AICTE-GTU Jointly Sponsored
Faculty Development Programme
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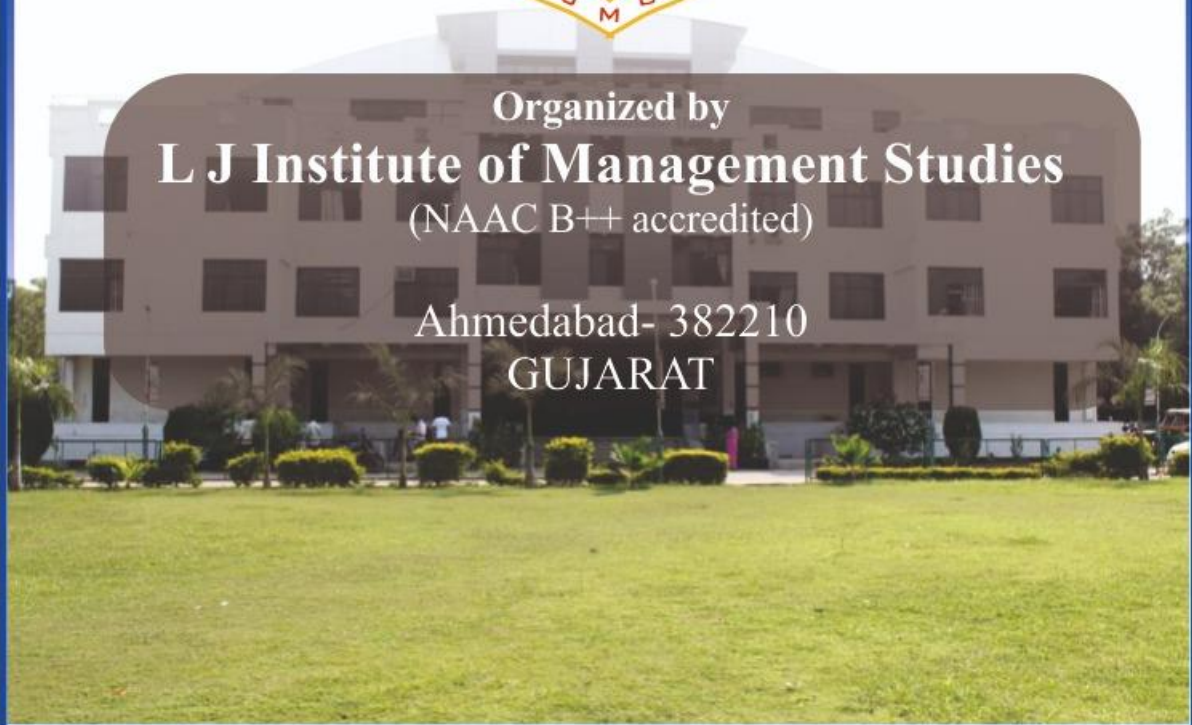# Multivariate Data Analysis using SPSS & AMOS
Date: 25th to 29th March 2019

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Organized by
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Introduction

A comprehensive knowledge about statistical analysis is especially important for academicians to pursue their research aspirations and to achieve success at workplace. In spite of enormous amount of available data, a thorough understanding and application of appropriate statistical tools, is the most critical factor in conducting research.

The FDP was intended to develop participants into competent users of statistical software's and to enable them to conduct independent data analysis for their research work and academic guidance to students. The programme was designed to cover all relevant aspects of statistical data analysis including basics of research methodology, data preparation, validation and advanced statistical techniques. It provided the participants good experience in interpreting output from widely used software packages like SPSS and AMOS. The Course structure was a perfect mix of theory and applications, so that the participants not only develop an understanding to interpret different software's output but also assimilate knowledge on the underlying assumptions and theory behind the outputs.

