered groups, though with established by-laws that members strictly adhere to. Such groups can evolve from regular interaction and are defined by the needs of members. The informal group provides some benefits for members, including the provision of social needs, status, security, information sharing, norms, and values that affect individual performance and behavior. The challenges of this sort of group include conformity and false rumor. Group exit when their goal is achieved.

Groups based on Hierarchies: Groups under this category exist as secondary or primary groups:

Primary groups: Primary groups show a high degree of intimacy and high affiliation of members, often comprise members with like backgrounds and experiences who may reside in the same area.

Secondary groups: Participation is driven by personal interest –individuals will benefit – rather than group interest and group goals. Groups where there is partial participation and allegiance of members often transform into primary groups.

Groups based on function (functional grouping): This classification is explained by the functions of the group. The group performs various group work, and their interactions and activities may result in individual growth and the realization of the group's expected goals. In the context of rural development, the categorization may be based on the purpose of group formation -- for example, marketing group, input acquisition group, resource sharing group, multipurpose group, extension group, etc.

Characteristics of a Group

1. *Group interaction:* This refers to how individuals engage with and affect one another. The interaction may be either to carry out group work or for socio-emotional purposes (relationships among members). This interaction involves information flow through preferred and effective communication channels.

2. *Group interdependence:* Groups exist because members depend on and influence one another.

3. *Group structure:* Group size, norms, roles, and stable patterns of relationship among the members of the group explain the group structure (Forsyth, 2006). A group structure is either formal or informal, each member occupies a position, and there is a pattern of relationship along the structure.

4. *Group size:* The number of members in a group affects how they participate in group activities. Small groups encourage greater participation of members than large groups. Besides, large groups tend to experience disagreements due to the challenge of managing diverse interests and building confidence and trust among members. An ideal group size should not be fewer than 10 and greater than 30 or 20-30 members (SEDIN, 2016).

5. *Group norms/rules/code of conduct:* Groups establish a standard of behavior for themselves by adopting codes of conduct or norms. Group norms keep a group together and promote effective functioning.

6. *Roles:* The expectations and attributes related to a social position form roles (Smith, 2008). Defining roles is crucial to enable members to appreciate their roles and contribute to the group and/or the group's goals.

7. *Common interest/goals:* Group goals show the interests, objectives, and vision of members and their group. The goals must be acceptable to members to encourage participation and group efficiency. The goals keep groups and members united and active. For example, farmers' groups must have their goal or interest around agricultural development, rural development problems, constraints, needs, and potentials.

8. *Group cohesion:* Groups thrive where there is cohesion and trust among members. Trust and respect unify members, help them to support one another, and keep the relationship void

of exploitation. Group cohesion is a function of the intensity of interaction among members (Suvedi and Kaplowitz, 2016; SEDIN, Program, 2016).

Group Formation

Individuals form or join a group for several reasons and through various processes. These may include a desire to solve common problems, needs, or interests. Group formation may be externally motivated -- e.g., groups formed through the intervention of research, extension, or development agents (NGOs or civil society organizations). It may also be internally motivated -- members of a community conceive the idea to form a group. Understanding the process is crucial to both stakeholders -- members of communities, NGOs, development agents, or extension workers -- for meaningful contributions to the development of the community.

Formation of externally facilitated groups: Development agents have the primary role of assisting and empowering communities to take control of their lives and harness resources (human, physical, social, economic, etc.) and work together for their benefit. Group formation is a powerful tool for advancing this course. Groups are formed externally using the following steps:

Entering the community: Primarily, development agents or extension workers need to gain the confidence of the community. It requires sufficient time, repeated visits, and patience to build trust with the community. Also, it calls for commitment from extension workers to overcome the inertia exhibited by local people at the early stage of the project (Suvedi and Kaplowitz, 2016). They have to show respect and interact with people from different backgrounds. The steps involved are:

(a) Gathering information about the community and its leadership. This may include information on socioeconomic groups/organization, needs, and problems and how they are addressed, power structures, communication patterns, channels, etc.

(b) Meet with stakeholders (local leaders, influential persons) to explain the reason for the visit and seek their support to enable the facilitator to meet with the entire community and similarly share the purpose of the visit and how it will benefit the community.

(c) Talk to community members wherever you meet them about the purpose (market, homes, field, etc.) to gain their confidence, interest, and trust.

(d) Show genuine interest in local needs, community beliefs, and norms.

(e) Interact with all social groups (men, women, youth, physically challenged).

Furthermore, extension workers can form groups internally or externally using these steps:

Step 1: Conception of a group: This can be done by a member of a community or an external agent. The idea may be shared with a few individuals to help develop and articulate the idea into a concrete plan of action. If the idea comes from a member of the community, it may be necessary to consult the development agents or local leaders.

Step 2: Mobilization of members: The idea is shared with a wider audience in a meeting. The vision of the people is explained, and issues raised are addressed.

Step 3: Convergence of interested parties: The interested members converge for further discussion and decision to form or join the group. At this level, members should be informed that membership is voluntary. Also, development agents may be involved to highlight experiences with group formation in other places.

Step 4: Birth of a group: At this point, the group is given an identity (name and locality). Other group foundational issues are discussed, including the constitution of a committee, meeting day and time, members agreeing on desired membership, and a guide on the selection of leaders, which may be facilitated by an extension agent.

Step 5: Setting of goals and objectives: The group is formed around an agreed objective /interest or goal. This is where the group establishes a group vision and sets goals. This may require the assistance of a development agency to help the group come up with achievable and smart objectives or goals with a timeline.

Step 6: Establishment of operational guidelines: This involves the development and establishment of norms, by-laws, and a constitution. The extension agent should identify potential areas of friction or conflict that need to be addressed and ways to avoid them.

Step 7: Resource mobilization: Having established consensus on the objective of the group, the group will identify the resources required and available to achieve their goals. These resources may include human (skills, attitude, ability, or interest), materials (equipment, raw materials), and financial, among others.

Step 8: Planning of group activities: This involves the identification of activities for the group, an outline of steps to achieve set goals, and the preparation of a budget for activities to be carried out.

Step 9: Implementation of group activities: This is characterized by the assignment of a task to members, the execution of the task, monitoring of performance against set targets, and review of the task performed. At this stage, individual members take responsibility with the extension agent providing technical backup. S/he ensures members' participation in group activities (Anandajayasekeram et al., 2008).

Additional Tips on Forming Groups (Externally)

- Be familiar with the diversities that exist in the community, such as those related to cultures, economy, education, geography, farming system, etc.
- Select members on the basis of common interests and proximity to one another. Visit members in their homes or farms to gather first-hand information on the people and their concerns or situation.
- Make repeated visits to establish a relationship and gain their trust.
- Show acceptance of local cultures, food, and languages.
- Work as one accountable and responsible to the group and the community.
- Understand the strengths and interests of local people.

- Encourage the participation of all members, including women, minority groups, etc.
- Educate members on the benefits of being and working in a group.
- Facilitate group process; select leaders, decide on goals, and formulate an action plan.
- Have regular meetings with members.
- Encourage transparency and good record-keeping.
- Guide and manage groups to circumvent interpersonal conflicts and personal allegiances.
- Acquire negotiation skills to handle conflict when it occurs in the group (Suvedi and Kaplowitz, 2016).

Group Development

Tuckman's theory recognizes that groups are not developed spontaneously but go through clearly defined stages. Groups of all kinds follow five common patterns or stages during development or formation: forming, storming, norming, performing, and adjourning (Tuckman and Jensen, 1977).

1. **Forming:** This is the stage when members get to know themselves, make contact, and indicate interest to come together to achieve individual or collective goals/ concerns. There is limited participation, no agreement on group aims, goals, or concerns, and roles of members are not defined. The facilitator is looked up to for guidance and direction, and members are only beginning to consider the task ahead and discuss the purpose. It is a good time for the group facilitator to open up discussions around the mission and address ground rules.

2. **Storming:** At this stage, communication patterns start to emerge, and members indicate interest in roles and positions. There may be arguments and conflicts among members over leadership, power, and authority. Some group members clash personally, professionally, or both; take offense at another's communication style, work attitude, etc. Thus, the stage is characterized by intra-group conflict, competition, and disharmony; and preliminary ground rules of purpose or behavior are damaged. This stage moves into mutually agreed-upon role definitions, and clarity of purpose increases, though with much uncertainty. To advance to the next stage, group members must move from a testing and proving mentality to a Problem solving orientation, remain focused, and be amenable to compromise to advance. It is also an opportunity for the facilitator to empower the group.

3. **Norming:** This stage is marked by greater cohesion and fewer pressures and conflicts with the establishment of norms and practices. Members accept roles and responsibilities, express willingness to change their preconceived ideas, and resolve interpersonal conflicts. They are also open to one another, share feelings and ideas, solicit and provide feedback to one another, and explore actions related to the tasks at hand. Group members participate in decision-making collectively and are committed to working to achieve group goals and objectives. Members are loyal to leadership,

the leaders facilitate the group activities, and leadership is also taken in turn. It is the "honeymoon" period.

4. **Performing:** This stage is anchored on the relationships and interdependencies established at the storming and norming stages. Members exhibit increasing interdependence – they have a shared vision, are unified, loyal, and supportive; and they focus on Problem solving and task completion. Members take on the roles to fulfill their responsibilities, exploring established relationships. Issues or conflicts that come up while the group moves on are resolved quickly and positively through dialogue. Group may function on its own, without interference from the leader at this stage and beyond. Roles and responsibilities are flexible.

5. **Adjourning:** This is also referred to as deforming, transforming, or mourning. At this stage, the group has realized their object and common interest and moved on to new concerns with a deep sense of achievement. The group may be dissolved, become dysfunctional, or members withdraw their allegiance. In rare cases, some groups may continue to function and diversify group activities. Others may transform to another stage, becoming and functioning as independent associations or registered groups, while some may regress to earlier stages of group development --. for example, cooperatives and farmers' groups.

Skills for Facilitating Group Development

Extension workers perform crucial roles at the various stages of group development. They need critical skills and competencies for the effective facilitation of the processes (Table 4).

Table 9.4: Roles and Skills for Group Development

Group development stages	Role of facilitators/extension agents	Skills and competencies
Forming	Keep the group focused; encourage patience, adaptation to the early challenges of becoming a group. Share experiences to motivate the group to progress.	Facilitate inclusiveness in membership, identify members' talents, facilitate decisions on the purpose and targets of the group, and promote and model good communication.
Storming	Manage conflict, tension, and disagreement, boost the morale/confidence of leaders, and facilitate the participation of all members.	Understand power dynamics, facilitate group processes, promote participation by all, have good communication/ listening skills to harness diverse ideas, manage conflicts or biases.

Norming	Impact management skills such as leadership, committee formation, Problem solving, and decision-making, engage members to collaborate and work as a team.	Demonstrate egalitarianism, fairness, members' acceptance, collaboration, facilitation of activities, Problem solving, teamwork, and leadership skills.
Performing	Encourage feedback, evaluation of progress/activities and performance; capacity building/empowerment of group members.	Monitoring and evaluation skills, group dynamics, creativity, and innovativeness,
Adjourning	Play advisory and motivational roles; facilitate group transition and decision on the next destination and how to reach it.	Networking skills, creativity, and innovativeness, facilitation, Problem solving skills.

9.17 Facilitation Skills

Agricultural extension strategies, methods, and approaches have evolved over the years. There has been a paradigm shift from the conventional extension approach -- top-down technology transfer -- to facilitation, where farmers and their groups identify problems and achieve their goals by themselves. Facilitation includes empowering and assisting farmers in forming groups, dealing with marketing issues, addressing public interest issues in rural areas, and collaborating with multiple service providers and other agencies in rural development. Thus, there is a need for extension professionals to update and acquire relevant skills and competencies including facilitation skills to improve performance and efficiency on the job. Knowledge of the facilitation process capacitates extension professionals with skills to assist groups through processes that will result in the attainment of group goals and a common interest (e.g., farmers' group, community group, workshops/training, committees, stakeholders' meeting).

What is Facilitation?

The word "facilitation" came from the middle French word "facil" and the Latin "facilis", meaning easy to do; and from "facere" to do or perform. Facilitation focuses on the design and management of group processes and dynamics, and it influences how members work together to achieve success. In a broader sense, the facilitation process is for generating ideas, involving people, getting a wide view on a topic, gaining commitment to a course of action, selecting preferred options, making simple decisions, and building teams. It is not for changing people's views, persuading people, focusing on an individual, giving people information, or dictating behavior.

Facilitation aims at supporting the work of different types of teams in solving most complex problems and in developing decision solutions (Murray and Blackman, 2006), and are designed to help make

groups perform more effectively (Auvine et al., 2012). Facilitation processes create an atmosphere to enhance groups, solve their problems, generate new ideas, and support and enable individuals and groups to take responsibility and ownership for their decisions and learning. It ensures that (a) the right resources are in hand and being used; (b) useful information is generated, shared, and used; (c) quality decisions are made; (d) quality decisions are implemented, and (e) desired outcomes are realized. Facilitation skills are useful for organizing meetings, planning/implementing group/ agricultural/community programs or processes, training, mobilizing resources, and resolving conflict.

The key functions of facilitation are:

- To serve the group.
- Understand the goal of the group or meeting.
- Keep the meeting on the agenda and ensure ideas represent the group.
- Ensure participation of members, understand and manage individuals in the meeting, including identifying and encouraging the quiet members and controlling the domineering ones.
- Make sure that the decision is made democratically and achieves the desired result.
- Ensure that outputs are captured and presented in an easily understandable form.

Importance of Facilitation Skill in Extension

Developing facilitation skills is crucial for today's agricultural extension and advisory services given the changes in extension systems, the operational environment, labor market, clientele system, and current food system. Firstly, agricultural extension organizations and services have witnessed new trends emerging across the world, such as privatization, decentralization, participation of beneficiaries, and pluralism (Suvedi and Kaplowitz, 2016), with new roles for extension including facilitation of programs rather than linear, top-down technology delivery in which the farmer is treated as a passive recipient.

The agricultural food system comprises several actors and their interactions in getting food from farm to folk; input, production, processing, packaging, and marketing to consumers are evolving. Agricultural extension professionals perform several roles in the entire process, including facilitation of interaction, knowledge and information sharing, networking, and collaboration for capacity building of the systems and empowerment of the individual actors to efficiently contribute to the functioning of the whole system.

There is increasing emphasis and prominence on the participatory approach to agricultural and rural development across the globe, which has led to the popular use of groups in development initiatives. Groups have common natural problems to overcome: drifting focus, misunderstanding communication, conflict, the struggle for power and control, difficulty reaching consensus, uneven participation, and frustration with obtaining a commitment to

follow-up action. These features make the role of extension workers as a facilitator imperative for effective group processes and performance. Facilitation of the group process creates leadership opportunities, individual and chain capacities, and empowerment of groups to take on responsibility and ownership.

The declining dominance of public extension and the proliferation and participation of private sector organizations and NGOs/ farmers' associations in agricultural extension and advisory services demand a shift in the roles and skills of extension educators. The public-private partnership to plan and implement development programs for communities or groups is gaining ground, with extension workers deploying or recruiting as facilitators.

Principles of Facilitation

Facilitation is a type of leadership role that concerns what one does with a group rather than what one does for a group. It is therefore related to certain values or principles which should be upheld by both the facilitator and the group. These values are enumerated by Auvine et al., (2012) as follows:

1. **Democracy:** A facilitator should ensure equitable participation and collaboration processes. She/he should focus on how people participate in the process, ensuring a comfortable and safe environment, without prejudice. The group participants share roles, prepare the agenda, and develop goals by consensus. No hierarchical structure is required.

2. **Responsibility:** An individual is accountable to her/his life experiences and behavior including participation in a meeting. Responsibility to people should be based on what they are prepared and able to do at the moment, and it could increase with experience. Similarly, the facilitator is answerable for his plans, what he does and how it affects participation, processes, and content.

3. **Cooperation:** The facilitator and participants collaborate to achieve collective goals. The facilitator works with a group and not for a group.

4. **Honesty:** The facilitator should be honest and able to set expectation standards for all participants. This involves self-awareness, knowing your abilities, and not attempting to go beyond your capabilities in the role of facilitation.

5. **Egalitarianism:** Each member has something to contribute to the group and is provided a fair opportunity to do so. The facilitator does not know it all and should not dominate the discussion. Both the group and the facilitator can learn much from each other. At the same time, every member has the right to withdraw her/his participation at any point in a meeting.

Philosophy of Facilitation

1. **Facilitation is Anchored on the Principles of Adult Learning (Andragogy):** Understanding those principles is critical for a good understanding and practice of facilitation. The principles of adult learning recognize that adults learn best when:

(a)   They are motivated, not coerced or forced on the basis of the context, relevance, and involvement level of work. Adults are interested in the usefulness, appropriateness of tasks, timeliness, and problem-centeredness of work, etc.

(b)   Learning is conducted in a group or partnership, where each individual brings resources and expectations, and direction and methods are negotiable.

(c)   Learning is interactive and experiential. The learners need to use their five senses while listening, talking, doing, watching, moving, or reading, and Adults should be engaged, use their senses, and utilize their knowledge and skill.

(d)   Learning provides reinforcement and clear structure. Learners need to understand the structure -- where they are going, and where they have been. New ways, new ideas/skills. They need continual reinforcement and feedback.

(e)   People's attention and energy stay engaged and focused. This is a function of the physical and psychological environments where learning occurs.

2.   **Group Dynamics and Problem Solving:** Good facilitation needs a good knowledge and understanding of group dynamics because it drives the group processes and the task work. This includes understanding the stages of development, group roles, psychosocial issues, leadership, communication patterns, participation, decision-making processes, conflict management, and task in progress.

3.   **Process Consultation:** Facilitation with groups involves assisting them to work with processes that are healthy and that enable groups to achieve their desired outcomes. Process consultation involves intervening in the ongoing flow of work to help the group learn about its processes and subsequently take group action to change the processes in ways necessary for the group's success. Rather than providing solutions and answers, facilitation leaves the group with ownership of the problems and the responsibility of resolution. Hence, it is non-prescriptive and educative, helping people to build the capacity to manage processes, both task-related and interpersonal.

Difference Between Teaching (Pedagogy) and Facilitation (Andragogy) Approach

Based on the principles discussed above, facilitation (andragogical approach) differs from formal teaching/lecturing (pedagogical approach) in the following ways (Table 9.5).

Table 9.5: Differences Between Teaching and Facilitation

Criteria	Trainer/Teacher (Pedagogy)	Facilitation (Andragogy)
Learning vs. Thinking	It is about passing on learning (starting from own knowledge); the teacher brings extensive knowledge of the subject.	Facilitation is about assisting to brainstorm in a group (starts from the knowledge of the group); the facilitator encourages and values different views.

Hierarchical vs. collaborative	Training is a hierarchical model. The teacher is on top as the sole source of knowledge; the student is the recipient under a formal relationship.	Facilitation is collaborative. Facilitator assists groups in addressing issues identified by them or their community; it promotes equality and relationships based on trust, respect, and a desire to serve.
Applying vs. communicating	The trainer helps the group to apply for the content she/he has given them.	In facilitation, good communication and sharing of ideas in the group are paramount, not reinforcement of concepts by a facilitator.
Linear vs. flexible	Information flows in one direction; training is linear and based on the teacher's outline.	The agenda for facilitation is flexible because the group process is not predictable. It is interactive, and ideas/information flow in many directions among members/participants and facilitators.
Long-term vs. immediate	A trainer focuses on achieving a long-term outcome and is concerned with students understanding the right answer.	As a process facilitator, one looks for short-term insights and, often, immediate results. The facilitator draws out and builds on the knowledge of the group and knows where to find further information on the subject.
Proximity	A trainer works for the community and may come from outside the community.	A facilitator works with the community and may come from within or outside the community.

