

**Training Workshop on ‘Scale Development in Social Sciences’
CRISP, SRS-NDRI, MANAGE, AESA
10-14 June, 2019
Southern Regional Station, ICAR-NDRI, Bangalore**



A Training Workshop on ‘Scale Development in Social Sciences’ was held from 10 to 14 June, 2019, at Bengaluru. It was organised by CRISP in collaboration with Southern Regional Station of ICAR-National Dairy Research Institute, MANAGE, and AESA. Satarupa Modak participated in this workshop and her report is presented here.

CONTEXT

Scale Development is a process of developing a reliable and valid measure of a construct in order to assess a particular attribute of interest, and is considered an integral part of any empirical social research. The scales help the researcher in measuring socio-psychological phenomena in a simple and accurate manner. Recent advances in the measurement paradigm have brought in various tools and techniques, which have drastically changed measurement systems. Regardless of the approach to scale creation, in order to create a scale, a clear conceptualization of the construct is required. This training workshop was aimed at creating a clear understanding of methodologies, application of theories in social science research, expertise on advanced statistical tools, and accurate interpretation of output among participants. Scales are vigorously being used in various disciplines of social science research – psychology, marketing, human resource management, extension, and sociology – as tools for understanding social and behavioural phenomena for advancing knowledge, sharpening technical and managerial skills, improving organisational climate and employee efficiency, and developing or refining policies.

The Training Workshop on ‘Scale Development in Social Sciences’ was organised by the Centre for Research on Innovation and Science Policy (CRISP) <http://crispindia.org/> in collaboration with Southern Regional Station (SRS), ICAR-National Dairy Research Institute (NDRI) <http://www.ndri.res.in>, National Institute of Agricultural Extension Management (MANAGE) <http://www.manage.gov.in/> and Agricultural Extension in South Asia (AESAs) <http://www.aesanetwork.org/> to equip scientists, academicians and research scholars from extension, economics, sociology, psychology, business management, and other related disciplines with critical skills in developing, using and obtaining copyright for scales. The workshop followed a ‘nuts and bolts’ approach by covering all aspects of psychometrics along with adequate hands-on experience on specific techniques.

A group of 20 participants with diverse educational and professional expertise attended this workshop. The group was comprised of senior researchers and young scholars and this facilitated a constant flow of knowledge and wider sharing of experience.

PROGRAMME

DAY 1

Dr S Subash (Coordinator and Scientist, Extension Section, SRS-NDRI) welcomed the participants and gave a brief introduction on the host institute. Using a short documentary film, he described the genesis of SRS-NDRI, its development till date, services delivered, and products developed by this station. The Head of the Station, while inaugurating the training workshop, mentioned the need and importance of research in social sciences for addressing immediate societal issues/needs.



Dr Subash briefing about SRS-NDRI

Dr P Sethuraman Sivakumar (Principal Scientist, ICAR-Central Tuber Crops Research Institute and workshop leader), initiated the formal session by first discussing the purpose of this training workshop. He elaborated on the benefits participants can obtain from such a workshop with participants of varied age and expertise (management, physical education, education, clinical psychology and agricultural extension). Furthermore, Dr Sethuraman mentioned the topics that would be discussed in the next five days, and the importance of hands-on exercises for the participants.

Dr MC Arunmozhi Devi (Principal Scientist, Dairy Extension Section, SRS-NDRI) organised an ice-breaking session in a very interesting manner and introduced a couple of simulation exercises to break the routine.



Simulations Exercise: encourage team building activities

In his lecture on basic Statistics in Social Science Research, Dr M Sivaram (Principal Scientist, Economics and Statistics Section, SRS-NDRI), discussed very briefly about the need for statistics in scientific research, variation/variability of any data, descriptive and inferential statistics, regression analysis, causes of standard error, boxplot techniques probability distribution, test of hypothesis, poison distribution, etc.

The day ended with a transact walk in the SRS of ICAR-NDRI campus with a briefing by Dr Siddaramanna (Senior Technical Officer, SRS-NDRI), about the heritage building of SRS-NDRI where the Father of the Nation, Mahatma Gandhi visited and got acquainted with dairy farming practices. Further, we visited various facilities, such as the Livestock Research Center where different indigenous breeds of Karnataka cattle, especially dwarf breed Malnad Gidda, and dual purpose cattle breed Deoni were maintained along with other crossbred cattle. Further we were also taken around the hydroponic fodder production unit, the medicinal plant garden, and the green fodder demonstration plot.



Extinct indigenous cattle breeds, Karnataka

DAY 2

The second day started with a quick recap of the previous day by Dr Subash. He also divided the participants into three groups for the practicals. Then came a session on 'Measurement and Scale Development in Social Science Research' led by Dr Sethuraman. He discussed the different methods of knowing, goals of scientific research, major paradigms of scientific research, measurement approaches, scaling techniques, construct conceptualisation, three numerical properties of measurement, techniques of systematic management of literature review, and sampling in extension research.

In the subsequent session, Dr Sivaram discussed sampling techniques, sample size estimation, and multiple linear regression with real world examples.



Sessions on paired comparison technique

In the third session of the day, Dr Subash briefly discussed the Method of Paired

Comparison technique, including characteristics of scale, classification of scaling technique, comparison of scaling technique, relative advantages of comparative scales, methods of paired comparison, interpretation of F-matrix and P-matrix. The day ended with a hands-on exercise on different scaling techniques that Dr Sethuraman assigned to the three groups.