Objectives

- Understand the basic principles and concepts of research methodology
- Understand the criterion of selection of appropriate statistical technique for analysis.
- Develop an understanding of basic concepts of statistics in hypothesis testing.
- Understand the concepts and application of various multivariate statistical techniques
- Understand the basic concepts, techniques and tools associated with Structural equation Modeling (SEM).
- Demonstrate different outputs of data analysis through statistical software (SPSS and AMOS)

The Course Outline

- Basic concepts of research methodology
- Criterion for choosing the right statistical test
- Descriptive Statistics using SPSS
- Summarizing the data using Charts
- Hypothesis testing –Chi Square, One sample and paired t test
- Analysis of Variance (ANOVA)
- Correlation and Multiple response analysis
- Logistic Regression
- Conjoint Analysis
- Exploratory factor Analysis using SPSS
- Confirmatory factor analysis using AMOS
- Checking validity and reliability of Scale
- Structure Equation Modeling (SEM)

The programme was useful to faculties in the area of Management/Commerce/Economics to improve their understanding on statistical concepts. It was also important for the faculty members who are pursuing their Ph.D and/or post Doctoral research in particular and any faculty doing research in general for further career advancement. The programme was attended by 40 participants, out of which 15 were external participants and 25 were internal faculty members. All participants were faculties from GTU affiliated institutes only.

Day 1: Key Note

Dr Rajneesh Krishna, Associate Dean & Professor in Strategic Marketing, MICA

The key note address was given by Dr Rajneesh Krishna on 25th of March 2019, who is an associate dean and a professor in strategic marketing at MICA. Armed with a PhD from IIT Bombay Dr Krishna has published in various refereed journals and has also written a book on consumer behaviour which was published by Oxford University Press. In his session he focussed on the practicalities associated with the researches these days. He shared his valuable experience and knowledge about the various researches which were being done under him.

He elaborated the main goals of research i.e. creation and transformation of knowledge as it is a never ending process. He also handled various doubts in the minds of the participants regarding the research work and motivated them a lot for the quality work. He introduced the concept of area random sampling which can be applied to get the good results out of the survey. He differentiated both quantitative and qualitative research techniques through the practical live examples which were discussed amongst participants. Being closely associated with consumer behaviour studies he gave very good practical examples of how to conduct the brand perception studies and the other behavioural studies through qualitative approach as it can lead to a broader picture of the research findings.

Day 1 : Session 1 and 2

Dr Anitha Sunil, Associate professor L.J. Institute of Management studies

The session on 25th of March 2019 was being taken by Dr Anitha Sunil who is a faculty with L. J. Institute of Management Studies with a teaching experience of 14 years in the area of quantitative analysis. She is a PhD and her areas of interest include service marketing, research methodology, quantitative analysis and operations management. She gave a comprehensive view about research process and types of research namely descriptive, comparative, relationship and causality. The research types were covered with real life examples so that participants could relate with their areas of interest. All the basic concepts which are needed to analyse the projects were covered like type of variables (discrete, continuous, independent, dependant, mediating, moderating, extraneous and confounding) and type of scales (ordinal, nominal, interval and ratio). Also the relevant and meaningful class based assignments were given to evaluate the participants which not only helped the resource person to develop the further flow of the session, but also helped the participants to self-evaluate themselves. Then she also elaborated on the type and process of hypothesis testing which was further analysed with the type of tests which a researcher can use depending upon the type of data