Source: Auvine et al., 2012; MacKay, 2017

Facilitation Skills

The extension worker as a facilitator performs the role of empowering participants to learn in a group. She/he acts as an enabler, supporter, team builder, problem solver, conflict manager,

encourager, motivator, counselor, etc. Therefore, in addition to know-how skills, an extension worker needs several social skills to be an effective facilitator of groups and agricultural programs (Farrington et al., 1998):

1. Communication skills (aids mutual understanding).
2. Affective skills – skills in dealing with emotions in the group.
3. Cohesion-building skills.
4. Problem solving skills.
5. Information management

1. ***Communication/listening skills:*** Communication skills are skills used to aid mutual understanding. It promotes group understanding and group-level responses. This involves the use of active listening skills and observation of behavior, relevant enabling questions, focus on what others are saying, paraphrasing, and summarizing. These skills enable a facilitator to aptly pick information and respond to individual and group verbal and non-verbal communications. Good communication skills will help the facilitator to demonstrate that he is involved and interested, and that he values individual and group contributions and understands positive intent behind objections and potentially helpful interventions.

Box 9.3: Other Communication-Related Tips for Good Facilitation

- Make clear your role as a co-learner, not a teacher, by your behavior.
- Focus on the goals of the group and see members' roles as supporting the group.
- Be aware of your eyes: keep eye contact with the audience.
- Be careful about your voice: do not talk too loudly, too softly, or too much.
- Consider your body language -- your posture and mannerisms -- to avoid a wrong impression.
- Be cognizant of your responsibility: encourage the participation of everyone, discourage argument, but promote divergent views or ideas.
- Take charge of the process. Explain and summarize when necessary, decide when to extend a discussion and when to seek consensus agreement and win-win solutions.
- Work hard to build and maintain empathy with the learners so they see themselves as valuable, respected parts of the group.
- Encourage feedback on every aspect of the session.

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2. ***Affective skills:*** Facilitation involves the softer side of human emotion, psychology, and relationship. It involves the capability of the facilitator to create and sustain a non- violent, honest, supportive environment for members in the group. Part of that is identifying and curbing unruly behaviors. Facilitation is useful in assisting the group in exploring, interpreting,

reflecting, etc. The skill is applied through reaching for and exploring feelings, reaching for feedback, scanning, identifying non-verbal clues, etc.

3. ***Cohesion-building skills:*** This involves building rapport between facilitators and connections among group members to help them to function as a group, and share knowledge, information, and experiences. This is important because of the diversity among participants and changing composition. It helps the facilitator to understand the feelings of members, how they view things, and appropriate interventions to make -- when to pause, take a break, change direction, energize the group, move to another subject, etc. This may involve reminding members of foundational rules and goals, using inclusive words, making the identified problem a group problem, making a member part of the group, recognizing differences, summarizing, etc.

4. ***Problem solving skills:*** These skills facilitate discussion and address individual and group problems. This type of skill is evident in the ability of the facilitator to understand the process and content, and stimulate participation, inventiveness, and creativity.

5. ***Effectively managing information derived from facilitation processes:*** This helps to gather and analyze ideas/proposals/facts required to realize the objective of the group, remain focused, provide clarity, record contributions, keep accurate records for the outcome of the session, reference materials, keep the group sessions on track, etc.

6. ***Mastering questioning to draw out and explore issues with the group:*** This involves first helping the group to be at ease, and showing empathy As a facilitator, the extension workers should explore open and probing questions to manage the whole process of facilitation, getting people involved and building their knowledge, skills, and experiences. This skill helps to open discussion, explore wide perspectives and angles, make connections and links, clarify issues, and get real facts. Questions oil the process, bring people in, move the group forward, and explore a different direction (Lawson, 1996; Barman, 2013).

Types of Questions: The following types of questions ease the facilitation process:

- Open-ended questions: Questions that require detailed answers, not yes or no.
- Leading questions: Questions raised to provoke critical thinking about a specific topic and generate useful information.
- Probing questions: Questions asked to get more specific information and enhance deeper understanding and insight about the topic.
- Possibility questions: Questions asked to virtualize the outcome following the resolution of a problem (Ngwenya and Kibwika, 2016).

Tips for Effective Facilitation

- **Prepare:** A good facilitator prepares thoroughly. Preparations include good knowledge of what to discuss, how to introduce the topic, how to increase understanding and application to issues, and how to record views of group members, among others.

- **Be flexible:** A good facilitator should have adaptive skills. He/she should be ready to make necessary adjustments and changes based on the needs and interests of individuals or groups being facilitated.

- **Be energetic:** A facilitator of extension programs or groups should encourage active participation and stimulate critical thinking through questions, using open and probing questions to explore issues. A facilitator should watch the group's body language (bored/ confused faces, restlessness) and know the appropriate interventions to get the group back on its feet or stop the meeting. Participants have to be excited and enthusiastic to keep the group and the discussion alive, active, and interesting.

- **Encourage humor:** Group members have different worlds of life -- culture, beliefs, attitude, experiences, etc. -- and so the atmosphere should be informal, where members are relaxed, free, respected, and valued, and can enjoy others' company and value one another's contributions. Humor helps achieve this, but it must not offend or alienate anyone.

- **Be clear:** A facilitator needs to have a good understanding of the task and the way forward and communicate this to members to arouse and sustain interest.

- **Think positive:** Facilitation is democratic and should encourage diverse views from the group and contributions from all members. In facilitation, everyone has useful knowledge, ideas, experiences, and contributions to make. A facilitator should aim to bring out the best in everyone (the dominant and the shy members) and help them fulfill their potential.

- **Manage time:** Facilitation is not easy because of the complexity of group dynamics. Getting groups to function as a productive unit, where members are supported and actively engaged to develop their initiatives and to begin to tackle their problems, is time-challenging. Therefore, effective time management is a critical skill for facilitators.

- **Be sensitive:** A facilitator should be able to observe and identify the moods and feelings of members, how they interact with one another, through both verbal and non-verbal communication. Apply a variety of techniques/tools, methods, and activities (ice breaker, brainstorming, etc.). People have different learning styles; variety keeps everybody involved and reinforces learning. Talking to the group instead of the blackboard keeps everyone involved.

- **Embrace your own mistakes and limitations:** The facilitator does not have all the answers but sees the group members as the experts.

Facilitation Techniques and Tools

To facilitate a meeting, group, or organization for change, an extension agent needs a variety of types of techniques and tools. In addition to the preliminary preparations of getting the environment ready -- such as providing writing materials (e.g., a chalkboard &chalk, flip chart, markers), a clock for time management -- she/he should choose appropriate tools/techniques for facilitating the

change process. The key basic tools include brainstorming, icebreakers, probing and questioning, visualization, process observation, and documentation.

1. **Brainstorming:** This is a technique of generating ideas and sharing knowledge to solve a particular problem. The facilitator invites participants or groups give suggestions or ideas on the topic. The facilitator encourages all participants to speak, say the first thing that comes to their minds, and uphold the flow of ideas. At this point, all ideas are good, and no one critiques or argues.

2. **Ice breaker:** It is useful to introduce participants to each other or to help them relax. It can also recapture the interest or focus of the participants and lead it back to the topic. The technique warms the learning environment, makes it exciting, and triggers the preliminary relation between facilitators and participants and among participants.

3. **Probing and questioning:** Questions are of various types depending on their purpose (see Box 4). Asking open-ended questions in a meeting helps a facilitator to generate useful information required to achieve change. To keep the participant focused on the topic, a facilitator can ask leading questions. When the problem or topic is clear, the possible questions are used to motivate the participants to start thinking of a solution.

4. **Process observation and documentation:** The facilitator should observe how the process of development happens over time. This informs future decisions on areas of concentration for change. She/he also records these observations either as minutes of a meeting or a personal record of observations.

5. **Visualization:** This means forming an image of what we are targeting and how to achieve it. A facilitator can help the group to think about the benefit expected if they take a particular course of action. By this, participants can form a mental picture/image of the outcome of their identified goal or development process and how to get to that outcome. This technique sustains interest and needs action for positive change.

Qualities of a Good Facilitator

To effectively facilitate community development initiatives, groups, or agricultural programs, extension workers should demonstrate the following qualities:

- A communicator/listener (use good communication tools, observation, questions, paraphrasing, etc.).
- Humble/willing to learn from his mistakes (share the position of learner with the group and is open to correction).
- Patient and understanding (permit/listen and note views of everyone).
- An encourager (provokes, energizes, and promotes fair and active participation in group process).
- Affirming everyone's knowledge (ensures everyone's idea/view counts).

- Confident (has good knowledge of both the content and process, the interest/goals of the group).
- A good motivator (can keep the group process exciting, interesting, free, open, and captivating, and build trust and respect).
- Good at summarizing others' ideas (records ideas as submitted by group members and summarize to help decision-making).
- Inclusive (ensures participation of diverse group members)
- Sensitive to the needs of others.
- Understanding and accepting.

How to Facilitate Meetings/Workshops/Programs

Preliminary plan

Extension workers are often faced with the role of facilitating farmers' groups, training, or workshops for farmers. This will require good planning, focusing on three important areas; climate and environment, logistics and arrangements, and ground rules.

1. ***Climate and environment:*** The environment for a meeting or workshop is important because it sets the tone for the participation of individuals, and it should be comfortable and safe to foster the expected interactions. A good environment should be:

   (a) Familiar (provide comfort for good interaction).

   (b) Accessible to everyone, even to people with disabilities.

   (c) Appropriate size (space provided should be proportionate to the size of the group to eliminate or reduce discomfort and interruption through the unnecessary movement of people and chairs).

2. ***Logistics and room arrangements:*** Extension workers should provide basic logistics for effective facilitation. Also, the arrangements of chairs affect the efforts of the facilitator to encourage active participation of all, the domineering and the quiet members, for good team decision-making. The room should provide:

   (a) Good chair arrangement: The chair arrangement should be in a circle or around a table depending on the goal/purpose of the meeting. This aids in a feeling of equality, familiarity, and ease of discussion of a group; a lecture style arrangement can appear too formal and may be intimidating.

   (b) Places to keep materials used to promote learning or documents of groups.

   (c) Refreshments: This is important especially when the meeting will take some time and involve some activities. Make adequate arrangements related to what to provide, who will supply them, when and how to distribute them, and clean up afterward.

   (d) Set up and test a microphone and any necessary audio-visual equipment before the meeting.

3. ***Housekeeping rules (ground rules):*** Ground rules are operating rules generated by a group to enable the management of group dynamics for effective facilitation. Ground rules foster the flow of ideas, encourage members to participate, and help to control the influence of personality traits (introvert and extrovert) on processes and outcomes. The group can develop their ground rules or develop them together with the facilitator (see Box 9.4).

Box 9.4: Examples of Ground Rules

- One person speaks at a time.
- Raise your hand if you have something to say.
- Listen to others when they speak.
- No mocking or attacking other people's ideas.
- Respect each other.
- A maximum of 5 chances for an individual to speak.

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4. ***Start the meeting:*** Start the meeting on time to encourage early comers by welcoming those that have arrived by the starting time. The following steps should lead to fruitful facilitation:

   (a) **Introduce people:** The kind of introduction depends on the kind of meeting, the number of people, the goals of the meeting, and the kind of information useful to know. The facilitator should provide a guide on the kind of information required such as names, organization/occupation, and other issues related to the purpose of the meeting. Sometimes introduction can be combined with an icebreaker (to build familiarity, create networking, build team spirit, shift roles). Examples are pairing people to share information about themselves which they later share with the larger group; forming small groups and having them work on a puzzle after introducing themselves before they get to work; have everyone in a large group writes things about him/herself (true and false) and later read to the group for others to guess what is true about the individual; or have participants administer a survey to others and later share the results with the large group. Also, the facilitator must remember to introduce him/herself to establish credibility and confidence in the group.

   (b) **Review agenda, objective, and ground rules:** This is important to ensure that everyone agrees with the agenda and knows the goals and expected outcome of the meeting.

   (c) **Encourage participation:** This is where the facilitator demonstrates relevant skills to ensure the participation of everyone, and the interaction of people to share experiences and ideas. Everyone should participate (shy/quiet and domineering people alike), and their views respected. The facilitator should stick to the agenda of the meeting but maintain some level of flexibility in case an unexpected and important issue arises.

(d) **Seek commitment:** This could be in response to a decision made in the meeting or the key goal of a meeting. The facilitator should encourage people to volunteer to assist and assume some roles/tasks. Everyone should be involved, and a record made of e people's names against the task they accepted to undertake.

(e) **Bring closure to each item:** With each deliberated issue, before going on to another, the facilitator should help the group summarize the consensus position or assign group members to do so. Voting is another option. (The ground rules should spell out whether a simple majority or a larger fraction of the total participants makes a vote valid.)

(f) **Summarize the meeting results and the needed follow-ups:** Reflect on the goals, how much was achieved, and how successful the meeting was.

(g) **Thank participants and close the meeting:** Participants could be given a few minutes to express their feelings about the meeting, the processes, and the outcome.

Challenges in Facilitation

1. **Taking control:** There is always the temptation to control discussion and influence the decision of the group. This is even more evident where the extension worker lacks good communication skills to steer and energize or stimulate productive discussion and participation of members. Most times this happens with the genuine intention to help the group move forward.

2. **Difficult questions:** Facilitators are sometimes faced with difficult questions that challenge their knowledge of a particular subject, concept, or language. This requires that they be familiar with the content and understand concepts and language. Facilitators should read the discussion materials, anticipate questions, and prepare likely responses. It's OK for a facilitator to say she/he does not know the answer and will make a further search.

3. **Managing conflict:** Conflict is inevitable in the group because members may share diverse ideas and sometimes conflicting ideas on a topic. A facilitator needs to be sensitive to possible differences and tensions and encourage people to work through them. To manage or resolve the situation, the extension worker facilitating the meeting should do the following:

   a) Accept the fact that there is conflict.

   b) Ascertain the reason for the conflict.

   c) If a conflict arises in the topic in question, help participants to agree or reach a compromise, and foster mutual respect.

   d) If a conflict is not related to the topic but concerns a few group members, encourage them to resolve this disagreement later outside of the group setting.

4. **Handling dominant people:** Sometimes, some persons/person dominate the discussion, confident that they have all the right answers. To create a free atmosphere for everyone to speak, divide into small groups and call on members by name. Another option is to introduce a quota system (each person has a limited number of chances to speak and ceases when the chances are exhausted).

5. **Working with shy/quiet people:** These are members who may be very shy or lack the confidence to express their views or relate their experiences in a group. A facilitator can divide the large group into smaller groups or ask people to discuss questions first in pairs. Referring to and using their views gives them a sense of belongingness and confidence. The following strategies are useful:

a) Encourage them individually, within and outside of the group.

b) Ascertain why they are silent.

c) Give notice ahead of time to help prepare before the time.

d) Assign them roles such as note-taking and feedback).

e) Place them in a supportive group.

f) Give them time.

g) Employ role play to build up confidence and skills

9.18 Conclusions

Extension works in ever changing agricultural food systems and is often faced with challenging situations or problems in the field. Creative and innovative skills aid the functional and operational management of affairs in an extension organization. Critical thinking skills require us to collect and evaluate information from a variety of sources. It is a skill that has to be learned and improved over time through practice. It is therefore important for us to understand what it is and how we can improve our critical thinking skills for greater personal success and success as members of our organizations and communities. Agricultural extension professionals need to have good Problem solving skills to deal with their own problems as well as those related to their work. Farmers also need help to enhance their Problem solving skills so as to better cope with their challenges and be more successful in achieving their goals. People with high flexibility skills are highly valued in their organizations. They are accommodating and tend to get along well with others. Agricultural extension and advisory services require an atmosphere of collaboration, teamwork, friendship, and positivity to achieve the expected outcomes. The attitude of an extension worker to his job, clients, or team defines the success or failure of the system. Extension workers need to develop positive attitudes to create a good working environment, build a dynamic team, achieve set objectives, and increase overall productivity of the extension services. This will involve developing traits such as empathy, caring, integrity, accountability, good communication, and others intrapersonal and social traits. For agricultural extension professionals, self-motivation is a critical skill that they should enhance, given the critical role that they play in serving small- scale, resource-poor farmers who in many cases are not able to pay for the services rendered. Everyone suffers from stress, and it is not possible to eliminate stress in life. Therefore, stress management is a critical soft skill that we need to cultivate if we are to be effective in life. It is important to recognize when you are stressed and also identify the possible causes of your stress. Applying techniques that help to avoid stress can help you to prevent some stresses from coming into your life. Where there is stress, there are also a number of techniques that we can use to minimize the amount of stress in our lives and/or reduce the negative

effects of the stress upon us. Effective time management is a critical skill for extension professionals and can enable them to be more productive. This is especially critical in countries where the number of extension agents is normally far below the requirement. The few extension professionals who are available have to maximize use of their time to effectively deliver services to as many farmers as possible. Each person has to identify the time management strategies that work best for him/her and apply them as effectively as possible to enhance his/her productivity.

The current pluralistic extension system requires that stakeholders in the agricultural extension and advisory service collaborate to reduce cost and duplication of efforts, and to enhance efficiency of service delivery. Collaboration is also important in the face of scarce resource and steady decline of public funding for rural and agricultural development. Collaboration takes many forms, and extension professionals need to develop requisite abilities to collaborate for greater impacts of extension services. Collaboration can be among extension professionals and between groups and organizations to explore strengths and opportunities, and to overcome weaknesses and threats to achieving a task, reaching goals, or addressing a problem. For organizations or professionals to effectively collaborate, there must be a shared interest, resources, division of roles, accountability, and trust. To reach out to clients more effectively and collaborate with other agencies, extension agents must embrace the paradigm shift. Education of rural farmers has been a core mandate of extension work, and this can be further enhanced through networking among service providers. Besides other numerous advantages, networking can curb the effects of funding and understaffing challenges that have bedeviled the system. It is useful for enhanced performance and personal and professional development of extension workers. Extension will be expected to take on roles beyond that of the expert of the past, to become the change agents of the future, by exploring opportunities to network. Conflict is inevitable in extension service delivery because extension professionals work with and among diverse clientele and stakeholders with different interests, cultures, traditions, expectations, attitudes/beliefs, behavior, etc. Conflict takes place between groups, members of a group or team, employees in a workplace, organizations, communities, or among members of a community. In the same vein, sources of conflict vary, and the outcome can be destructive or constructive. How you manage conflict, the strategy and approach employed, determines the outcome, either constructive or destructive. When conflict is competently managed, it results in increased creativity, and a stronger and more dynamic group. Otherwise, it can sever relationships, hinder group function, and, in extreme cases, lead to extinction or dissolution of groups. Negotiation is a process that can be approached in many ways. No matter what strategy you choose in your extension role, success lies in how well you are prepared. Negotiation is important in corporate organizations to avoid conflicts and improve relations among employees. The key to negotiating a beneficial outcome is the negotiators' ability to consider all the elements of the situation carefully and to identify and think through the options. At the same time, negotiators must be able to keep events in perspective and be as fair and honest as circumstance allows. Because a common ground or interest has brought the parties to the negotiating table, a negotiator can benefit by trying to capitalize on this common ground.