To summarise, the second day of the workshop started with scale construction and the modern approach, and went on to latent variable models, and the importance of structural equation modeling that was discussed by Dr Sethuraman. He also allotted hands-on exercises on different scaling techniques to the three sub-groups.



Group discussion about the lessons learnt

DAY 3

This day started with a quick recap of the second day's activities by Dr Subash. He then discussed follow-up activities – preparation of scale construction (equal appearing scale, Q-sort analysis, and Guttman scaling techniques) – and assigned these to the groups.

Dr Lalith Achoth, Prof. (Retd.) of Karnataka Veterinary Animal and Fisheries Sciences University (KVASU), Bengaluru, discussed data preparation for analysis-outliers, missing data, testing assumptions. He also introduced 'R', 'rstudio' software for advanced statistical analysis that basically works with dos & command, 'LPSolve' for linear programming, 'Anaconda Python' for large-scale data processing, all of which were quite interesting and new for us. He practically showed step wise installation procedures and properties of this software, and also said that 'data cleaning, or data preparation is an essential part of statistical analysis'. Dr. Lalitch elaborated on the usefulness and importance of 'R'. He argued that agricultural professionals should develop expertise in advanced statistical softwares as the future will demand accuracy in demand-supply and price forecasting.

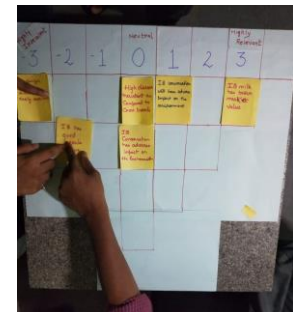
Dr Mariamma Philip (Associate Professor, Dept. of Biostatistics, NIMHANS, Bengaluru) explained in detail the development of psychometric scales, including the need for psychological scales, principles of rating scale, testing and assessment, test conceptualization, test construction, test tryout, item analysis, agreement statistics, random error & systemic error, importance of reliability & validity, test revision, etc.



Lecture on construction techniques of psychometric scale

Then, Dr Sethuraman explained reliability and validity: importance and need of these in scale construction, methods, types; missing data analysis, procedure for sample size estimation. He worked out the analysis through step-wise elaboration on prepared datasheets that helped the participants in easily understanding, and initiating follow-up activities.

Dr Subash and Dr Sethuraman encouraged the participants to work on scale construction by following these methodologies with their respective group members. The participants were asked to present the outputs of their respective group's work the next morning, and all participants really struggled till midnight to complete the given tasks. It was the most active and energetic night of the whole workshop where each participant supported their respective teams in preparing the outputs of their group's effort.



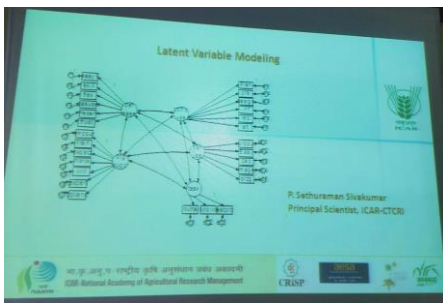
Data collection by Q-sort method



Presentation on group exercise

DAY 4

The fourth day of the workshop started with the presentation of scales (equal appearing Likert scale, Guttman scale, Q-sort scale) by the representatives of each group. Each group described their outputs accurately in the presence of the workshop leader and coordinator, and also responded well to the queries raised by fellow participants. This exercise was really helpful to understand the different scale construction procedures with close observation and practical implication.



Critical analysis of statistical methods

Dr Sethuraman in his first session on Day 4 gave a lecture on latent variables, structural equation modeling-factor analysis, factor extraction method, interpretation of factors, and testing reliability of the factors. He again introduced SPSS Amos software for factor analysis, and participants also performed exercises on factor analysis with the help of this software in the classroom situation with a given set of datasheets.



Visual representation of factor analysis

DAY 5

After a quick recap of previous sessions by the coordinator of the workshop, Dr KP Ramesha (Head, SRS-NDRI) gave a brief sketch of IP protection for scales. He described the strategic use of Intellectual Property Rights and valuation of technology for value extraction, trade-related Intellectual Property Rights, Patents, Copyrights, Trade Secrets, Trade Marks, Industrial Designs, Geographical Indicators, etc., and related legal procedures.



Lecture on Intellectual Property Rights

Later, during the plenary session, Dr Rasheed Sulaiman V (Chief Guest and Director of CRISP) addressed the gathering and explained the rationale for organising these types of training workshops for the benefit of social science professionals; and narrated the role of CRISP and AESA (Agricultural Extension in South Asia) in contributing to such initiatives. He congratulated Dr Sethuraman and Dr Subash for successfully organizing this event, and the participants as well for their new learning experience. He also handed out certificates of participation to all the trainees.



MY IMPRESSION

Though the schedule of the workshop was very hectic, there was continuous and systematic flow of knowledge, expertise and experience throughout the workshop. The heterogeneity of the participants also contributed greatly to the success of this workshop. The participants expressed the need for more such follow-up workshops and appreciated the SRS-NDRI management for all the necessary arrangements. They profusely thanked the Course Leader and Coordinator for maintaining a logical sequence of varied sessions that facilitated systematic learning.

I would like to personally thank the the organisers and collaborators (CRISP, SRS-NDRI, MANAGE and AESA) for providing this type of an effective learning platform that contributed significantly to my understanding of scale development. This workshop also introduced and connected many of us with researchers from numerous fields with wide-ranging expertise. We also formed a WhatsApp group to share doubts and information about advances in social science research as well as information on similar training opportunities with fellow participants, and we continue to interact with each other regularly in order to reinforce our learning.

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