In the second session she extensively explained all the options by which the data can be coded and fed into the SPSS software depending upon the type of data. For this all the participants were given exposure to the same software.
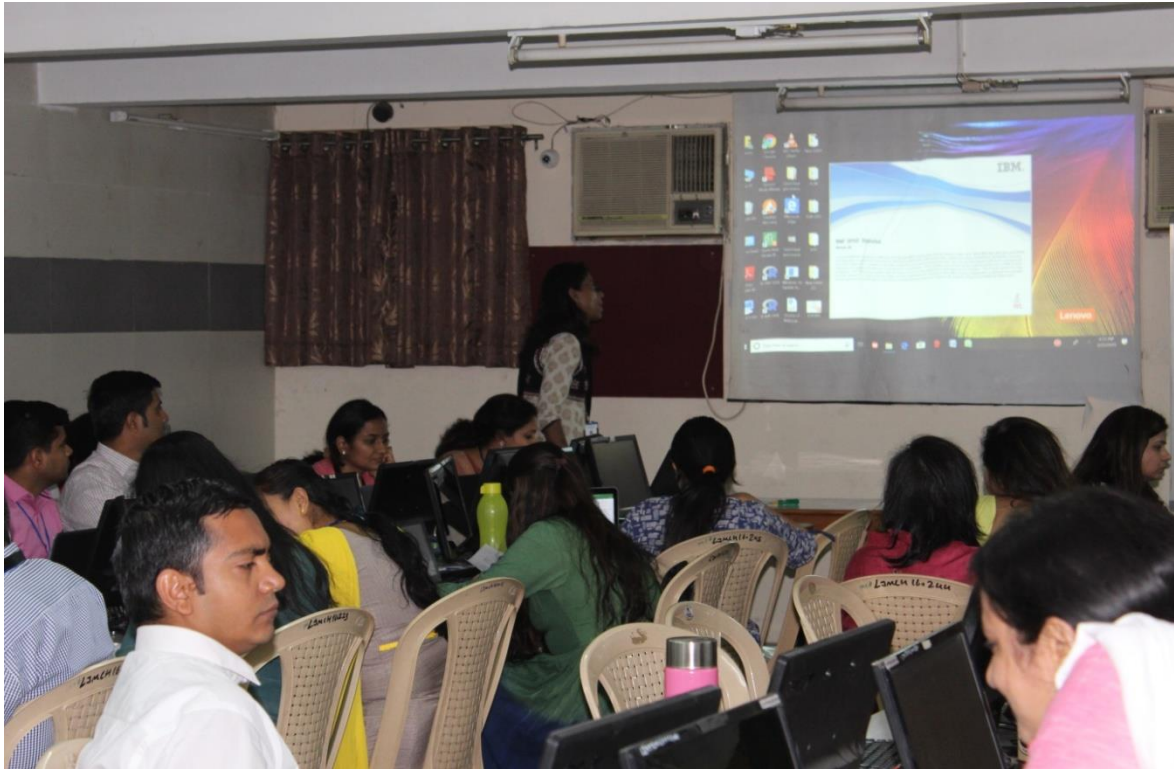
All the queries and doubts of the participants were cleared so that they could have an enriching experience in the further sessions. The basic concept of hypothesis testing was explained. She also taught various options to use T test and independent T test for the analysis pose and the interpretation of the results of the tests.

Day 2 & 3

Dr Bhavesh Vanparia, Faculty and Coordinator at Department of Human Resource Development, Veer Narmad South Gujarat University, Surat

The sessions were conducted by Dr Bhavesh Vanparia on 26th and 27th of March who is PhD, MBA, LLB, PHDR and PGDHRM and works in the department of HRD, VNSGU (Veer Narmad South Gujarat University), Surat. He gave insights into the basic assumptions and generalization of the research like it is being used extensively in medical science, manufacturing, product quality control and consumer surveys. Detailed explanation was given about the metric and non-metric tests along with the practical problems which was very much meaningful and useful for all the participants. The resource faculty focussed on the applicability and the feasibility of the tests like one sample T test, independent T test, paired T test, Chi square test, correlation, regression and ANOVA to name a few. For each and every test he had a case based approach through which all the participants got a chance to operate SPSS with the suitable examples being taken for the study. The cases which were provided to solve the problems through SPSS were situational and practical so that the participants could relate them with the actual projects. The learning took place in the stages like testing of the normality of the data, checking of the applicability of the tests, handling of outliners, linearity and homoscedasticity (if any) and interpretation of the tests. In regression analysis he also elaborated various concepts like variance, r square, adjusted r square, standardized coefficients etc, so that as a researcher the participants could interpret the results in a better way. He guided the participants step by step so that they could get the practical exposure of applying the tests through SPSS software. Later in the sessions he gave insights into the logistic regression, discriminant analysis and conjoint analysis also, wherein detailed discussion was being held on the objectives and uses of these techniques. The participants were evaluated on the basis of the assignments being given by the resource person.