Extension negotiators should look at the other side as a partner rather than an opponent, and by working together, negotiators have an opportunity to craft a solution that will be beneficial to both sides. Leadership is a key soft skill for successful extension work. It is not primarily about position but should involve building relationships, leading by example, and investing in developing others into leaders. Extension professionals should therefore understand the importance of leadership and aim at improving their leadership skills so as to be effective leaders. Effective teamwork is critical to the success of teams, whether they are families, farmer groups, community organizations, or work-related teams. Extension professionals are members of diverse teams. As a team member, it is important to understand your role and contribution towards the success of your team. You should also understand how you can improve your teamwork skills and strive to develop them so as to contribute better to the success of your team. This is especially necessary in the workplace where extension and advisory services are critical intermediaries in the agri-food systems. Extensionists also need to help the farmers they work with to work better in their teams. The group is a veritable tool in the era of participatory approach to research and development for several purposes including economy of scale, cost effectiveness, ease of access to services and information, capacity building, and sustainability of development efforts, among others. It is a mechanism for effective farmer-to-farmer exchanges of information, experiences, mutual help, and empowerment. Extension works with groups and facilitates formation and development of functional groups for agricultural and rural development. There are many types of groups, but the formation and development of all groups follow a similar pattern. People come together to form groups to achieve a common interest/goals. Extension agents need good knowledge and skills to facilitate group formation, development, and processes, focusing not just on the group outcomes but, more importantly, on the processes of achieving the outcomes. Facilitation skill is a critical competency for effective performance of extension and advisory services in the 21st century to meet the needs of diverse stakeholders within the changing agricultural extension paradigm. Extension professionals facilitate groups and community/private/public programs. Good facilitation skill promotes and fosters innovative ideas, inclusiveness, participation, commitment of a team or group to a preferred course of action and efficiency of group process. It helps to achieve team cooperation and empowerment and address collective problems and concerns of groups.

9.19   Self-Assessment Exercises

1. Define creativity. Write about the importance of creativity in extension work.

2. Write the distinguishing characteristics of critical thinking. List the common critical thinking dispositions.

3. Discuss the main approaches in problem solving. How can extension programs benefit problem -solving skills?

4. List the benefits of flexibility. How would you improve flexibility skills?

5. Discuss the concept of positive attitude with implications to extension work.

6. How can extension workers be self -motivated? Illustrate with examples.

7.   What are the different forms, components, and causes of stress? Discuss the signs and symptoms of stress.

8.   Discuss the benefits and strategies of time management.

9.   What is collaboration? Why use collaboration in extension work? Illustrate with examples.

10.   Define networking. Discuss the types and importance of networking skills for extension.

11.   What are the various sources of conflict? Explain the types and principles of conflict.

12.   Discuss methods/approaches for managing conflict with suitable examples.

13.   What is the importance of negotiation at an extension workplace? Discuss the seven steps to negotiating successfully.

14.   Differentiate between various leadership styles. Explain the qualities of a good leader.

15.   Discuss the importance of teamwork in extension work.

16.   Why are groups formed? What are the different types of groups? Discuss roles and skills for group development.

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Agribusiness, Marketing, and Value Chain Development in Extension: Skills and Competencies

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10.0 Learning Outcomes

- Understand the concept and dimensions of agribusiness, different markets, agricultural value-adding process, record keeping, and what the management thereof entails.
- Discuss the influence of agricultural policies on an agribusiness.
- Demonstrate the importance of business ethics in agriculture.
- Manage key financial records.
- Analyze market trends and assist farmers in designing/accessing a value chain.
- Formulate a marketing strategy.

10.1 Introduction

Modern day farmers no longer farm in a protected, uncomplicated environment. They are exposed to global market influences and must manage many components of their farming business, irrespective of its size. Many are no longer just involved in primary production (farming business) and have evolved to manage an agribusiness. Agribusiness encompasses all the different businesses involved in taking the raw product produced on the farm and processing it into a product delivered to the final consumer. This includes manufacturing and distributing farm supplies, value addition, marketing, and entrepreneurship. It demands management skills that most farmers were not formally taught anywhere.

Direct marketing and value chain development have become imperative for farmers across the globe. Farmers must increase their share in the consumer dollar to ensure the sustainability of their farming operations. Effectively marketing their products and moving further along the value chain can assist in achieving it. Modern-day agricultural extensionists must aid farmers in this process and can do so only if they have sufficient knowledge of the topic. This chapter outlines the agribusiness, marketing, and value chain development skills involved in assisting farmers in the process (Box 10.1).

10.2 Agribusiness Management in a Changing Environment

The environment that agricultural production takes place in is constantly changing. Improvements are continuously made in production methods, technology, and input formulation. Farmers find themselves amidst climate change, globalization, and population growth. The farm business manager must make regular decisions based on available information to be resilient and survive.

A farmer that wants his/her business to progress must be up- to- date with the food demands of consumers, technological advancements, and climate and market forecasts, to name a few. He/she must manage change, risk, and human resources. His/her skill set has to include financial planning and marketing. He/she is not only farming but also managing a business. From there, the term "agribusiness". Davis and Goldberg (1957) defined agribusiness as *"… the sum total of all operations involved in the manufacture and distribution of farm supplies; production operation on the farm; and the storage, processing, and distribution of farm commodities and the items made from them…".*Additions and changes have since been made to the definition to include all the organizations involved in the agricultural value chain and related products and services (Van Fleet, 2016).

An agricultural extensionist assisting the farmer plays a major role, especially in rural areas where farmers are often isolated. He/she is tasked with guiding farmers who have or want to take their business forward.

10.2.1 Elements of a Successful Agribusiness

To be successful, the agribusiness manager must be able to carry out the five tasks for each of the four basic functions of the agribusiness: marketing and selling, production and operations, financial management and planning, and human resources management (Maqbool & Adeel, 2022).

As with any other business, a farmer wants to maximize profit. To achieve this, he/she must choose the right combination of enterprises, given the area and climate that he functions in. Profit is usually measured using **annual net farm income**. Net farm income takes both cash and noncash (change in inventory, household use, etc.) sources of income into consideration. The extensionist must understand that each farmer and his/her family have unique income needs. Some farmers want to expand; others are satisfied with reaching a specific goal and maintaining it. Some farmers want to increase net worth (the difference between assets and liabilities), which sometimes conflicts with maximizing profit as debt is minimized wherever possible.

A successful agribusiness manager manages **physical, financial, and human resources** to deliver a product to a customer while making a profit.

Financial sustainability is a prominent element of a successful farming business. A farming business that can survive the unexpected, such as weather disasters (drought, floods, hail), livestock diseases, and crop failures, will be able to continue for generations to come. Another important element of a successful farming business is manageable debt. The debt's annual or monthly repayment requirements should be well within reach of the business to avoid financial stress.

An extensionist should be sensitive to a farmer's individual goals and needs. Some farmers want to maintain a certain lifestyle, others want to provide service to their community, and some have extended families to care for. These needs must be incorporated into their planning.

10.2.2 Essential Managerial Skills for an Agribusiness Manager

A successful agribusiness manager is:

- Producing products cost-effectively.
- Resilient, adaptable, and able to facilitate change.
- An efficient communicator and negotiator.
- A good leader that can also work in a team.
- Knowledgeable in business ethics.
- A problem solver that can plan proactively, considering all the uncertainties of farming.

Although this sounds like a tall order, most of these skills and attributes can be developed through appropriate training.

The management process starts with planning. Planning must be done for the long term, medium term, and short term. The long-term plan will entail 3 to 5 years ahead. The medium-term plan will be for the year and the production season, and the short-term plan will be weekly and daily. In farming, a plan can be watertight just to be challenged by the unexpected the next day. A farmer must then formulate contingency plans wherever possible.

Planning areas are formulating objectives, planning the physical steps, doing the necessary financial planning, human resource planning, and marketing (Figure 10.1)
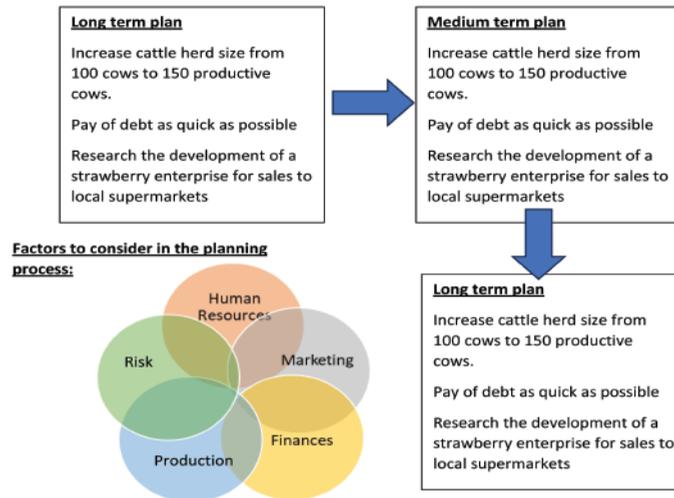
Figure 10.1: Practical Example of the Planning Process on a Farm

All the plans might be in place, but if the unexpected happens, a farmer must manage the implications. In the example above, if the strawberries suddenly develop a disease or a drought occurs and the cows need extra water, the farmer must manage the process. The management process to follow is illustrated in Figure 10.2.

Figure 10.2: The Management Process
(Source: Finance and Farm Management (Standard Bank, 2017).

10.2.3 Agricultural Policy and Agribusiness Management

Agricultural policy encapsulates a specific country's laws and regulations on domestic and international agriculture. It is implemented to regulate certain aspects of a country's food and fiber industry. Policies will usually be formulated around the quality of food, quantities exported/ imported, health standards, impact on employment, etc. The policy ca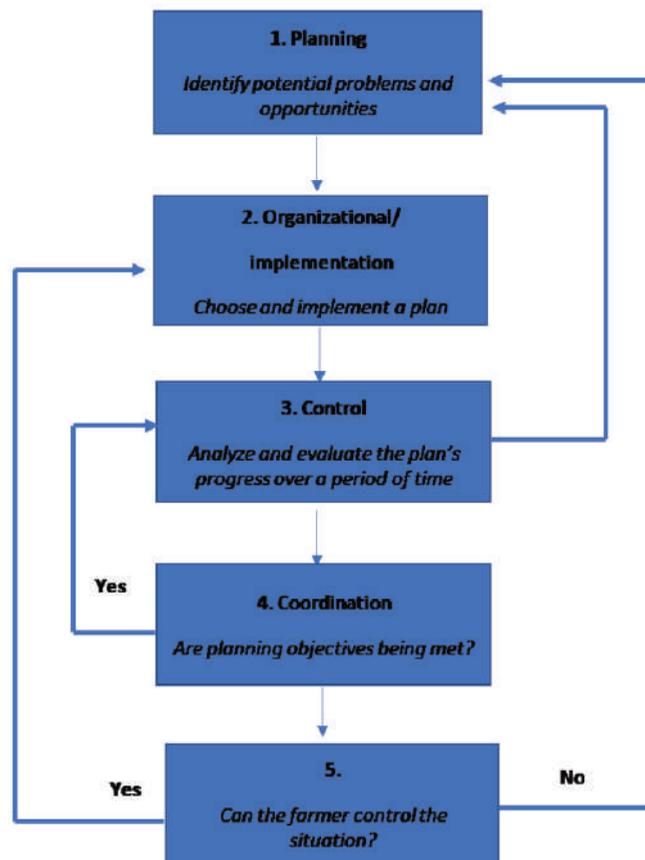n also focus on smallholder development, market access, food security, and environmental sustainability. Specific policies also guide empowerment of youth, women, and vulnerable groups.

For agribusiness management purposes, it is necessary to know the contents and understand the impact of the agricultural policies of the applicable country. Each country has its own unique policies. The agricultural extensionist must study the relevant policies of the country he/she works in to guide farmers in benefiting from and adhering to them.

10.2.4 Business Ethics in Agriculture

Conducting farming business ethically has become increasingly important to consumers and other businesses. Business ethics include:

- Being trustworthy.
- Being responsible.
- Acting fairly.

In agriculture, consumers are also increasingly demanding ethical production that entails humane treatment of animals, protecting the environment, and sustainable production methods. The agricultural extensionist should investigate the importance of these aspects in the market the farm is servicing.

10.3 Farm Business Financials and Record Keeping

A crucial part of any farming business is record keeping and financial management. The famous physicist Lord Kelvin once said: "To measure is to know. If you cannot measure it, you cannot improve it." With an efficient record-keeping system, a farmer will know whether the business is making a profit or operating at a loss, which enterprise needs improvement, and where to start.

10.3.1 Essential Record Keeping for Farming Purposes

The farmer needs an accurate record-keeping system on the farm to:

- Determine the profitability and financial efficiency of each product that is produced.
- Evaluate the efficiency of the farm business as a whole.
- Collect essential information for decision making and management purposes.

The categories of essential documents that make up the record-keeping system are illustrated in Figure 10.3 below:
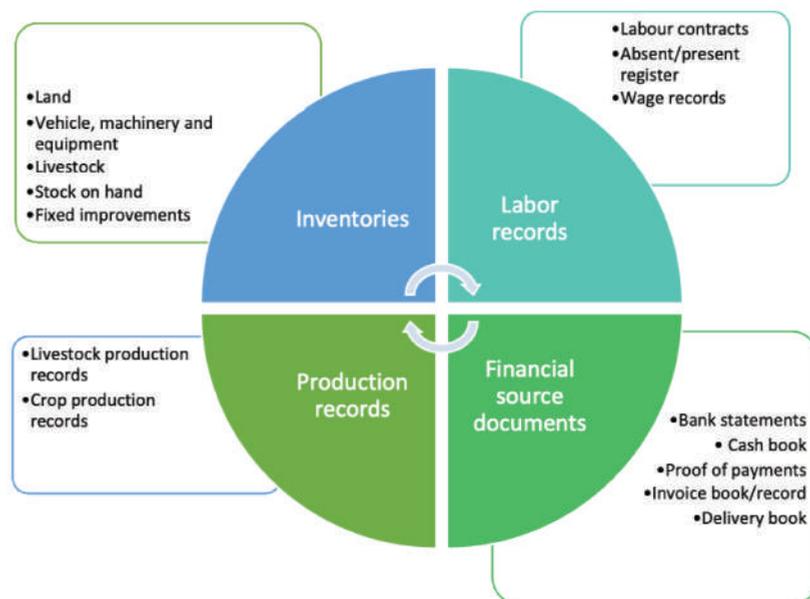
Figure 10.3: Components of a Farm Record System

Examples of extracts from each of the source documents are provided below. It should be noted that these are mere examples to guide the extensionist. Documents should be adapted according to farmer-specific needs and farming characteristics.

1. Inventories

An inventory is a document that records quantities of the assets of the farming business at a specific date of the year. It is used for management purposes and compiling the business's balance sheet. The farmer should update the inventory as changes occur to ensure that his/her records are up- to-date.

Land inventory Example

Financial institutions require a detailed inventory of the land. The land is usually used as collateral for loans. A typical example of a land inventory is provided below.

Name of the farm	Total size (ha)	Lands for cropping (ha)	Pasture (ha)	Other (ha)	Value ($)
Own land:					
Farm A	100	20	75	5	$100, 000
Rented or sharecropping:					
Total					

Fixed Improvements

An inventory of the fixed improvements on the farm is helpful when considering insurance. A typical example of such an inventory is provided below.

Item	Description	Current value	Notes
Homestead			
Shed	10m2	$10, 000	Stone walls and corrugated iron roof
Milking parlor			
Boreholes			

Vehicles, Machinery, and Equipment Inventory Example

The vehicle, machinery, and equipment inventory is useful for management purposes as well as insurance purposes.

Item	Description	Purchase value	Current value	Notes
Tractor	John Deere 1624	$5, 000	$4,000	300 hours worked

Livestock Inventory Example

Cattle

Breed	Number	Value per unit	Total
Stud bulls			
Other bulls			
Cows			
Heifers			
Bull calves			
Heifer calves			
Total			

Sheep

Breed	Number	Value per unit	Total
Breeding rams			
Other rams			
Ewes			

Wethers			
Weaned lambs			
Unweaned lambs			
Total			

Stock on Hand

Item	Quantity	Value per unit	Total value
Seed			
Fertilizer			
Fuel			
Feed			

2. Production Records

Crops

Records should be kept for each enterprise on the farm. For example, if a farmer is producing maize:

Field number:

Cultivar:

Size:

Date	Description	Quantity	Cost per ha
23/10/22	Tillage		
24/10/22	Planted seed	20kg/ha	$40/ha
	Applied fertilizer:		
	Lime	1 t/ha	$60/ha
	Nitrogen	50kg/ha	$20/ha
13/11/22	Sprayed for moth		
10/7/23	Harvested	4 t/ha	$200/ton
10/8/23	Sold 20 tons	$250/ton	

Through diligent record keeping, the farmer can easily make comparisons (between fields, between years, between cultivars) and have the information needed for enterprise budgeting.

Livestock: Cattle

Description	Number at beginning of the year	Sold		Bought		Slaughtered		Died	Other losses	Births	Final number
		Number	Value	Number	Value	Number	Value				
Stud bulls											
Cows											
Heifers, etc.											

Activity record

Date	Action	Description
22/11/22	Applied dip for ticks and lice	Deadline, entire herd
22/07/23	Weaned calves	Supplied weaners with production lick

Additional Information

Item	Number	Description/notes
Calves born, calving percentage		
Calves weaned, weaning percentage		
Average weaning weight		

3. Labor Records

The labor records typically include:

- Labor contracts: An employment contract for each employee, preferably formulated for the farmer by a labor consultant.
- Absent/present and leave register: A monthly register that records absenteeism and other incidents as well as leave taken.
- Wage records and salary slips: Calculation of employee salaries each month, showing gross numeration, deductions, and net salary payable.

4. Financial Record-Keeping Documents

A separate bank account for the farming business is advisable. This way, income, and expenditures can easily be traced and allocated. Important documents to keep include:

- Bank statements.
- Cashbook.
- Proof of payments.
- Invoice book/record.
- Delivery book.

A record-keeping system can be kept by hand or on a computer as long as it is done regularly and accurately and kept safe.

10.3.2 Enterprise Budgeting on the Farm

Farmers often ask extensionists:

- Which are the most profitable enterprises?
- Which crops should I plant?
- How many hectares of each should I plant?
- How many tons/hectare do I need to harvest to pay all my input costs? In other words, what is my break-even point?

The answer to these questions lies in enterprise budgeting. Constructing an enterprise budget for each product allows the farmer to determine profitability and do a sensitivity analysis. These are also called "What if" scenarios. For example, what if the fuel price increases -- what influence will this have on profitability?

> **IMPORTANT:** A budget is only as useful as its accuracy! A budget that uses inaccurate values/prices/yields will provide false and useless information.

Extensionists can usually obtain enterprise budgets for specific products and areas of production from public and private agricultural institutions. These can then be used as a framework for creating individual enterprise budgets. Templates for a typical crop and livestock enterprise budget are provided in Tables 10.1 and 10.2.

Table 10.1 Template for Crop Enterprise Budget

Item	Unit	Price per unit	Quantity	Value per unit in herd/flock
Gross income				
Total gross income				
Marketing costs				
Gross income minus marketing costs				
Directly allocatable variable costs				
Feed costs				
Animal health (dips, medicine)				
Laborr				

Transport				
Other				
Indirectly allocatable variable costs				
Fuel				
Repairs and maintenance				
Total directly allocatable variable costs				
Total indirectly allocatable variable costs				
Total allocatable variable costs				
Gross margin above total allocatable variable costs				
Margin above directly allocatable variable costs				

Suppose a farmer is unsure of the exact costs or income of a component in the enterprise budget. In that case, the extensionist can assist by collaborating with experts in the field and more experienced neighboring farmers.

Once the enterprise budget is compiled and the total allocatable variable costs are known, a sensitivity analysis can be done to indicate the impact of a change in yield and price. This is done by calculating the gross margin using different price and yield scenarios. For example:

for a wheat farmer with a total allocatable variable cost of $700/ha, the calculation is done as follows:

Gross income per ton – (costs per ha ÷ expected yield/ha)

E.g., $280 – ($700/1.5 tons)

= - $186.67/ton

In other words, if the producer receives $280 per ton of wheat harvested and harvests 1.5 tons per hectare, a loss of $186.67 per hectare will be incurred.

		Price/Ton			
		$280	$300	$320	$340
	1.5	-$186.67	-$166.67	-$146.67	-$126.67
Yield	2	-$70	-$50	-$30	-$10
(ton/ha)	2.5	0	$20	$40	$60
	3	$47	$67	$87	$107
	3.5	$80	$100	$120	$140

The farmer can see that he will start to make a profit only if he harvests at least 2.5 tons/ha of wheat. If the long-term average harvest in the area is below 2.5 tons/ha, careful consideration is needed before deciding to plant wheat. The farmer must consider the weather forecasts for the coming season -- will it be a dry or wet season? He/she must also consider the market forecasts for the season. Are prices expected to increase or decline?

Another budget useful in farm management is the partial budget. Management can use a partial budget to evaluate the profitability of a specific farm practice or enterprise that affects only a part or certain parts of the farm business.

A partial budget is used to test the effect of the proposed change on a specific part of the farm business on its profitability using only the relevant costs and income.

Typical uses include:

- Comparing cultivation practices (e.g., plowing versus no-till).
- Buying or leasing a machine?
- Determining or changing size of an enterprise.
- Replacing an enterprise.
- Introducing a new enterprise.

Method:

Current Product		Alternative Product	
Lost income:	A	Additional income:	C
Saved costs:	B	Additional costs:	D
Difference (sacrifice):	A - B	Difference (benefit)	C - D

The change will be advisable if the benefit is more than the sacrifice. The farmer should not execute the change if the benefit of changing to an alternative product is less than the sacrifice.

10.3.3 Cash Flow Statement and Budget

A wise man once said: "Turnover is vanity, profit is sanity, and cash flow is reality." An accurate cash flow budget is vital to indicate the monthly financial requirements of the farming business. A cash flow budget uses historic data and current estimates to plan ahead. Once the year starts, the actual figures are entered into a cash flow statement for comparison to the budget. A computer program such as Excel is a handy tool for compiling a cash flow budget.

Using the cash flow examples, the farmer can see that there are certain months when s/he will run into a deficit. S/he must therefore plan and arrange finance for those months. This will typically be done with an overdraft facility from a local bank. The bank will require him/her to provide the cash flow budget as a supporting document. The total cash flow column indicates whether a profit will be made for the year.

Once the year starts, the farmer can construct an actual cash flow statement, entering the income and expenditure every month. This can then be compared with the budget to determine if he/she is still within bounds or plan if the unforeseen occurs.

10.4 Marketing and Value Chains in Agriculture

Agricultural marketing involves all the steps and processes of delivering agricultural produce from the farm to the consumer. The product can be in its original form or processed/packaged/presented according to consumer preference. The commercial roadmap of food from farm to consumer is illustrated in Figure 10.4 below:
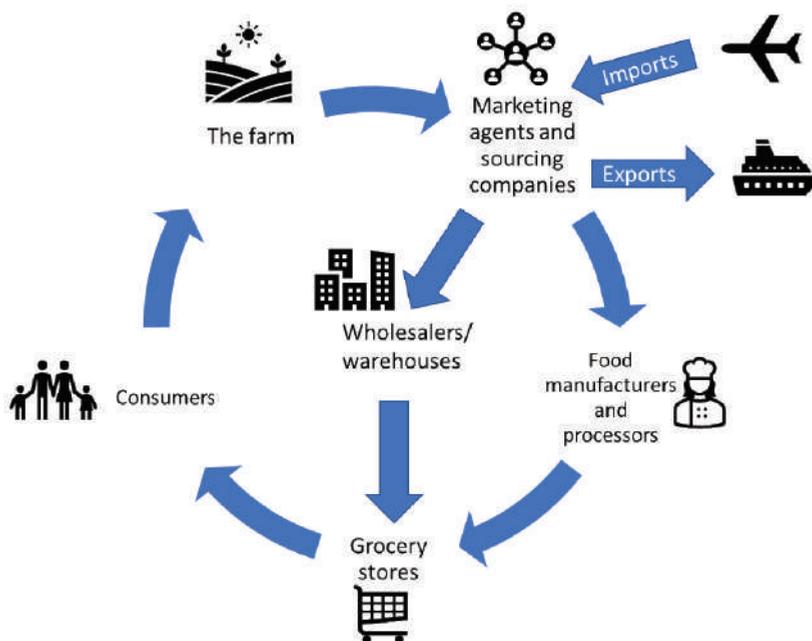

Figure 10.4: The Roadmap of Food from Farm to Consumer

Each step in the process above involves marketing. The entire system is influenced by the environment it functions in, which is characterized by consumer preference, food policies, government regulations, transportation, monetary systems, communication systems, and available technology.

The agricultural extensionist's role is to aid and support farmers to successfully market their products. The extensionist should be up- to- date with what is going on in the relevant markets and assist the farmer to formulate a marketing plan. The extensionist is also the communication channel between the farmer and the government. Through working with the farmer and experiencing the challenges, the extensionist can facilitate communication with the government to formulate solutions.

10.4.1 Farming with the Market in Mind

Profitable farming is directly linked to the successful marketing of farm products. Producing a product efficiently is futile if there is no market for it. With increased globalization and deregulation of agricultural markets, farmers are free to market produce themselves. The opportunities are endless, but it is often easier said than done. Several challenges exist that need to be noted:

- The perishability of raw agricultural produce varies, significantly influencing the marketing process. For example, dry maize can be stored for a long time, enabling the farmer to wait for good prices. Vegetables must be sold within a week; otherwise, they will rot.

- Products are seasonal, sometimes discouraging stores from buying directly from the farmer. They often buy through a sourcing company that can ensure product availability for 12 months of the year by importing from other countries.

- Farmers are price takers. This means they must accept the market price of the raw product and can't influence it individually. They might stand a better chance by collaborating with other farmers to enhance bargaining power, but this is not always a desirable route as it brings its own challenges.

- Farmers often compete with cheaper imports, which is detrimental to their ability to market their produce at fair prices.

- The food processing sector mostly dominates the value-adding process of farm produce. A few large corporate companies usually control the market, making it difficult for farmers to obtain any form of individual market share.

A farmer must understand markets, consumers, and supply chains to successfully market his product. Some farmers will produce a crop and search for a market after harvesting instead of conducting market research first to understand what the market wants before deciding what to produce. Production changes take time to execute on a farm. Fruit orchards are planted years before coming into production. Large investments are made in infrastructure and equipment specific to the product, and changes are often too expensive.

A large company involved in food processing and marketing employs many experts to formulate its marketing strategies. These include product developers, advertising experts, digital technologists, and food stylists, to name a few. A farmer wanting to market his/her own product must have knowledge of all the many aspects involved. He/she must be prepared to accept a certain amount of risk, face the challenges that come with the territory, and be willing to walk the extra mile for their customers. The product should be less costly than that of competitors, or it should be distinctive in some way. It should cater specifically to the market it is intended for.

Despite the numerous challenges, there are many success stories of farmers marketing their own products or moving further down the value chain to increase their share of the consumer dollar, so to speak. Many smallholder farmers engage in the value chain through different methods. Vegetable farmers will pack harvested vegetables in small bags and sell them in informal markets directly to consumers. Livestock farmers will sell livestock directly to customers. However, farmers sometimes sell their produce at prices far below the commercial market price because they need to research the current prices and/or are far away from markets, so it's more convenient to sell to a direct customer than sourcing transport to a better market.

Types of Agricultural Markets

Various types of markets, value chain actors, consumers, and regulatory organizations exist in the value chain and have an influence on the farmer's marketing strategy.

The agricultural market ranges from small local markets to globally integrated modern markets. In between, there are hundreds of market types and market chains that make up the global food system.

a. Informal Markets

In most developing countries, the informal market trades up to 80% to 90% of agricultural goods. This market is called "informal" because it is not regulated or taxed.

Characteristics of an informal market include:

- Any type of product produced by farmers is available here.
- There are no grading or traceability or standard measures.
- Prices are based on local supply and demand.
- It is mostly a cash market.

All of the above characteristics have advantages and disadvantages. Some of the disadvantages for farmers are:

- These markets are sometimes controlled by local authorities or main role players who dominate them and limit entry to protect them (i.e., the taxi industry).
- They can be unsanitary, and food safety issues can arise, which discourages consumers to buy at this market.
- Farmers working with cash are vulnerable to thieves.

Types of informal markets include:

1. *The farm gate market*:

For example, an individual who wants to buy a cow drives to the farmer and buys it on the farm from him. This is convenient for the farmer, who has no additional costs such as transport and who can negotiate directly with the consumer. The disadvantages include that the farmer is sometimes not informed enough about market prices and can be vulnerable to low prices offered by the consumer.

2. *Informal assembly market and informal wholesale market*:

In this type of market, e farmers sell to local traders and not directly to the consumer. Traders use the farm gate market to buy from farmers, package or prepare the products according to consumer preference, and then sell directly to consumers in informal locations such as the roadside or taxi rank.

3. *Informal retail market*:

In this scenario, a farmer will sell directly to small businesses (such as restaurants and street-food vendors). He/she might be prevented from doing so by wholesalers and therefore need to have

some sort of agreement with the business. The advantage is that he/she can charge a better price for the produce than the wholesalers would have been charged.

b. Formal Markets:

Formal markets are regulated and taxed but have standards and codes of practice that offer protection to the farmer -- for example, the Johannesburg fresh market.

The advantages of formal markets for farmers are:

Such a market is organized and transparent, and a long-term trading relationship can be established between farmer and buyer.

The advantage for consumers is that they know they will get what they pay for in quality. For example, a potato farmer will deliver to a market agent at the Johannesburg fresh market. The farmer will be required to fill in forms with details before he/she is allowed to do so. He/she must understand how to grade his potatoes and pack them accordingly. He/she will be paid according to the grade, and will pay a commission for the agent. For instance, a consumer that goes to the market to buy grade 1 potatoes will be guaranteed by the market that he will receive grade 1 potatoes. If the potatoes fail to meet the quality standard, the buyer can return the product, and the farmer will not be paid for grade 1 potatoes. The agent will check the quality and perhaps advise him to label them as grade 2 or whatever is the case. This is what is meant when referring to the regulation.

Although pricing is not always better at a formal market than at an informal market, the payment can be more secure, and a farmer can eventually benefit from a good reputation if he delivers consistent quality.

Various types of formal markets exist:

Supermarkets

Supermarkets that are privately owned can buy directly from farmers. In our growing economy, many consumers prefer supermarkets above informal markets because all their shopping happens in one place. Supermarket chains often require farmers to discuss terms and conditions with a central head office, which can prohibit smallholder farmers from selling to them because of a lack of volume.

Food Processing Markets

Farmers can sell to companies that process food in some form. Processing can be simple or complex. For instance, a local egg farmer can sell eggs to a large egg farming company that packs and distributes them. A farmer can also sell apples to a juicing company that manufactures and packages juice.

Hotels and Restaurants

Farmers who have access to and are close to hotels and/or restaurants can sell directly to them.

Feed Markets

Farmers can sell directly to companies that manufacture animal feed.

Export Markets

Farmers can sell their products globally, usually through the assistance of an export agent.

c. E-commerce

What is e-commerce and why can it be beneficial to farmers?

The internet and smart phones make it possible for people to buy and sell online. The ability to pay online enables millions of consumers across the globe to buy products and services of all kinds through various forums.

The advantages include:

- Diverse population to market to remove the limitations of marketing only to local buyers, better access to markets.
- Lower transaction costs.
- Faster transactions.

Dangers/disadvantages include:

- Exposure to online fraud, such as payment fraud.
- Compromised data privacy.

Where to start?

The best way to start with e-commerce is to search for reliable online companies that deal in products that the farmer produces. For example, Farm Fresh Direct in South Africa sells everything that can be produced on a farm directly to consumers: https://www.farmfreshdirect.co.za/. Numerous similar companies are available on the internet. A farmer can contact them to find out what they need and if they are interested in his/her produce.

Aspects to consider:

- Is the vendor close by?I If not, can the farmer work with other farmers in the area to establish a similar online business?
- Reviews and recommendations from other farmers who have entered a working business relationship with a vendor.
- Delivery terms.
- Payment terms.

E-commerce opens a world of opportunities for farmers that did not exist in the past. It should be investigated and accessed cautiously.

10.4.2 Agricultural Marketing Process

The agricultural extensionist can play a significant role in assisting a farmer to formulate a marketing strategy. A few important questions must be asked at the start of the process:

- What product must be produced to suit most of the relevant customers?

- When and where must the product be on the market? In other words, what segment/s of the market is the focus on?
- Can the farmer do the marketing himself, or does he/she need assistance?
- Is there any growth potential in this market?
- What are the marketing costs involved?
- What is the pricing strategy? In other words, when will the product be priced, where (location), what grade will be delivered to which market, and how will the product be delivered to the market?

These questions can be answered with a marketing plan, which pulls together the most important information in a written document. This document can also be used when applying for funding or assistance.

10.5.3 Market Planning and Analysis

The information needed to formulate a marketing plan is illustrated in Figure 10.5 below:
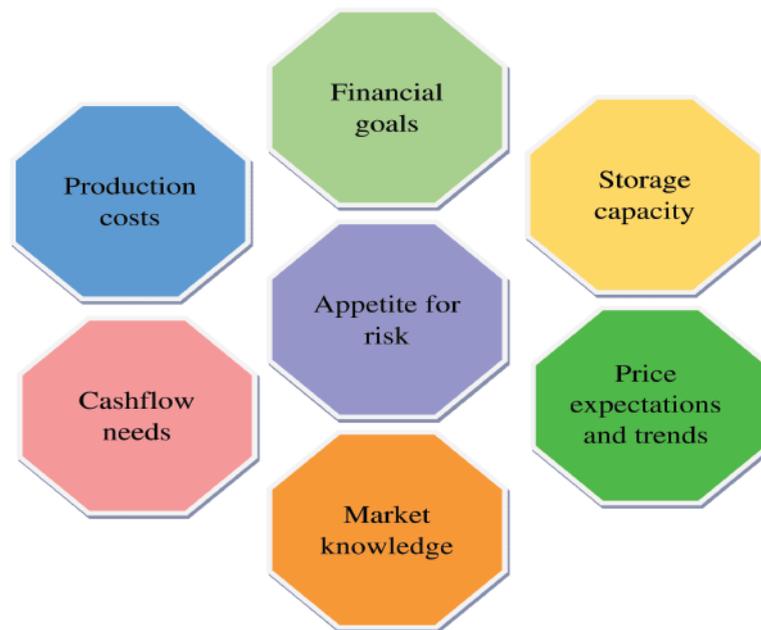

Figure 10.5: Information Needed to Formulate a Marketing Plan

After providing a brief background of the farmer, the farming environment, and the products produced, the marketing plan can be put together.

Step 1: Specify Goals

All farmers want to make a profit. To do so, they must know what their costs are. Therefore, accurate information from the financial documents listed in section 10.3 is very important. If a farmer knows the break-even point of producing a specific product, he/she will know that every bit of income above the break-even point is profit. This can be done as a preseason estimation using data from previous years. Maximum profit is a target many farmers pursue. It often leads to high-risk decisions

that have the opposite effect. Risk management is important when formulating a marketing plan aiming at realistic profits, which are more readily available. An example can be made from maize marketing. If the farmer knows the break-even point, a certain portion of his expected maize crop can be marketed through forward contracting. A forward contract is an agreement between a producer and a buyer relating to a certain commodity. The contract will stipulate what quantity of a specific product will be delivered or collected by the buyer at which date and for which price. The price can be fixed, deferred (pricing will be done at a specified time in the future), or minimum guaranteed. This will depend on the farmer's appetite for risk. If he/she is risk averse, he will prefer to fix the price at the time of signing or have at least a minimum price guaranteed. A farmer with a larger appetite for risk will perhaps specify a date in the future on which pricing can take place. The date can be determined using historic information on price movements, production predictions, etc. The financial position of the farmer is also important here. A farmer who can't afford risk shouldn't engage in it.

A contingency plan can also be formulated using the same information. If plan A does not pan out, what is plan B? Very often, farmers market their products when cash flow demands to do so. The price obtained for products could be better if marketed at the ideal time rather than when the farmer must sell. Thorough cash flow planning will therefore aid him/her in making the best marketing decisions. If cash flow needs are met by a bank's running account (overdraft facility), marketing can happen when it is most timely rather than when the cash flow needs are demanding otherwise. The advantages and disadvantages of an overdraft account should be evaluated using the information provided in the cash flow analysis. The interest payable on a running account loan should justify a possible delay in marketing products.

Step 2: Marketing Schedule, Volume, and Pricing

To set up the cash flow as discussed in section 10.3.3, the farmer must estimate the volume of products that will be marketed, at what price, and when. This is then integrated into the marketing plan, and the two must adhere to each other. As mentioned above, the pricing is done using the enterprise budgets that have been formulated and incorporating the other overhead costs reflected in the cash flow.

It is of utmost importance that farmers follow market information as it becomes available. Thanks to the internet, this information is readily available and updated regularly. A farmer should keep up-to-date with market forecasts from experts in the field.

The product that is marketed should be suitable to the targeted market type (discussed in 10.4.1) Another important point is market segmentation. A market can be segmented/divided according to geographic, demographic, and behavioristic characteristics. Different segments of the market have different needs. People in a city are more prone to buy pre-prepared food than people in rural areas, perhaps because of differences in income, employment, available time to prepare food, and food trends.

Let's look at examples of market information:

- Agricultural magazines -- for example, Farmers Weekly.
- Online sources exist for all products. Examples:
- Red Meat Producer Organization, South Africa -- https://rpo.co.za/
- Johannesburg Fresh Produce Market -- http://www.joburgmarket.co.za/dailyprices.php
- Ministry of Agriculture, Livestock, Fisheries and Co-operatives, Kenya -- http://kamis.kilimo.go.ke/
- Farmgain Africa, Uganda -- https://farmgainafrica.org/

Step 3: Decision Making

Once the farmer has all the information, the important decisions can be made:

- Will a profit be made considering the lowest possible market prices and projected input costs? If not, how can a profit be ensured? Does the product have to be marketed immediately, or can value be added to it?
- Where will the product be sold, and how will it reach the destination?
- What back-up plans can be formulated to manage price risk?
- What are the payment terms, and how does this influence the cash flow?

It is always a good idea to write the plan down and keep it safe. This way, the farmer can revisit the plan as the season progresses and reassess if necessary.

10.5.4 Understanding Value Chains in Agriculture

"Traditionally, agriculture is seen as a low-tech industry with limited dynamics dominated by numerous small family firms which are mostly focused on doing things better rather than doing new things. Over the last decade, this situation has changed dramatically due to economic liberalization, a reduced protection of agricultural markets, and a fast changing, more critical, society. Agricultural companies increasingly have to adapt to the vagaries of the market, changing consumer habits, enhanced environmental regulations, new requirements for product quality, chain management, food safety, sustainability, and so on. These changes have cleared the way for new entrants, innovation, and portfolio entrepreneurship. It is recognized by politicians, practitioners as well as scientists that farmers and growers increasingly require entrepreneurship, besides sound management and craftsmanship, to be sustainable in the future" *(Moses, Okpachu & Okpachu, 2019)*.

"Recent studies show that agricultural entrepreneurship is not only wishful thinking or a new hype:it has a profound impact on business growth and survival" (Lans, Seuneke & Klerkx, 2013).