Day 4 &5

Dr. Vipul Patel, Associate professor and course coordinator at VU-GNU centre for excellence, Victoria University – India
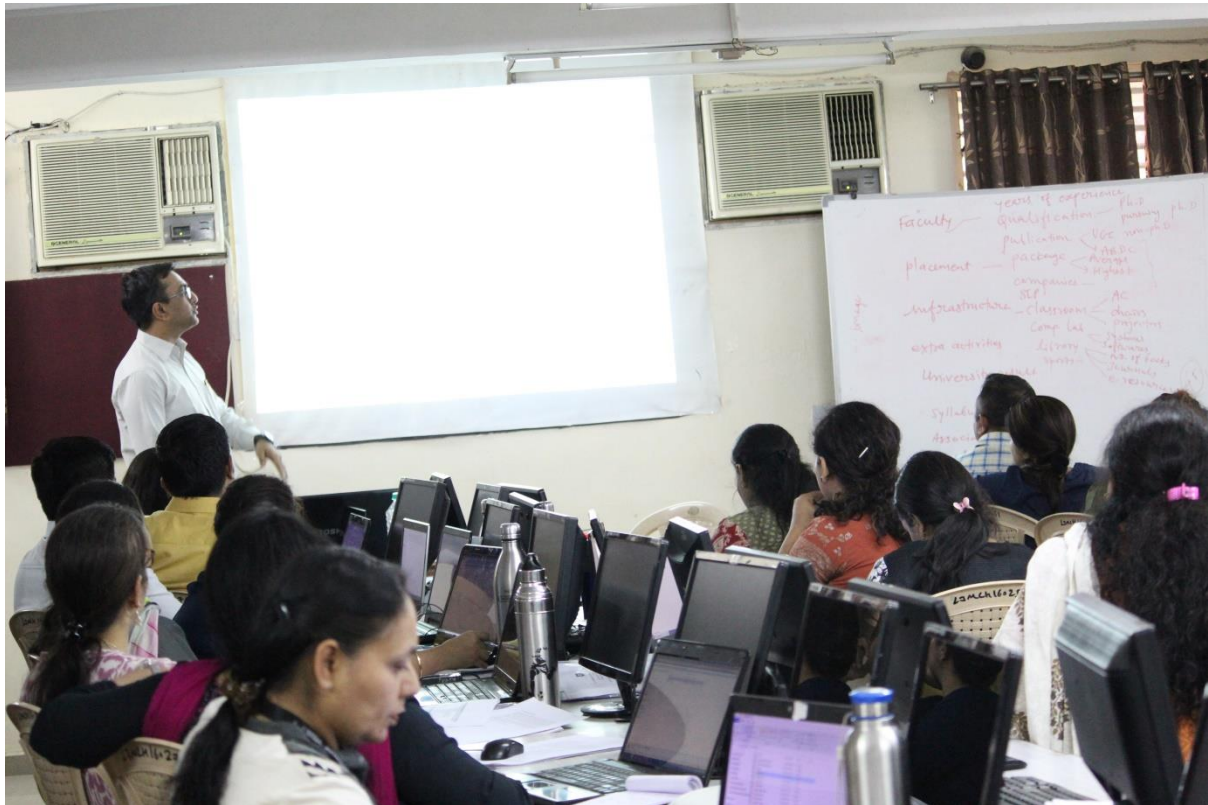
The sessions on 28th and 29th of March were conducted by Dr Vipul Patel who holds the doctorate degree in management, master degree in management and bachelor degree in engineering. He is working as associate professor and course coordinator at VU-GNU centre for excellence, Victoria University – India. In the preliminary session, he focussed on the Exploratory Factor Analysis and emphasised that this tool can be used for the brand personality scale testing, SERQUAL scale application, Job satisfaction employee surveys, leadership behaviours surveys etc. So basically for any study related to HR, finance, marketing etc. this tool can be helpful for the researcher to study various factors, components or dimensions. He also exemplify how factor analysis is the foundation of other univariate or multivariate tests like t test, ANOVA, regression analysis and cluster analysis. Later on he elaborated on the difference between EFA (Exploratory Factor Analysis) and CFA (Confirmatory Factor Analysis). The participants got a fair idea about these tools to be used for exploring the data for possible data reduction and anticipating the underlying dimensions based upon the relationship with the variables. The hands on experience of SPSS software was provided to apply factor analysis on a practical case wherein the stage wise explanation was given along with the practical exposure. The resource person also elaborated on the examination of the KMO test, Bartlett's test, Cronbach Alpha, factor loadings, treatment of cross loading and assessment of communality of the variables. Then the basics of structure equation modeling were covered, putting emphasis on independent variables and dependent variables. The 2 main components of SEM – Confirmatory factor analysis and Path analysis was also introduced with the detailed explanation of latent and observed variables. The participants were given the exposure to the AMOS software wherein they got a chance to operate the pictorial representations of the SEM model so as to run the model properly. Then the scale development process and the representativeness of the data collection was further analysed stage wise. The information was provided on how to check the reliability and the validity of the scale. Under this construct reliability, discriminant validity and nomological validity was examined. Further one factor CFA model and two factor CFA model were explained along with the direct and indirect effects on the model of SEM. The participants were evaluated on the basis of the assignments being given by the resource person.