Figure 10.7 depicts all the stages involved in the commercial food chain, from production to consumer. This is called "the value chain" because each step adds value to the raw product. Activities range from production on the farm, postharvest handling and storage, grading criteria and facilities,

cooling and packaging, storage and transport, industrial processing, wholesale and retail, and finally, to consumption.

Actors and Regulators in the Agricultural Value Chain

Various markets are regulated by different actors and institutions. The agricultural extensionist should familiarize himself with the regulations involved when selling food/food products directly to consumers. The risk of legal action against a farmer who did not follow the correct procedures or delivered a substandard product should always be kept in mind. A typical example of regulations on food safety can be found at the following website: https://www.cgcsa.co.za/wp-content/uploads/2020/06/DoH-REGULATORY-ASPECTS-OF-FOOD-SAFETY-Mr-Matlala.pdf

Value Chain Development for Farmers

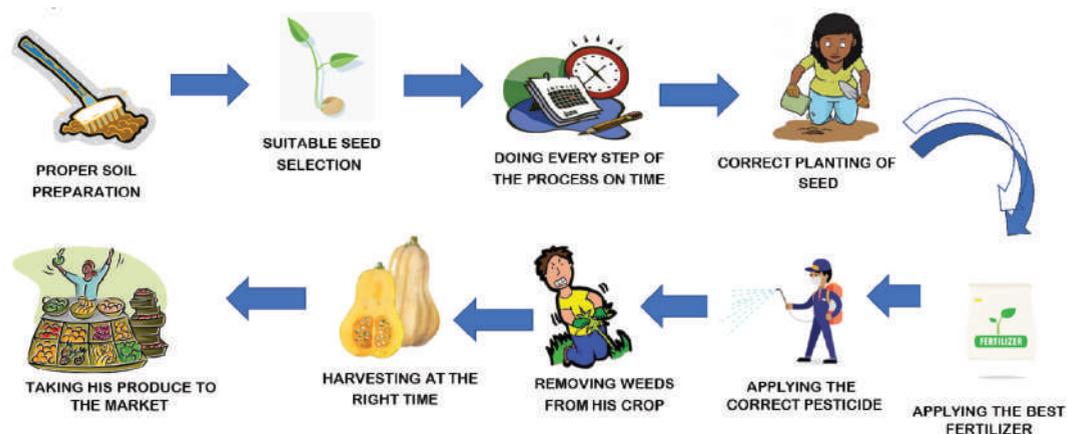Traditionally, farmers are involved in food production exclusively (Figure 10.6).

Figure 10.6: Value Chain Development

A farmer can increase the value earned for the raw product by moving further along the value chain (Figure 10.7). However, it is not always a simple process, and research must be done carefully to ensure that extra profit is made.
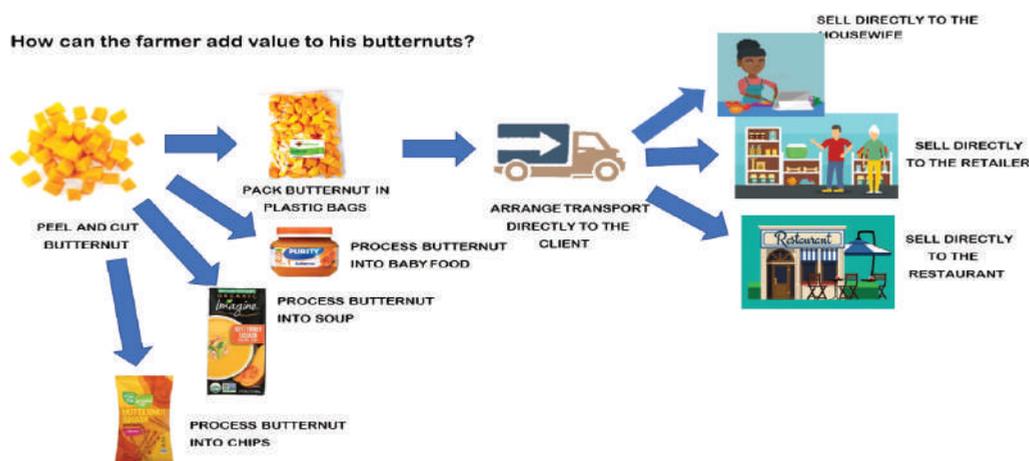

Figure 10.7: Adding Value to Raw Butternut Squash

In deciding what to produce and process, it is important to understand the food preferences of the targeted consumers. Food preferences vary across areas and communities. Socioeconomic factors -- including urbanization, education, income, and lifestyle-- influence food preferences and therefore decide on which product to market.

Other questions to ask in the process include:

- What is the cost/benefit ratio of becoming involved in the chain?
- Where in the value chain is the most value added, and how accessible is it?
- What are the rules and regulations involved in each step?
- How practical is it to move further along the chain?
- Can a new step be created that does not already exist?

Smallholder farmers face numerous challenges in moving down the value chain. These include:

- Difficulty accessing finance because of lack of collateral and proven track record.
- Difficulty accessing formal markets due to limited supply and logistical challenges.
- Lack of infrastructure to facilitate processing, linked to inability to access finance.

An extensionist can assist a farmer who wants to add value to a product through:

- Market analysis.
- Value chain negotiations.
- Product design.
- Obtaining financing.
- Assisting with sales.
- Building business opportunities for farming clients.
- Developing skills and competencies required for successful entrepreneurship.

Important aspects to take into consideration when planning the process include:

- Business and cultural norms.
- Risk tolerance levels.
- Environmental factors.

The role of an agricultural advisory service is to find the right mix of partners who can support this process, combined with a set of upgrading activities supported by the actors. These include:

- Business mentors: Farmers generally know how to produce crops and raise livestock. They want to learn how to improve their farming business skills from long-term business mentors, who can advise them on how to make investments to improve existing enterprises.
- Marketing experts: Agents who can work with farmers to identify new markets to explore.
- Production experts: Specialists who can provide information on how to improve productivity.

- Technology experts: Specialists who can support rapid innovation in technology options.
- Postharvest handling experts: Specialists who can provide advice on processing, packaging, and cooling facilities if required.
- Financial services: Agencies that can advise on the most appropriate financing method.

10.5 Risk Management in Farming

Risk encapsulates the probability that something will not turn out as planned. The risk involved in farming is proportionately higher than in many other industries. The number of factors that influence the outcome in agriculture is vast. The weather, with all its complexities, higher fuel prices, higher input prices, unexpected pests and diseases, labor problems, and political instability all influence the planned outcome of farming. A farmer needs to manage risk as much as possible by having a plan when things turn out differently than expected. The agricultural extensionist's role is to support the farmer in formulating these plans and being up- to- date with economic and weather forecasts.

The following section will detail the types of risk in farming and provide guidance for extensionists to assist farmers in managing the various types of risk.

10.5.1 Sources of Risk

The various types of risk in farming can be grouped into five categories: production risk, financial risk, institutional risk, marketing risk, and human risk.

1. Production Risk

The production process on a farm, be it crops or livestock, is influenced by the environment it takes place in. Weather conditions have a significant influence on the successful outcome of production. Rainfall quantity and time received are critical for optimal crop production. Hailstorms can destroy an entire crop. Animals need fodder and water to flourish. Pest and disease outbreaks can lead to catastrophic results. Production requires inputs, equipment, and management. When making a production decision, a farmer uses the information he has available at the time. For example, before planting, he/she will decide how much to plant, where to plant, and what to plant, using the knowledge he/she has and available information about the coming season. He/she cannot predict the future, does not know if there will be a hailstorm, and can't foresee that equipment might break down unexpectedly.

2. Marketing Risk

A market for a product is not set in stone. It fluctuates according to supply and demand as well as the cost of production. If supply is scarce, prices might increase – if supply is in abundance, prices will drop. The demand for a product will depend on consumers. Do they want the product, how much are they willing to pay for it, and can they afford it? Market circumstances can change because of unforeseen events. The recent war in Ukraine is a good example. The war's influence on the export of wheat from Ukraine has been noticeable across the globe.

3. Financial Risk

Financial risk has to do with debt and the ability to repay it. If circumstances change for the worse, installments still have to be paid to repay debt. If the farmer cannot do so, he/she risks losing the assets offered for collateral.

4. Institutional Risk

Farmers interact with both public and private institutions. Unforeseen changes from their side have a direct impact on the farming business. For example, when government policy that influences farming changes unexpectedly, the farmer is forced to make decisions. When the company that supplies seed suddenly runs out of supply, a farmer is exposed and has to have a plan ready.

5. Human Risk

Human risk refers to any risk to the farm business that is inferred through human error or problems. These include accidents, death, labor shortage, and illness.

10.5.2 Risk Management and Mitigation Methods

Having a plan for each possible scenario forms the basis of risk management. The financial documents discussed in Chapter 4 allow the farmer to perform "What if?" scenarios. What if the product price falls, what if the harvest is less than expected, what if the price of inputs increases, etc.? It should be noted, however, that risk appetite differs among farmers. Some farmers like taking risks and therefore make decisions different from those that are more risk-averse.

The basic steps in formulating a plan to manage risk are illustrated in Figure 10.8.

- Identify possible sources of risk
- Identify possible outcomes
- Identify alternative strategies
- Consider possible consequences
- Make a decision

Figure 10.8 Basic Steps in Formulating a Plan to Manage Risk

Let's look at an example. A maize farmer has to make the necessary decisions for the coming season. After looking at the weather and market forecasts, he/she has information to use in decision making (Figure 10.9).

If the farmer did not attempt to manage the risk involved, he/she would have planted without considering risk and could have suffered a loss of mammoth proportions.

In most cases, the risk is not confined to a single source. Famers might experience a dry season, the equipment can fail, input prices can increase, and product prices can fall all at once. Farmers need to reduce their risk exposure as far as humanly possible. Various strategies can be combined:

- Diversifying into more than one enterprise ensures that "all the eggs are not in one basket."
- Use available insurance against disaster if it'saffordable.
- Consider earning an additional income from non-farming enterprises to supplement income.
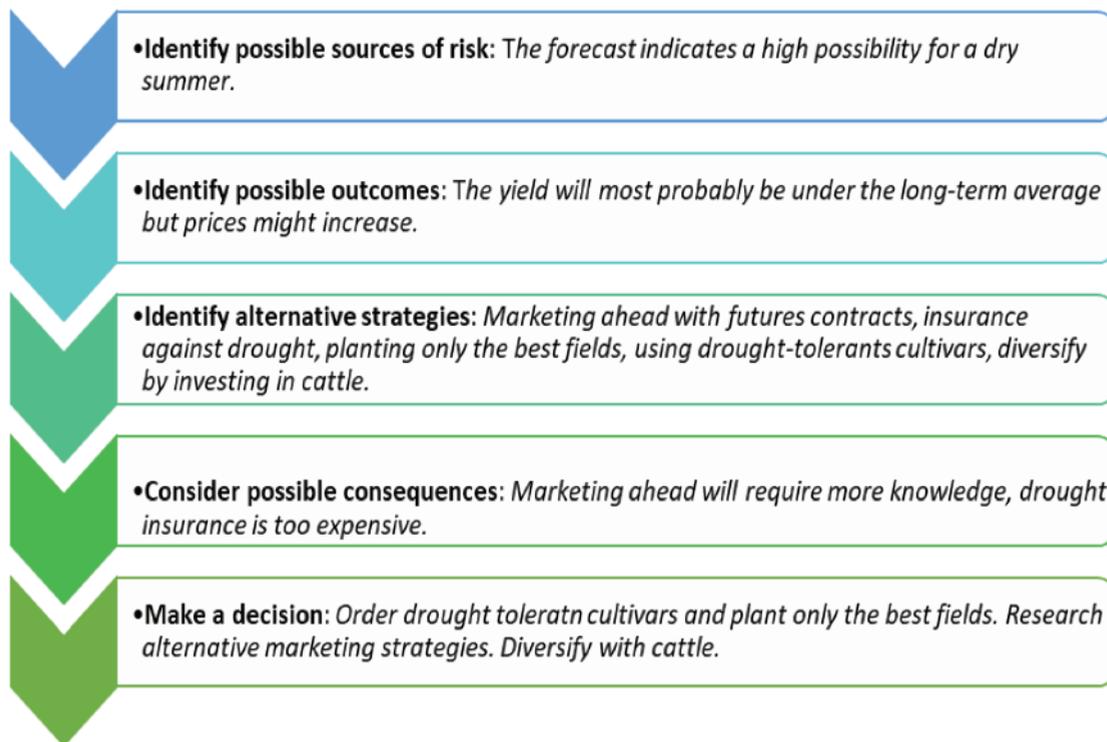
- **Identify possible sources of risk:** *The forecast indicates a high possibility for a dry summer.*
- **Identify possible outcomes:** *The yield will most probably be under the long-term average but prices might increase.*
- **Identify alternative strategies:** *Marketing ahead with futures contracts, insurance against drought, planting only the best fields, using drought-tolerants cultivars, diversify by investing in cattle.*
- **Consider possible consequences:** *Marketing ahead will require more knowledge, drought insurance is too expensive.*
- **Make a decision:** *Order drought toleratn cultivars and plant only the best fields. Research alternative marketing strategies. Diversify with cattle.*

Figure 10.9. Decision-Making Information for a Plan

10.6 Conclusions

The discussion in this chapter constitutes a firm foundation for sound record keeping and financial management. All of them are essential, and the extensionist should encourage farmers to use and implement them into their business. No matter the size of the operation, the modern-day farmer is an agribusiness manager. He/she must be up- to- date with market information, policy changes, weather forecasts, labor issues, and financial record keeping. Agricultural extensionists play a crucial

role in assisting farmers with the above. They should assist in marketing planning, information sourcing, and guidance in financial record keeping. To do this, they need to stay up –to- date on these matters.

10.7 Self-Assessment Exercises

1. What do you understand "agribusiness management in a changing environment to mean? Discuss the elements of a successful agribusiness and essential managerial skills and competencies for an agribusiness manager.

2. Explain the concepts of farm business financials and record keeping with examples.

3. Discuss the various types of agricultural markets with their characteristics.

4. Differentiate among types of risks in farming.

5. How do you analyze market trends and assist farmers in designing/accessing a value chain? Illustrate with an example.

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Climate Change Mitigation and Extension: Skills and Competencies

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11.0 Learning Outcomes

- Understand the concepts of climate change, global warming, and climate- smart agriculture.
- Explain the causes and impacts of climate change on agriculture.
- Discuss the global efforts to combat climate change.
- Engage in climate-smart agriculture practices for addressing climate risks.
- Practice various extension approaches to mitigate climate change.

11.1 Introduction

The world is dominated by global forces—population growth, rapid urbanization, new scientific discoveries, changing demographics, changing consumption patterns, and interdependence in global markets. This has placed huge pressure on the global food systems. The Food and Agriculture Organization (FAO) of the United Nations estimated that by 2050, agricultural and food production will need to increase by 50 percent to meet future food demand (FAO, 2018). Further, the challenges faced by global demand are intensified by the adverse impacts of climate change. This chapter addresses the key skills and competencies required by agricultural extension agents on climate change and its mitigation (Box 11.1).

11.2 Meaning of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) (2007) defined climate change as any change in the climate over time that directly or indirectly alters the global atmospheric composition and climatic variability. Climate change is detected when the climate – the long-term pattern of climate variability -- gets warmer or cooler, or wetter or drier, over decades.

Climate and Weather: The terms "climate" and "weather" seem synonymous, but they are only interrelated terms. Weather is the state of the atmosphere prevailing over a particular place at a particular time. Climate is the weather prevailing over a region for a longer period of time, typically three consecutive decades. Thus, weather is short- term and climate is long-term. Box 11.2 explains the major differences between climate and weather.

Box 11.2. Differences Between Weather and Climate	
Weather	**Climate**
• Weather is day- to- day information on atmospheric conditions such as temperature, humidity, intensity and frequency of rainfall, cloudiness, atmospheric pressure, and wind speed and direction.	• Climate is the average weather information that indicates the atmospheric conditions or weather parameters prevailing over a region for a long period.
• Changes in weather can be observed frequently.	• Changes in climate cannot be observed frequently because it takes longer to change.
• Study of weather is meteorology, and the person who studies the weather is called a meteorologist.	• Study of climate is climatology, and the person who studies the climate is called a climatologist.

• Short- term changes in the atmosphere are called weather changes.	• Long-term changes in the weather pattern are called climate change.
• Weather change is influenced by short-term variation in parameters such as temperature, pressure, humidity, cloudiness, sunshine, and wind speed.	• Climate change is influenced by long- term variation in the atmospheric conditions such as changes in number of rainy days, frequency and intensity of rainfall, temperature changes, and wind pattern.

Climate Variability: Climate variability is considered to be the natural fluctuation within the climate. It includes variations above and below the mean state and other parameters. Climate variability could be explained specifically as the varying weather conditions over a day, month, season, or year. For instance, low rainfall variability is observed when the rainfall in a given period in a particular region of the world has small fluctuations in quantity or timing of rains from one year to another.

11.3 Causes of Climate Change

Natural Causes

Some amount of climate change could be attributed to natural causes. Volcanic eruptions, fluctuations in solar radiation, tectonic shifts, and even small changes in the Earth's orbit have contributed observable effects on warming and cooling patterns of the Earth.

Natural causes include:

- *Volcanic eruption***:** Volcanic eruptions release large quantities of carbon dioxide. In addition, it can also release aerosols, such as volcanic ash or dust, and sulfur dioxide. Aerosols are liquids and solids that float around in the air, and they can block a percentage of sunlight and cause a cooling that may last for 1 to 2 years.

- *Movement of the tectonic plates***:** Tectonic plates move over geological timescales. This carries the landmasses along to different positions and latitudes. These changes reconfigure the global circulation patterns of air and ocean water and affect the global climatic conditions.

- *Orbital Changes***:** The Milankovitch Theory explains that three cyclical changes in Earth's orbit -- such as change in Earth's eccentricity, the tilt angle of Earth's axis of rotation, and precession of Earth's axis -- cause climate fluctuations that occur over tens of thousands of years to hundreds of thousands of years.

- *Global warming***:** It is the rise in earth's surface temperature. It is mainly caused by the presence of increased greenhouse gases in the atmosphere which holds the solar radiation received by the Earth and results in heating of Earth's atmosphere by increasing the surface temperature.

Anthropogenic Activities

Though natural activities tend to change the climate, since the 1800s man-made activities have accelerated the pace of climate change, resulting in several negative impacts on the environment

and human health. The documentary "Anthropocene: The Human Epoch" narrated by Alicia Vikander captures the alarming ways in which Earth's climate has been disturbed by human activities.

Man-Made Causes Include:

- ***Transportation*****:** Transportation using cars, trucks, buses, ships, and even air travel by planes have been a major source of global greenhouse gas emissions. The petroleum-based fuel in combustion engines releases incredible amounts of carbon dioxide into the atmosphere.

- ***Industry*****:** The factories and facilities that produce our goods and services are significant sources of greenhouse gas emissions. Most industrial emissions come from the production of a small set of carbon-intensive products, including basic chemicals, iron and steel, cement and concrete, aluminum, glass, and paper. The manufacturing processes also contribute to water, air, and land pollution.

- ***Oil and gas production*****:** Oil and gas production leads to emissions—not only when they're burned as fuel, but just as soon they are extracted from ground. Fossil fuel development is a major source of methane and carbon dioxide (prevalent greenhouse gas), accounting for around 5200 million tons (Mt) of carbon dioxide equivalent (IEA, 2018).

- ***Electricity generation*****:** Burning of coal, natural gas, and other fuels to generate electricity accounts for a considerable amount of greenhouse gas emissions, including carbon dioxide, methane, and nitrous oxide.

- ***Our lifestyle choices*****:** Individuals' day- to-day activities and their lifestyle decisions also contribute to climate change. Humans assume that these individual activities might make a negligible contribution to climate change, but the collective contribution of 7 billion people in the world makes a huge impact on the global climate. Decisions on the usage of electricity, travel, food waste, food consumption, things we buy, and shopping contribute to the overall carbon footprint.

- ***Deforestation*****:** Cutting down the world's forest coverage and degrading wetlands have immensely contributed to the spike of greenhouse gases in the atmosphere. Plant-rich landscapes such as forests and wetlands act as carbon sinks by capturing and holding global carbon emissions. Logging and other forms of development have led us to cut down or clear off the vegetative biomass, thus releasing all of its stored carbon into the air.

- ***Agriculture*****:** The advent of industrial agriculture has been as one of the major drivers of climate change. Industrialized agriculture is responsible for the emission of nitrous oxides and methane, which are two powerful gases in enhancing the greenhouse effect and account for one-quarter of greenhouse gas emissions.
  - o   Degradation of grasslands leads to loss of soil capacity to sequestrate carbon, which results in converting soil carbon to carbon dioxide.
  - o   In a similar manner, the management practices adopted in cropland and the deforestation invariably affect carbon sequestration and the conversion of soil carbon to carbon dioxide.

o Burning of crop residues (leftover vegetation of paddy, sugarcane, wheat, and other crops) by farmers leads to emission of 149.24 MT of carbon dioxide, 9 MT of carbon monoxide, 0.25 MT of oxides of sulphur, 1.28 MT of particulate matter, and 0.07 MT of black carbon in the atmosphere, which lead to several environmental and health hazards. In India, the National Green Tribunal in December 2015 prohibited the activity of stubble burning in the states of Rajasthan, Uttar Pradesh, Punjab, and Haryana under Air and Pollution Control Act of 1981.

o The flooding or waterlogging method of paddy cultivation results in emission of methane through anaerobic digestion. Lack of oxygen in waterlogged conditions converts the organic matter of the soil to methane.

o The addition of inorganic fertilizers and the adoption of chemical pesticides disturbed the delicate relationship between the soil and climate, disrupting the natural carbon, nitrogen and water cycles.

o Large-scale livestock production has contributed a significant amount of atmospheric methane, which is produced through the digestive process of ruminants, called "enteric fermentation."

11.4 Global Warming

"Climate change" and "global warming" have often been used interchangeably, but have distinct meanings. Global warming is the increase in Earth's average surface temperature that occurs as a result of the greenhouse effect -- uncontrolled emission of greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O); fluorinated gases such as hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6), and nitrogen trifluoride (NF_3); and perfluorocarbons (PFCs) from burning of fossil fuels, deforestation, garbage landfills, etc. Global warming due to human activities is one of the major causes of climate change.

Greenhouse effect: Greenhouse gases play a vital role in maintaining the temperature of our planet. Greenhouse gases such as carbon dioxide, methane, nitrous oxide, and fluorinated gases absorb heat from sun's infrared radiation and maintain the Earth in a habitable temperature (temperature suitable for life). If there were no greenhouse effect, the heat emitted by Earth would simply pass into space, and Earth would reach a temperature of about -20°C (BGS, 2023). Greenhouse gases are harmful only when they exceed or fall below beyond certain concentrations. Anthropogenic actions emit greenhouse gases that trap more heat and act as an insulating blanket that results in global warming.

Since 1880, the Earth's temperature has been found to be increasing at an average of 0.14° Fahrenheit (0.08°C) for every 10 years. Weather data indicated that 2011-2020 was the warmest decade, with a global average temperature of 14.9°C --, i.e., 1.2°C above preindustrial levels in 2019 and with a surface global temperature of +0.82 °C (+1.48°F) above the average of 20th century which is greater than previous decade (2001-10) +0.62°C (+1.12°F) Human-induced global warming is increasing at the rate of 0.2°C per decade. According to the World Meteorological Organization's Global Annual to

Decadal Climate Update, there is at least one chance in five that the increase in the average global temperature will exceed 1.5°C in 2024. The progression of changing global surface temperature since 1884 can be observed in the NASA climate time machine. The concentration and distribution of carbon dioxide have been increasing steadily. The CO_2 increased from 379 ppm to 419 ppm from September 2002 to November 2022.

Further increase of global temperature will have catastrophic effects on the natural environment and human health and well-being. Thus, to combat these catastrophic effects and to limit the increase in global temperature below 2°C and pursue efforts to limit it to 1.5°C, 195 nations endorsed the Paris Agreement in 2015.

Emission of Greenhouse Gases by Sector

Hannah et al. (2020) assessed the emission of greenhouse gases from various sectors (Fig. 11.1).
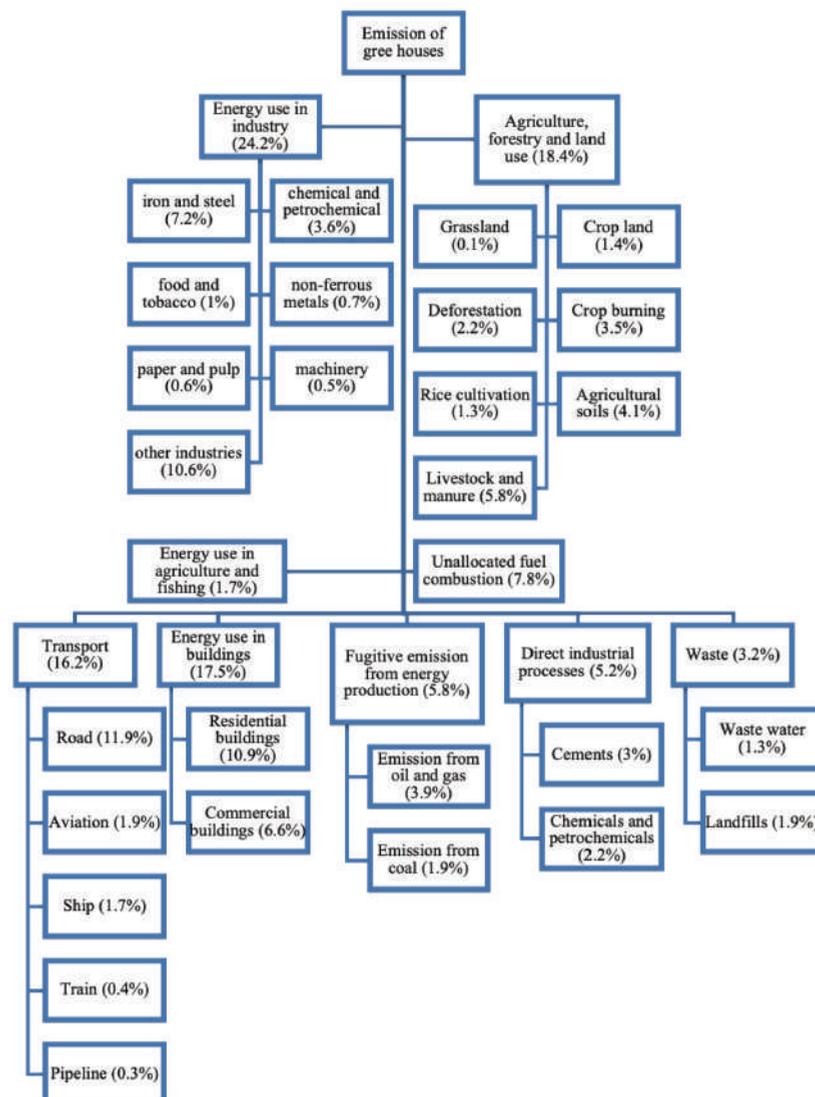

Fig.11.1. Emission of Greenhouse Gases Based on Sector (Source: Hannah et al., 2020).

11.5 Impact of Global Warming

Global warming has disrupted the natural balance of the earth, and the following are a few examples of its impacts.

(a) **Melting of the polar ice sheets:** Each year, shedding of polar ice sheets is increasing. Between 2002 and 2020, an average of 430 billion metric tons of ice per year was shed because of burning of fossil fuels by humans (NASA, 2023a). NASA (2023b) pointed out that, since 2002, the ice mass was melting at an average rate of about 150 billion tons per year in Antarctica and 270 billion tons per year in Greenland. Researchers from the National Oceanic and Atmospheric Administration (NOAA) reported a significant decrease in the extent of ice cover and its thickness over time. In the 1980s, the average Arctic March sea ice covered more than 15.5 million square kilometers (km2), but, in recent years, the average is closer to 14 million km2 (NSIDC, [National Snow and Ice Data Center], 2023).

(Note: The Arctic sea ice reaches its maximum extent in March, so the average March sea ice is measured.)

(b) **Rise in sea level:** Satellite observations have detected melting of Greenland and Antarctic ice sheets. Even partial loss of these ice sheets will increase sea level by 1 meter (about 3 feet). Complete melting of these ice sheets would increase sea level by 66 meters (217 feet). Since 1880, the global average sea level has risen 21 to 24 centimeters (8-9 inches). In 2021 alone, however, the global sea level set a new record, rising by 97 mm (3.8 inches) (Lindsey, 2022).

(c) **Decreasing sea ice:** Perennial ice cover is defined as the minimum extent of sea ice cover at the end of each summer. The area of the perennial ice has steadily decreased since 1979 (when the satellite record began) (NASA, 2023a).

(d) **Ocean warming:** Since 1955, human-induced global warming has raised ocean temperatures. This leads to loss of polar ice, rise of sea level globally, extreme weather aberrations, large-scale coral bleaching events, and other consequences. The global ocean surface temperature set a record high of 21.1°C in early April of 2023 and beaten the previous high of 21°C in 2016.. Surface temperature has been rising an average of 0.18°C (0.32°F) for every 10 years.

(e) **Rainfall:** Climate change affects the amount of water in the atmosphere and often produces violent downpours instead of steady rain showers. This has led to flooding becoming common and increased power in storms such as hurricanes and typhoons.

(f) **Heat waves and drought:** Rising temperature will disturb the entire global weather system by shifting cold upper air currents and hot, dry ones. This affects rainfall so that some areas become much hotter and drier, and others become wetter.

(g) **Changing ecosystems:** Increasing temperatures mean that fish are migrating to waters with their preferred temperature range, and climatic conditions for staple crops are becoming less favorable as temperate zones are becoming drier. This indirectly leads to loss of wildlife habitat and endangers biodiversity.

(h) Forest fires: The increasing temperature leads to hot, dry weather conditions that favor the occurrence of frequent and high- intensity wildfires. Though fire is a natural phenomenon, the increasing pace of climate change results in frequent, extreme, and widespread fires. Millions of acres in the world's largest tropical forest, in the Amazon, were razed by fire during 2019-21. Wildfires not only destroy the vegetation but also lead to loss of biodiversity or the forest ecosystem, release enormous amounts of greenhouse gases, increase the pace of atmospheric ozone depletion, and change the microclimate of the surrounding areas by creating an unhealthy living environment. Forest fires release about 0.23 MT of carbon; of which, 0.7 MT is in the form of carbon dioxide (83%), 0.9 MT is carbon monoxide (16%), and 3200 tons of methane (1%).

(i) Loss of biodiversity: As climate change leads to frequent and intense weather aberrations, it creates unfavorable environments for living organisms by destroying ecosystems. Climate change is one of the main drivers of loss of biodiversity and extinction of plant and animal species, which exacerbate climate change impacts and affect the food chain.

(j) Threat to agriculture and food security: The rise in temperature affects crops in their critical growth stages and affects their production and productivity. Rice, the staple food crop for more than one-third of the world's population, declines 10% in productivity for every 1°C increase in temperature. The International Food Policy Research Institute (2022) in its Global Food Policy report pointed out that climate change will push 90 million people toward hunger.

11.6 Global Efforts to Combat Climate Change

Climate change is potentially catastrophic to human civilization Therefore each and every individual in the world should commit to and participate in climate- resilient measures. Combating climate change will require education, innovation, and adherence to climate commitments at all levels. Global Goals 2023 suggested five targets to combat climate change:

- Build knowledge and capacity to meet climate change.
  - o Creating awareness on climate change, educating the people, and improving the human and institutional capacity on climate change mitigation and adaptation, and thereby reducing its impact by providing early weather-related information.
- Integrate climate change measures into policies and planning.
  - o Identified and developed climate change mitigation and adaptation measures should be integrated into national policies, strategies, and planning.
- Strengthen resilience and adaptive capacity to climate- related disasters in all countries.
- Promote mechanisms to raise capacity for planning and management.
  - o Mechanisms for enhancing capacity of effective planning and management for climate change should be promoted in least developed countries and small island developing states, particularly focusing on women, youth, and local and marginalized communities.

- Implement the UN Framework Convention on Climate Change (UNFCCC).
  o The commitment to jointly mobilize $100 billion annually from all sources to address the needs of developing countries in mitigating actions and transparency in implementing and operationalizing the Green Climate Fund through capitalization by developed-country parties to the UNFCC should be implemented.

Climate Change Education

Educating the future generation is the only way to combat climate change. The UN Framework Convention on Climate Change (UNFCC) undertakes educational and public awareness campaigns on climate change and ensures public participation in programs and information access on the issue. Education helps people to make informed decisions and empowers and motivates the young to act, so educating students about climate change plays a vital role. Hence, several nations established educational institutions to promote knowledge on climate change (Box 11.3).

Box 11.3: Climate Change Education Programs

Climate Change Education for Sustainable Development Programme: To serve the abovementioned purpose, UNESCO (United Nations Educational, Scientific, and Cultural Organization), through its program "Climate Change Education for Sustainable Development", aims to increase climate literacy among young people. Similar programs such as the Global Action Programme (GAP), Action for Climate Empowerment, and a ZOOM campaign aim to create climate change awareness.

Alliance for Climate Education in the U.S.: The Alliance for Climate Education (ACE) is a national leader in high school climate science education. It educates America's high school students about the science behind climate change and inspires them to act while having fun.

Climate Adaptation Knowledge Exchange (CAKE) in the U.S.: CAKE provides an interactive online platform, creates a directory of practitioners to share knowledge, and identifies and explains climate data tools and information. It acts as an innovative community of practice.

United Nations Framework Convention on Climate Change (UNFCCC)

The United Nations Framework Convention on Climate Change (UNFCCC) is the international parent treaty of the 2015 Paris Climate Change Agreement, with 197 parties addressing climate change. It organizes global efforts to manage climate change. UNFCCC was launched at the Rio Earth Summit in 1992 to address GHG (green house gases) concentrations. It conducts two-week summits each year (COP) to discuss the climate crisis on a global level among its stakeholders (representatives from every party) and plan action on climate change (COP). The 26th COP was to be held at Glasgow, Scotland, UK, in November 2019, but it was postponed because of the COVID-19 pandemic. The 27thCOP was held Nov. 6-18, 2022, in Sharm el Sheikh, Egypt, with the theme "Together for Implementation", with a view to renew and extend the agreed terms of the Paris Agreements. Further, COP 28 was to be held o Nov. 30- Dec. 12, 2023, Dubai, United Arab Emirates (UAE).

Paris Agreement

The Paris Agreement (or Paris Accords or Paris Climate Accords) is an international treaty on climate change adopted in 2015 that covers climate change mitigations, adaptation, and finance. The main aim of the Paris Agreement is to hold the rise in global average temperature below 2°C in this century and, if possible, to limit the temperature increase even further -- to 1.5°C above preindustrial levels. It was drafted between Nov. 30, 2012, and Dec. 12, 2015, and became effective November 4, 2016. Out of 198 parties to the convention, 195 are parties to the Paris Agreement.

International Organizations that Commit to Climate Neutrality

At the United Nations Climate Change Conference (COP24) in Poland (2018), several international organizations announced their commitment to climate neutrality as per the Paris Agreement. They are:

1. Organization for Economic Cooperation and Development (OECD) Secretariat.
2. Common Markets for Eastern and Southern Africa Secretariat (COMESA).
3. Eastern Africa Development Bank (EADB).
4. Western Africa Development Bank (BOAD).
5. Asian Development Bank (ADB).
6. Pacific Community.
7. ICLEIC – Local Governments for Sustainability.
8. European Investment Bank (EIB).
9. European Bank for Reconstruction and Development (EBRD).
10. Southern African Development Community (SADC) Secretariat.
11. Inter-American Development Bank (IDB).
12. International Paralympic Committee (IPC).
13. Latin American Energy Organization (OLADE).
14. World Travel and Tourism Council (WTTC).

These organizations joined agencies throughout the UN system in 2007 and adopted a strategy and a roadmap to reach climate neutrality by 2020. These organizations measure their greenhouse gas emissions and reduce as much as possible by implementing installation of solar photovoltaic systems, policies for reduction of air travel, upgrading of insulation and lighting systems in buildings, reduction of the amount of paper used at conferences, installation of efficient cooling systems, promotion of car-pooling schemes among employees, establishment of sustainable procurement policies, recycling of waste, etc. Over half of the UN systems are climate neutral now, representing 39% of total UN emissions as mentioned in Greening the Blue report. In 2018, the UN headquarters also become climate neutral for the first time.

Note: Greening the Blue is a UN-wide campaign that supports the move toward environmental sustainability.

Institutions Involved in Addressing Climate Change

At the national level, the United States Global Change Research Program (USGCRP) coordinates the world's extensive research on climate change. In addition to USGCRP, NASA (the National Aeronautics and Space Administration), NOAA (the National Oceanic and Atmospheric Administration), the U.S. Environmental Protection Agency (EPA), and some other federal agencies – such as the National Weather Service (NWS)'s Climate Prediction Center (CPC) or Climate Analysis Center (CAC), as well as private sector entities in partnership with public institutions -- are actively involved in addressing the challenges of climate change and global warming.

Further, several research organizations based in sub-Saharan Africa are making efforts to combat climate change. The following link provides information on the complied research organizations in Africa combating on climate change:

https://carnegieendowment.org/publications/interactive/african-climate-research.

Intergovernmental Panel on Climate Change

To analyze climate change data and to provide scientific strategies to tackle climate change, the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC) in 1988.

World Meteorological Organization (WMO)

This specialized agency of the United Nations is dedicated to international cooperation and coordination on the state and behavior of the Earth's atmosphere, its interaction with the land and oceans, the weather and climate it produces, and the resulting distribution of water resources. The WMO works closely with weather parameters and engages in education and outreach on climate change. For this purpose, it founded a new network, Climate Without Borders, which aims "to educate, motivate, and activate" the audiences to access information on weather parameters (approximately 375 million people).

WMO, along with Climate Central (a non-profit news organization that analyses and reports on climate science), produced a series of videos called "Summer in the Cities" that provide insights about the future effects of global warming on weather in cities around the world. Similarly, a video series, "Weather in 2050," reports a typical weather forecast based on scientific scenarios for the year by a TV weather presenter.

11.7 Impact of Climate Change on Agriculture

Soil, seed, irrigation, agricultural inputs, and climate are the major factors that determine agricultural production. Among those, agriculture is highly affected by climate change. Changes in rainfall pattern, severe and frequent droughts, and changes in temperature, number of rainy days, frequent or delayed rains, change in intensity of rainfall, flooding, and other natural disasters severely impact the agriculture sector. Increasing temperature and declining rainfall are the most significant negative impacts of climate change on agricultural production and food security (Parry

et al., 2007). All allied sectors—crops, livestock, fisheries and aquaculture -- are highly dependent on climate stability.

Impact on the Crops

Crops are highly sensitive to weather events. Thus, changes in the temperature and rainfall patterns have a significant impact on crop production. Further, climate change has already disrupted the natural carbon, water, and nitrogen cycle which have a significant negative impact on crops in the following ways:

- According to plant physiology, an increased amount of CO2 in the atmosphere could favor plant growth. But other factors, such as increasing temperatures and depletion of soil nutrients have been limiting factors for plant growth. Even if the required amounts of water and nutrients are available, temperatures exceeding the optimal plant temperature would reduce plant yields.