Learning

- The participants gained an understanding of the basic principles and concepts of research methodology
- The importance of qualitative research in supplementing the quantitative research was understood.
- The participants developed an understanding of basic concepts of statistics in hypothesis testing and the process of choosing an appropriate statistical test.
- The conceptual clarity and application of various multivariate statistical techniques was acquired.
- The basic concepts, techniques and tools associated with Structural equation Modeling (SEM) were learnt.
- The ability to demonstrate different outputs of data analysis through statistical software (SPSS and AMOS) was acquired

Pointers for future action

Establishing a research program is not an easy task, it requires good resource persons with wide spectrum of skills, including leadership, resource management, and the ability to balance competing priorities and demands. Also from the participants point of view, a good motivational level is required so that they ask and clear all the doubts and participate whole heartedly. The FDP on "Multivariate Data Analysis using SPSS and AMOS" conducted have the following pointers for the future action.

- **Institute**

  Organising faculty development programmes at regular intervals is important for the institutes of higher education in order to upgrade skill set, knowledge as well as research culture among the faculty members. Such programmes should be on continuous basis rather than one time event. LJIMS as an organizing institute should conduct another workshop on qualitative research methodology as discussed in the inaugural key note address so as to equip the participating faculty members to strengthen the conceptual aspects of their research. The institute can organize a series of internal workshops on each aspect of research methodology discussed during these five days in order to strengthen the learning from the current FDP.

- **Sponsoring Agency**

  GTU as an organisation has done a fair job in establishing the connection between the resource person and the research participants. Support of the university was there right from the point of selection of the FDP program to the invitation of the participants and the execution of the program. Still there should be more such like programs being approved by the university as it increases the capability and the diversity of the participants who ultimately help the students.

- **Participants**

  Participants are the backbone of such programs. The whole heartedly and active participation from their side leads to the true success of such program. In future the participants should read about the topic of FDP a little bit and come so that not much time is being wasted in giving the preliminary information. Also they should not be rigid to attend such meaningful programs out of city.

Feedback from the participants:

A formal feedback was taken from all the participants .Based on the analysis, the feedback is summarised as below:

1. The FDP content was relevant, practical and easy to understand.
2. The resource persons were well prepared, knowledgeable and effective.
3. The resource persons were able to deliver the content in the right manner.
4. The labs were well equipped and well managed to match the content of the FDP.
5. Sufficient breaks were given with good food so that there were not too many interruptions.
6. The timings of the FDP should be a little bit early.
7. Such FDP programs should be regular and should happen more often.