- Increasing temperatures can also damage the physical structure of soil. This leads to soil erosion and thus negatively affects soil fertility and crop yields. Failing to undertake proper soil reclamation measures leads to land degradation and future desertification.

- Extreme events, especially floods, lead to waterlogged conditions that can harm crops physically and reduce yields. Increased rainfall during sowing leads to waterlogging of agricultural fields; this leads to anaerobic conditions in which the seeds could not survive. Similarly, high intensity rainfall during harvesting affects seed quality and shelf life by exposing to high moisture content at the time of harvest.

- Warm temperatures, wetter climates, and elevated CO2 levels encourage the growth of weeds, pests, and fungi. This could cause new problems for farmers' crops. Human health is also threatened by increased pesticide use because of increased pest pressures and reductions in the efficacy of pesticides due to pesticide resistance. Further, increased pesticide usage has increased the risk of food chains accumulating harmful chemicals. Though rising CO2 can stimulate plant growth, it also reduces the nutritional value of most food crops. Rising levels of atmospheric carbon dioxide reduce the concentrations of protein and essential minerals in most plant species, including wheat, soybeans, and rice. This direct effect of rising CO2 on the nutritional value of crops represents a potential threat to human health.

- Heat waves cause extreme heat stress in crops and limit pollination, flowering, and pod or fruit set, which affects the yield of plants. Further, heat waves lead to increased transpiration rates, which would cause yield loss if counteracting irrigation is not provided. Increasing temperature also affects the seed set in climate-sensitive crops and thus poses a threat to food security.

- Drought during critical stages of crop growth limits the water availability to crops and reduces crop yields. In addition, as weeds exhibit more resilience and adaptation

to increasing levels of carbon dioxide than crops because of their diverse gene pool and greater physiological plasticity, management of weeds will be more complex and expensive. Drought and aridity during herbicide application increase the volatility of herbicide and reduces their effectiveness.

Impact on Livestock

The livestock sector has also been threatened by climate change. Following are a few examples:

- Exposure to high temperatures causes heat stress on animals, both directly and indirectly. Over time, heat stress can increase vulnerability to disease, reduce fertility, and reduce milk production. Extreme hot summer conditions disrupt several reproductive processes, resulting in a pronounced depression of conception rate in dairy cows worldwide (Wolfenson and Roth, 2019). Heat stress also negatively affects milk and meat production in both quality and quantity.

- Extreme droughts and low precipitation could dry up pastures and reduce feed supplies. Drought reduces the amount of quality forage available to grazing livestock. For animals that rely on grain, changes in crop production due to drought could also become a problem.

- Increases in carbon dioxide (CO_2) may increase the productivity of pastures but may also decrease their quality. Increases in atmospheric CO_2 can increase the productivity of plants on which livestock feed. However, the quality of some of the forage found in pasturelands decreases with higher CO_2. As a result, cattle would need to eat more to get the same nutritional benefits.

- Climate change may increase the prevalence of parasites and diseases. The earlier onset of spring and warmer winters could encourage some parasites and pathogens to survive more easily.

- Increasing use of parasiticides and other animal health treatments could increase the risk of pesticides entering the food chain or lead to evolution of pesticide resistance, with subsequent implications for the safety, distribution, and consumption of livestock and aquaculture products.

Impact on Fisheries

Evidence of the impacts of anthropogenic climate change on marine ecosystems is accumulating and fish stocks are already threatened (Brander, 2007).

- Seasonal changes and changes in temperature have affected the timing of reproduction and migration. Increases in temperature beyond a threshold level threaten the existence of some species.

- Many aquatic species can find colder areas of streams and lakes or move north along the coast or in the ocean. Nevertheless, moving into new areas may put these species into competition with other species over food and other resources.

- As the oceans absorbs atmospheric carbon dioxide and converts it into carbonic acid, higher concentrations of atmospheric carbon dioxide led to ocean acidification, reducing the ocean pH. Increased ocean acidity prevents shell growth in oysters, clams, and snails. It also leads to increased predation and mortality, alteration in feeding rate and behavior, changes in nutrient recycling, and altered productivity of certain marine species; thereby disrupting the food chain of the ecosystem.

- Marine disease outbreaks have been linked to the changing climate. For instance, higher water temperatures and higher estuarine salinities have enabled an oyster parasite to spread farther north along the Atlantic coast of United States; winter warming in the Arctic has contributed to salmon diseases in Bering Sea.

- Increasing salinity of the tropical oceans and other habitats damages the ecosystems that serve as some species' breeding and nursery grounds and thereby threaten their population and very existence

- Rises in sea level due to thermal expansion may alter the salinity of estuarine habitats and inundate wetlands, reduce or eliminate the abundance of submerged vegetation, and affect the dependence of species on coastal areas for reproduction. Further, increases in sea level will have negative impact on productivity and availability of fish, fish landing, processing and marketing of fish, and fish-based products. Thus, it directly or indirectly affects the people who depend on fisheries for their livelihood.

11.8 Climate-Smart Agriculture

Climate-smart agriculture (CSA) is an integrated approach for developing agricultural strategies to assure sustainable food security under climate change. It is vital that climate-smart agriculture takes the local context and cultural and social heritage into account, so that it motivates the participation of local people and becomes a community approach.

The World Bank defines CSA as an "integrated approach to manage landscapes, cropland, livestock, forests and fisheries that addresses the interlinked challenges of food security and climate change". In 2020, more than half (52%) of the World Bank's agricultural financing is directed towards climate adaptation and mitigation initiatives, to promote climate-smart agriculture which improve productivity, resilience, and reduce greenhouse gas emissions in various countries. FAO (2013) defined climate-resilient agriculture as "a broad set of practices that sustainably increase productivity and resilience, reduce or remove greenhouse gas emissions where possible, and enhance the achievement of food security". In other words, it is an approach to transform and reorient the agricultural system to support food security under new realities of climate change". Adoption of climate-resilient practices is one of the ways to mitigate negative impacts of climate change.

Climate-Smart Agricultural Practices

Agriculture is directly affected by climate change, so adopting climate- smart agricultural practices is one of the ways to mitigate climate change and to ensure food security for the growing world

population. CSA takes an integrated approach to tackling the effects of climate change by adopting environmentally friendly practices.

CSA aims to simultaneously achieve three outcomes:

a. Sustainably increasing agricultural productivity and income (increased productivity).

b. Adapting and building resilience to climate change (enhanced resilience).

c. Reducing or removing greenhouse gas emission (reduced emissions).

a. Sustainably increasing agricultural productivity and income

The first objective of CSA is to produce more and better food to improve nutrition security and to boost incomes. This could be done through adopting sustainable agricultural practices such as:

- *Zero tillage/minimum tillage* – This involves minimum soil disturbance and retention of the plant residues on the surface. With zero tillage, you don't till the soil – instead, use a no- till drill or no- till planter to cut seed furrows. Minimum tillage helps to reduce soil erosion and retain soil moisture. Soil becomes more fertile and resilient. This improves crop productivity.

- *Mulching* – Mulch is a layer of organic (or inorganic) material that is placed on the root zone of the plants to conserve soil moisture and discourage weeds. Straw, wood chips, and peat are examples of organic mulches; plastic sheets are used as inorganic mulches. Mulching is a popular sustainable soil conservation practice.

- *Crop rotation* – Soil water- holding capacity could be improved by growing different types of crops every season. This helps to improve the soil structure. Crop rotation may also improve soil fertility and help control pests and diseases.

- *Green manuring* – This is the practice of growing plants and plowing or incorporating them into the soil specifically to improve the physical structure and fertility of soil. The improved soil quality then also improves water retention capacity. Green manures include legumes such as vetch, clover, beans and peas; grasses such as annual ryegrass, oats, rapeseed, winter wheat, and winter rye; and buckwheat. Most commonly grown green manure crops are dhaincha (Sesbania aculeata), sunhemp (Crotalaria juncea), cowpea (Vigna unguiculata), pillipesara (Phaseolus trilobus), cluster bean (Cyamopsis tetragonoloba), and sesbania (Sesbania rostrata).

- *Green leaf manure* – Green leaves and twigs of trees, shrubs, and herbs collected from plants growing in wastelands, field bunds, forest trees, etc., and applied to crops are called green leaf manure. The important species used as green leaf manure are neem (Azadirachata indica), mahua, wild indigo, gliricidia (Gliricida sepium), gulmohur (Delonix regia), karanji or pongania (Pongamia glabra), calotropis (Calotropis gigantea), avise (Sesbania grandiflora), subabul, peltophorum (Peltophorum ferrugenum), and other shrubs.

- *Adoption of nitrogen – efficient crop varieties* – Growing nitrogen- efficient crop varieties could minimize loss of nitrogen from the soil and into the atmosphere.

- ***Integrated pest management practices (IPM)*** – IPM integrates chemical pest control methods and other control methods such as mechanical, physical, biological, or cultural practices. This reduces the amount of chemicals entering into food chains and into the environment. Similarly, integrated weed management, integrated disease management, and integrated nutrient management practices can be adopted to promote sustainability.

- ***Water harvesting irrigation*** – Systems can be developed to collect water from a surface area for irrigation. These systems can be small or large, ranging from individual farms and plots to a much more considerable area. Water harvesting could be done through micro catchments (e.g., planting basins -- half-moon, trapezoidal or diamond-shaped basins; terraces and contour bunds on slopes; tied ridging) or through macro catchments (e.g., dams, weirs, and channels, etc.).

- ***Economical Irrigation*** – Irrigation helps farmers grow crops even if the rains fail. But water is scarce. Economical methods such as drip and sprinkler irrigation should be adopted. Drip irrigation or sprinklers require some investment but make efficient use of limited water supplies. Drip irrigation is a type of micro-irrigation system that allows water to drip directly into the root zone of the plant. This has the potential to save water and nutrients because it minimizes the chances of evaporation or leaching. Sprinkler/spray irrigation is the method of applying water in a controlled manner that is similar to rainfall.

- ***Feed management*** – This involves storing fodder such as stover, legumes, grass, and grain properly, and making better use of feed by combining types and growing grass varieties specifically suited to the agro-ecological zone. Improving the quality of livestock feed can be done by simple adjustments, including introducing byproducts such as molasses or bran; fodder crops or legume tree and shrub cuttings; and chopping or urea treatment of crop residues to process feed.

- ***Livestock manure management*** – The manure produced in a livestock farm should be collected and stored for future application to producers' fields as an organic fertilizer.

- ***Adoption of biofertilizers*** – Biofertilizers are microbial formulations that facilitate the growth of plants and trees by supplying essential nutrients to plants through natural processes such as fixing atmospheric nitrogen, solubilizing phosphorus and stimulating plant growth by synthesizing growth-promoting substances. Most commonly used biofertilizers are Azospirillum, Azolla, Azotobacter, and Rhizobium.

- ***Application of organic fertilizers*** – Application of seed-coated urea as slow-releasing nitrogenous fertilizer, and use of other organic fertilizers, compost, and farmyard manure improve soil structure and fertility as well as manage soil- borne pests and diseases.

  (*Note:* Neem coated-urea is a fertilizer that's been coated with neem tree seed oil. Neem coating works as a nitrification resistant as it propagates slowly and ensures availability of nitrogen as per crop requirement which results in growth of crop production. Neem coated urea reduces 10% of urea requirement)

- *Sustainable agricultural practices* – Adoption of pest-and disease- resistant varieties, use of treated seeds or high quality seeds, conserving biocontrol agents, agroforestry, adoption of silvo-pastoral systems, intercropping, and several other agricultural practices promote sustainable agricultural production.
  - o **Biocontrol agent** refers to the biological control agents which are either natural or modified micro-organisms that reduce the severity or incidence of diseases caused by plant pathogens such as weeds, insects and mites. It acts as a plant protectant thereby reduces pest population and generate pest-free crops.
  - o **Agroforestry** is a land use management approach that involves integraion of agricultural and forestry technologies into farming systems. It remove carbon dioxide from atmosphere and increase soil carbon. It can also act as a windbreak.
  - o **Silvo-pastoral system** is a type of agroforestry system that combines trees ('silvo'), forage plants or grasses ('pasture'), and livestock in a mutually beneficial way. It also have the potential to contribute to greater animal welfare and sustainability.
  - o **Intercropping** is a farming practice that involves cultivation of multiple crops in a close proximity: in the same row or bed, or in rows or strips that are close enough for biological interaction)

b. Adapting and Building Resilience to Climate Change (Enhanced Resilience)

Adaptation and resilience are often interchangeably used in policy and academic discourse. "Adaptation" refers to the process of changing one's life to be better able to survive in a new environment. "Resilience" describes the capacity or ability to anticipate and cope with shocks and then recover from the impact. Many definitions of resilience exist in the literature. Resiliency is a multidimensional concept and can be affected by various factors. Most of the literature defines resilience as the ability to bounce back or return to equilibrium after a disturbance occurs. Some define it as the capacity of a household or a community to deal with adversity in such a way that negativity created by the particular adversity would no longer affect the well-being of the household or the community (Tendall et al., 2015). "Vulnerability" refers to the tendency of something to be damaged. Though resilience and vulnerabiltiy are often regarded as polar opposites, resilience is coupled with a time dimension to the concept of vulnerability as the vulnerability of a region due to climate change might improvise in due course of time because of its resilience. FAO (2018) proposed three variables that can be modified at local levels and within communities to reduce vulnerability of farm systems:

1. **Reduce the farm system's exposure** – For instance, planting healthy windbreaks and hedgerows and following no-tillage planting practices help soil to resist erosion. Storage of the harvest off the ground helps keep it safe from floods.
2. **Reduce the sensitivity of the farm system to potential shocks** – For instance, farm insurance, agronomic practices such as water conservation techniques, water harvesting techniques, growing drought-resistant varieties, and growing short-term varieties could reduce the sensitivity of the farm systems.

3. **Increasing adaptive capacity** – The generic determinants of adaptive capacity are economic development, education, technology, knowledge, infrastructure, institutions, equity, and social capital. Therefore, efforts to improve these dimensions would increase the adaptive capacity of the farmers.

c. Reducing or Removing Greenhouse Gas Emission (Reduced Emissions)

The third objective of CSA is to reduce greenhouse gas emissions. As much as agriculture is impacted by climate change, it has also been a major driver of climate change, especially by means of industrialized agriculture. Therefore, we should carry out interventions especially in the agriculture sector to mitigate the emission of greenhouse gases.

Basically, there are two main ways to achieve this objective. Firstly, by reducing and avoiding emitting greenhouse gases into the atmosphere by planting nitrogen- efficient crops, reducing the usage of chemical fertilizers, using of livestock feed additives (addition of nitrates in ruminant's feed as an additives helps to reduce methane gas emission during digestion), etc. Secondly, by enhancing carbon storage through sequestration by increasing woody vegetation that absorbs carbon dioxide from the atmosphere by, for instance, planting trees, practicing rotational grazing, or storing carbon-rich organic matter in soils.

World Bank-Funded CSA Projects in Various Countries

Bangladesh: In Bangladesh, with the help of the World Bank, a project aims to boost resilience among livestock farmers by improving animal health. It also addresses climate mitigation by reducing greenhouse gases emission intensity, and improving production efficiency, including improvements in feeding strategies, animal health, breeding, manure and waste management, and low-emission technologies for milk chilling and transport activities.

China: World Bank investments of US$755 million support resilient and lower emission agricultural practices and institutions through a suite of projects. One project facilitates the expansion of climate-smart agriculture through better water use efficiency (on 44,000 ha of farmland), new technologies that improve soil conditions and boost production (rice – 12%; maize – 9%). More than 29,000 farmers' cooperatives benefited from this project by earning higher incomes and increasing climate resilience. Another project reduced significant emission of greenhouse gases by 23,732 tons of CO_2 equivalent and increased soil carbon sequestration by 71,683 tons of CO_2.

Philippines: A project to improve the capacity of local government to better manage biodiversity conservation and fisheries resources promoted climate resilience.

Uruguay: The World Bank supported sustainable agricultural production by establishing the Agricultural Information and Decision Support System and the preparation of soil management plants in Uruguay. Since 2014, 2,946,00 hectares of land has been brought under CSA by 5139 farmers, who made their farms climate smart by improving energy efficiency and soil management capacity.

Brazil: Brazil's Sustainable Production in Areas Previously Converted to Agricultural Use Project (ABC Cerrado) tested approaches to promote low-carbon agriculture through agricultural extension while boosting private profitability. This project provided technical assistance and training to 20,025 beneficiaries during 2014-2019, out of which 20% were female. It was estimated that these practices would likely sequestrate 7.4 million tons of CO_2 equivalent over the next 10 years.

Colombia: The Mainstreaming Sustainable Cattle Ranching Project of Colombia adopted silvopastoral systems along with other landscape management tools, technical assistance, and incentives. From 2010 to 2020, the participating producers in this project transformed 38,390 ha of pastureland to SPS (Silvopastoral System). Compared with production areas without SPS, the cost of milk production decreased by 9% per liter, milk productivity increased by about 25%, the animal stocking rate increased by 26%, and farmers' income increased as much as US$523 per ha per year.

Mexico: Through the Sustainable Rural Development Project of Mexico, 2286 environmentally sustainable technologies such as renewable energy, energy-efficient technologies, sustainable waste management, and biomass conversion were adopted by 1842 agribusinesses.

Morocco: The Green Generation Program for Results in Morocco aims to increase the economic inclusion of rural youth and marketing efficiency and environmental sustainability of agri-food value chains. This project will strengthen climate resilience across four dimensions of food security: availability, access, stability, and utilization. Further, it will promote precision agriculture, improve extension service on CSA practices, and act as a pilot initiative to promote agroecology to improve climate resilience. The technical extension targets 12,000 farmers and supports adoption of additional climate- smart agricultural practices.

North Macedonia: The Agriculture Mechanization Project supports North Macedonia's efforts to contribute to Intended Nationally Determined Contributions (INDC) goals by implementing climate change adaptation and mitigation activities and activities that reduce GHG emission in agricultural sector.

Yemen: The Desert Locust Response project of Yemen provides support for farm management approaches that enhance resilience of farmers and landscapes to mitigate changes in climate and pests while improving the capacity to monitor meteorological data.

Uzbekistan: Along with the World Bank, the Uzbekistan government facilitates adoption of climate-resilient farming systems and applies climate-smart practices to improve soil health and reduce land degradation, such as shifting away from cotton and wheat monoculture.

Niger: The World Bank supports climate- smart agriculture in Niger through distribution of improved, drought-tolerant seeds, more efficient irrigation, expanded use of forestry for farming, and conservation agricultural techniques to benefit 500,000 farmers and pastoralists of 44 communes. This project has helped 336,518 farmers to sustainably manage their land and brought 79,938 ha of land under more sustainable farming practices.

Pakistan: The Pakistan Punjab Irrigated Agriculture Productivity Improvement Programme aims to improve productivity of water use in irrigated agriculture. In addition to this, this project contributes to increased agricultural production, employment, income, and higher living standard for farmers and positive environmental outcomes. In 2019, 23,500 ha of land were brought under high efficiency irrigation systems, and 3667 ha of land are still in progress; 11,916 water courses had been improved, with 1220 water courses in progress; 5000 laser land- leveling units had been deployed; and 621 ponds were constructed. These efforts have benefited half a million farm families and 5.7 million acres of farmland, created more than 15,000 full- time jobs, and improved water management.

Kenya: The Climate- Smart Agriculture project of Kenya aims to increase agricultural productivity and build resilience to climate change risk among smallholder farming and pastoral communities by scaling up climate-smart agricultural practices, strengthening climate- smart agricultural research and seed systems, and supporting agrometeorological, market, climate, and advisory services.

Sahel: In 2015, the World Bank supported pastoralists in the Sahel to adopt climate- smart agriculture practices through a project in Burkina Faso, Chad, Mali, Mauritania, Niger, and Senegal. Interventions were introduced to improve animal health and rearing, and to promote more sustainable rangeland management that boosts productivity and resilience and helps to reduce emissions.

Malawi: The World Bank promotes CSA to enhance the resilience of farmers to increasing and persistent droughts by improving soil health for increased agricultural productivity and climate change adaptation and mitigation. This project is assisting around 140,000 farmers to adopt a range of CSA practices and improve soil health of 280,000 ha of land.

India: To date, the Maharashtra Project for Climate-Resilient Agriculture is the largest CSA project financed by the World Bank -- US$420 million. This project is estimated to yield climate change improvements of US$386 million. As of June 2020, this project had benefitted 309,800 beneficiaries and brought improved irrigation and drainage technologies to 56, 602 ha of land.

Kazakhstan: The Sustainable Livestock Development Programme for Results runs from 2021 to 2025 in Kazakhstan. It aims to facilitate a profound transformation of the beef sector in Kazakhstan to foster sustainability and climate change mitigation. This project addresses the issues of biodiversity conservation, land degradation, pollution control, and mitigation of GHG emissions.

West Africa: The West Africa Agricultural Productivity Program (WAAPP) involves 13 countries and multiple partners in developing climate-smart varieties of staple crops such as rice, maize, and plantains. It also provides access to technologies such as efficient water harvesting systems. As of July 2019, this project had benefitted 9.6 million people and made more than 7.6 million ha of land more productive, resilient, and sustainable. Beneficiaries reported a 30% average increase in yields and income, and the project improved food security for around 50 million people in the region.

11.9 Extension Approaches to Mitigate Climate Change

Weather-Based Agro-Advisory Services

Almost all agricultural activities -- sowing, transplanting, irrigation, spraying of pesticides and insecticides, harvesting, marketing, and so on -- have to be planned on the basis of the climatic conditions prevailing in that area. Climate change consequences such as delayed or frequent rainfall during sowing or harvesting time will lead to yield loss. To avoid this, farmers need up-to-date weather information, which can be provided through weather- based agro-advisory services. Weather agro-advisory services provide information on weather- sensitive crops, their weather- sensitive stages, and weather- sensitive farm operations based on short- and long-term weather parameters such as temperature, rainfall, wind speed, wind velocity, and direction of wind.

Benefits to farmers include easy access to weather information, affordability, and applications. Nowadays, information and communication technology (ICT) tools such as mobile phones, computers, the internet, etc., are readily available to diffuse information easily and quickly. In past decades, several government and non-government initiatives provided weather information to farmers through mobile phones via calls and messages. They can then use the information to decide when to carry out weather-sensitive farming activities such as sowing seeds, transplanting crops, scheduling irrigation, applying pesticides and fertilizer, harvesting crops, and vaccinating animals.

Strategies to Promote Climate-Resilient Agricultural Technologies

- Extension professionals should provide advisory services after considering the climatic parameter. This could be done through the following steps:
  1. Assessing the agro-climatic zones based on their agricultural profile and weather parameters.
  2. Document the existing and available climate-smart agricultural technologies adopted by the farmers according to the nature or characteristics of agro-climatic zones, weather parameters and existing cropping patterns.
  3. Assess farmers' awareness and knowledge of available climate- smart agricultural practices.
  4. In accordance with the nature of the agro-climatic zone and the constraints faced by the farmers, recommend one or more climate-smart agricultural practices.
- Promote technology mapping – available CSA practices should be documented and suggested according to the agro-climatic zones.
- Establish demonstration units – documented CSA practices should be carried out at farmers' training centers to create awareness among them.
- Establish outreach centers and remote pilot training organizations to disseminate documented CSA practices and to improve adoption by providing training to farmers.

- Generate employment and promote entrepreneurship by establishing custom hiring centers in agro-climatic zones that need to be improved through agricultural mechanization.

11.10 Conclusions

Climate change over time directly or indirectly alters the global atmospheric composition and climatic variability with serious implications for agricultural food production systems. There is an urgent need to make the actors in the agricultural systems aware of climate change, its impacts, and strategies to mitigate climate change. This also calls for promoting climate- smart agriculture among the actors of the agricultural systems. Climate-smart agricultural activities and outcomes require integrating a wide range of concepts, information, and practices from a variety of disciplines to a wide range of stakeholders. This chapter addressed these issues with focus on causes of climate change, emission of greenhouse gases causing global warming by sector, global efforts to combat climate change, impacts of climate change on agriculture, climate- smart agriculture, and extension approaches to mitigate climate change.

11.11 Self-Assessment Exercises

1. In your understanding, explain the following concepts:
   a. Climate change
   b. Global warming
   c. Climate- smart agriculture
2. Explain the anthropogenic and natural causes of climate change with examples.
3. Discuss the emissions of greenhouse gases by agricultural sector. .
4. What is the greenhouse effect? Discuss impacts of global warming.
5. Communication is one of the pillars of the extension profession. Based on this premise:
   a. How to create awareness among the farmers about climate-smart agricultural practices?
   b. What are the different extension methods that can be used to improve understanding of climate change among the people?
   c. How to increase the people's engagement and action towards climate change?
   d. What are the barriers to be tackled in climate literacy?
6. List the five targets to combat climate change as per Global Goals 2023.
7. Discuss the global efforts to combat climate change with examples.
8. Outline the extension approaches to mitigate climate change with examples.

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Essential Competencies of Frontline Agricultural Extension Professionals – Synthesis and Way Forward

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Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that frontline agricultural extension professionals require to perform their tasks effectively. The problem of professional incompetence among them has been a persistent issue within extension. Related to this problem is a lack of motivation among extension employees to develop the core competencies they need for their jobs. Some of the pertinent related questions are:

- How do we establish a vibrant staff development unit?
- How do we motivate agricultural extension workers to participate in professional development programs?
- What mechanisms should we have to reward agricultural extension professionals who excel in these competencies or disincentivize those who consistently lack these skills?

In the United States, the Extension Committee on Organizational Policy (ECOP) has been involved in designing strategies for extension services, including core competencies for U.S. Cooperative Extension professionals. The documents -- Gibson and Hillison (1994) and ECOP (2002) -- have been instrumental in helping the U.S. land grant universities to develop their staff members' core competencies and inspired other organizations to develop and redevelop their staffs' core competencies.

Extension professionals must be prepared with the knowledge, skills, and behaviors to help meet the demands and needs of clients in developing and underdeveloped countries. However, agricultural extension and advisory services (EASs) seem to lack capacity and a system to identify and address the training of extension workers on required process skills and core competencies. Agricultural universities are tasked to develop curriculum to prepare agricultural development professionals, but they tend to lack resources, expertise, and/or willingness to develop a robust curriculum for extension worker training.

12.1 Identifying Skills and Competency Gaps in the Extension Curriculum

The changes in the role of the EASs demand different core competencies among extension professionals (Cooper and Graham, 2001) -- different types of knowledge and attitudes along with

more diverse skills and working patterns. Ultimately, this has tremendous implications for preservice training curricula (undergraduate and graduate levels) in agricultural and extension education (Scheer et al., 2006). It also has implications for the professional development of extension professionals -- specifically, the content of in-service training programs. To put it simply, the changes taking place within the agricultural extension system call for significant modifications in curriculum-based capacity development programs to impart the core process skills and competencies that agricultural extension professionals need.

To fill the process skills and competencies gaps in the agricultural extension curriculum, we conducted three major studies in south Asia (India, Nepal, and Sri Lanka) and sub-Saharan Africa (Nigeria, South Africa, Malawi, Uganda, and Kenya):

- Assessment of Core Competencies of Livestock Extension Professionals in India. This study was funded by USAID/Modernizing Extension and Advisory Services project (Sasidhar and Suvedi, 2016).
- Strengthening Agricultural Extension Training in South Asia (India, Sri Lanka, and Nepal) -- Process Skills and Competency Gaps in Undergraduate Agricultural Extension Curriculum (2020). The study was funded by the U.S. Department of State under the Fulbright Regional Research Program (Suvedi and Sasidhar, 2020).
- Strengthening Agricultural Extension Training in Nigeria, Malawi, South Africa, Uganda, and Kenya. The study was funded by the Michigan State University Partnerships for Innovative Research in Africa (PIRA) initiative (Suvedi et al., 2023).

The goal was to identify gaps and suggest areas for agricultural extension curricular revisions to better serve the needs of contemporary bottom-up, pluralistic, and demand-driven extension systems in South Asia and sub-Saharan Africa. The results point to the conclusion that the agricultural extension professionals are fully aware of the importance of all process skills or competencies to performing their extension job well. They are also fully aware that the present undergraduate (UG) extension curriculum minimally addresses these skills and competencies. Though some of the broad process skills and competencies are included in UG agricultural extension courses, students have inadequate opportunity to have hands-on training and build up critical thinking and problem-solving skills to line up with EASs delivery outcomes. New textbooks and training manuals on essential core skills and competencies is one of the key recommendations that emerged in these studies. To address the need, we developed this manual, *Essential Competencies of Frontline Agricultural Extension Professionals.*

In the first chapter, we gave an overview of the agricultural sector, the concept of extension competencies, the history, current issues, challenges of EASs, and how competencies can be imparted and assessed in extension work. Based on our works in South Asia and sub-Saharan Africa, we also identified the essential skills and competencies of frontline agricultural extension professionals along with subcompetencies under each competency.

Chapters 2, 3, and 6 are essentially the key stages in the extension program cycle with focus on program planning, implementation, and evaluation. The key competencies covered in these chapters include stakeholders' engagement in planning, conducting need analysis, developing program goals and objectives, preparing resource inventory, selecting educational methods and materials, developing a grant proposal, ground preparation and procedures in program implementation, selection of local leaders and stakeholders, management and control of program resources, evaluation types, frameworks and designs, sampling, evaluation data collection and analysis methods, communicating, and utilizing evaluation findings for improving evaluation practice. With a thorough understanding of these three chapters, frontline agricultural extension workers can formulate a sound extension program, implement it, and evaluate its outputs and outcomes.

As planners, educators, and managers of local development programs, extension workers must possess strong communication skills. In the information technology age, using information and communication technologies (ICTs) has become a part of extension educators' daily work. In chapters 4 and 5 we covered the key communication and ICT competencies -- viz., selecting appropriate communication methods, establishing communication with various stakeholders, respecting local culture while communicating with clients, preparing required progress reports, sharing success stories and lessons learned with stakeholders through various media, using extension methods to disseminate information about extension activities and programs, demonstrating good listening skills and listening to all clients and stakeholders, demonstrating good public speaking and presentation skills, word processing, data entry and analysis software such as Excel, SPSS, etc., Power Point for making presentations, audiovisual aids for facilitating learning, and use of mass media, computers, mobile phone services, social media for communication, using ICT tools to improve access to information, knowledge, technologies, innovations, enhance collaboration and partnerships, and ICT tools for collecting data, monitoring, and evaluating extension programs.

Professional development refers to continuing education and training for field extension professionals to help them develop new skills, stay up-to-date on current trends, and advance their careers. Agricultural extension professionals should acquire and employ a variety of professional development competencies to deliver quality educational programs of relevance and importance to the clients. These relevant skills and competencies are acquired through professional development activities that improve the abilities of extension professionals and stimulate individual improvements. Keeping this in view, chapter 7 focuses on the concept of professional development, professional development activities including their benefits for agricultural extension professionals, ethical codes guiding the extension profession, and how to engage in and assess various professional development activities and apply fundamental governance principles in extension work.

To promote inclusivity, equity, and social justice, addressing gender and diversity issues is critical in agricultural extension programs. Further, agriculture is a gendered sector, and gender plays a significant role in shaping access to resources, decision making, and control over productive

assets. Therefore, gender consideration is essential to ensure that agricultural extension programs are responsive to the needs and priorities of women and men as well as other diverse groups of farmers. Chapter 8 introduces gender and diversity concepts, presents requisite skills needed by extension professionals for addressing the needs and opportunities for women and youth farmers, and discusses the dimensions and importance of diversity for agricultural extension professionals developing extension programs to benefit and engage women, youth, marginalized, and vulnerable groups.

Soft skills, also termed "life skills". These 21st century skills are the intangible, non-subject matter, and personality-specific skills that help agricultural extension professionals to facilitate, mediate, and negotiate in extension work. In chapter 9, we discussed the concept of soft skills with implications to extension work, 16 important soft skills under two broad categories -- eight intrapersonal skills and eight interpersonal skills that are useful in extension work and how to apply them in extension work in the delivery of agricultural extension and advisory services.

Modern day farmers no longer farm in a protected, uncomplicated environment. They are exposed to global market influences and must manage many components of their farming business, irrespective of its size. Many are no longer just involved in subsistence farming and they have evolved to manage an agribusiness. Agribusiness encompasses all the different businesses involved in taking the raw product produced on the farm and processing it into a product delivered to the final consumer. This includes manufacturing and distributing farm supplies, value addition, marketing, and entrepreneurship. It demands management skills that most farmers were not formally taught anywhere. Chapter 10 outlines the concepts and principles of agribusiness, marketing, value chain development, and marketing strategy development skills and competencies to assist farmers.

Competence in basic subject matter knowledge and skills, and its application in relevant extension work enable the extension professional to perform effectively. Extension is not a stand-alone discipline as it deals with a specific subject matter which needs to be communicated to a specific target group -- i.e., farmers growing crops, livestock, fishery, and other relevant agribusiness operators. The subject matter to be transferred depends upon the farming enterprise and category of farmers. Climate change, however, is a subject matter concept that cuts across different streams of extension with serious implications for agricultural food production systems. There is an urgent need to make the actors in the agricultural systems aware of climate change, its impacts, and strategies to mitigate climate change. Climate-smart agricultural activities and outcomes require integrating a wide range of concepts, information, and practices from a variety of disciplines to a wide range of stakeholders. Chapter 11 addresses the key skills and competencies required by agricultural extension professionals on climate change and its mitigation with focus on causes of climate change, emission of greenhouse gases causing global warming, global efforts to combat climate change, impacts of climate change on agriculture, climate-smart agriculture, and extension approaches to mitigate climate change.

12.2 Way Forward

Agricultural EASs play a key role in addressing complex challenges, increasing farm productivity, and linking farmers to markets. On the other hand, inadequate institutional capacity -- i.e., faculty vis-à-vis the agricultural extension curriculum -- has resulted in poor quality training of extension professionals, resulting in low quality EASs. Periodic updating of the undergraduate (UG) agricultural extension curriculum is necessary for universities to produce graduates with essential process skills and competencies that will enable improved EASs, sustainable food and nutrition security, improved livelihoods, and natural resources conservation.

The findings of the three major studies that we conducted in South Asia and sub-Saharan Africa and analysis of existing UG extension curricula revealed that curriculum, learning methods, and materials are inadequate with current EASs needs to meet today's challenges. Though some of the broad process skills and competencies are included in UG agricultural extension courses, students have inadequate hands-on training, critical thinking, and problem-solving process skills to line up with EASs delivery outcomes. The analysis on distribution of courses based on competence domain covered in UG extension curriculum revealed that the curricula for the programs are largely aligned with the 11 competency domains but with outstanding emphasis on technical competence rather than process skills and competencies, with few exceptions. Some critical professional competency domains such as soft skills, gender and diversity, nutrition and food safety, brokerage, marketing and value chains, and personal and professional development are not well covered in UG extension curricula. Also, some subject matter -- particularly on contemporary issues and technologies in competency domains such as ICTs -- is not adequately addressed.

In most cases, the proper implementation of curricular recommendations is impacted by budgetary constraints, instructor preparedness, and student / faculty motivation for practical or hands-on learning. As a result, the curriculum transaction is more theoretical and inadequate on practical hands-on training. Students have little opportunity to develop critical thinking and problem-solving process skills that are necessary to align training content and instruction with employment outcomes. The results and coverage of process skills and competencies in UG extension curriculum lead to a further conclusion that the level of required curriculum transaction and preservice training at the UG level is inadequate to prepare students with the required skills and competencies to provide integrated EASs efficiently to their clients. The universities should specify the skills or competencies in course content with learning outcomes to be achieved, suggest pedagogy for facilitating process skills development, support practical training and fieldwork, and focus on enhancing the curriculum transaction processes. Capacity building of the agricultural extension faculty on the 11 process skills or competencies and 97 subcompetencies for effective curriculum transaction is also essential.

With respect to competencies related to technical subject matter expertise, the agricultural extension professionals receive adequate education in production agriculture disciplines such as field crops, horticultural crops, and livestock, but they lack adequate preparation about various types of risks

and uncertainties due to climate change, market fluctuations, and natural disasters. There is also lack of basic knowledge of agribusiness management, value chain development, and principles of entrepreneurship development. These issues are covered in the manual.

Though some of the contents being imparted at the UG level are still relevant in the field of agricultural extension, curriculum reforms are important to address new challenges such as demand-driven or market-led pluralistic EASs, contract farming and value chain EASs, agriculture start-ups, digital EASs, management of natural resources, community sustainability, facilitation for development, diversity of extension staff members and clients, changing job markets for agriculture graduates, etc. The introductory concepts and principles of extension come from diverse social science disciplines such as adult education, rural sociology, development communication, economics, psychology, anthropology, management, and development studies. Modernized agricultural extension curricula could be enhanced through the integration of various social science courses and faculties. In view of all these, it is essential to transform the terminology and course contents of UG extension curricula with a focus on modernized EASs.

Methods such as preservice training, internship in various work environments, basic induction training, inservice training, and continuing education opportunities are appropriate and could be employed to enhance the skills and core competencies of agricultural extension professionals. There are vital advantages to incorporating precisely defined competency outcomes and job roles in the UG agricultural extension curriculum at preservice and internship training levels. The process skills and competencies covered in this manual could be the starting point for defining learning outcomes, job roles, minimum day-one competencies expected of graduates and National Qualifications Framework at preservice and internship levels during UG programs. To address barriers and improve agricultural extension training, it is essential to allocate sufficient budget for extension practical teaching-learning experiences, recruiting quality faculty members to teach extension courses, training and motivating teachers to teach required process skills and competencies, providing good classroom and demonstration facilities, and making available quality textbooks and/or manuals.

This manual *'Essential Competencies of Frontline Agricultural Extension Professionals'* is developed primarily to serve as an extension training resource for extension faculty, field-level professionals, research scholars, and graduate students. We hope this publication would serve a useful purpose. We would be highly obliged and thankful to receive feedback on this manual for its further improvement.

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Essential Competencies of Frontline Agricultural Extension Professionals

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Process skills and core competencies are basic sets of knowledge, skills, abilities, and behaviors that frontline agricultural extension professionals require to perform their tasks well and respond to contingencies, change, and the unexpected. The three comprehensive studies conducted by the editors in South Asia and sub-Saharan Africa revealed a significant gap between existing and required skills of the frontline agricultural extension professionals on the following essential competencies:

- **Program planning**
- **Program implementation**
- **Communication**
- **Information and communication technologies**
- **Program evaluation**
- **Personal and professional development**
- **Diversity and gender**
- **Extension soft skills**
- **Agribusiness, marketing and value chain development**
- **Climate change mitigation and extension**

This manual is developed primarily to serve as a training resource on the above competencies for the frontline agricultural extension professionals, extension faculty, research scholars, and graduate students to address the needs of demand-driven, pluralistic, participatory, and decentralized extension advisory services.

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