

# THE TRENDS AND PROSPECTS OF STATISTICAL PACKAGES FOR THE SOCIAL SCIENCE (SPSS) AS A TOOL FOR DATA ANALYSIS IN ARCHITECTURAL RESEARCH

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## **Abstract**

*Research, by all its ramifications, aims not only to provide answers to the 'what' or 'how', but also to the 'why' questions. To be able to answer the posed research questions properly, the researcher need to collect relevant data, code the data, process /analyse the data and finally draw conclusions. Clearly there are tools for collecting data and researchers hardly have problem using them. The apparent difficulty encountered during research process is data analysis. This is due to the fact that it involves mathematical calculations. In most cases, people would rather pay others to do it for them. The advent of computers has made so many things easy. Computer software package have now come to replace lots of other hitherto cumbersome processes. Statistical Packages for the Social Science (SPSS) have been developed to do the statistical analysis of research data. This paper therefore examined the application of SPSS as a tool for statistical data analysis. The paper reviewed literature on SPSS, its development and suitability for architectural research data analysis. The paper concludes that adopting SPSS would make quantitative research in architecture much dependable and replicable.*

**Keywords:** Analytical tool, Architectural research, Data analysis, Prospects, SPSS

## Introduction

Social scientists have come to involve the computer in nearly every component of their research, from the literature search, to the implementation of experiments, and the writing of the manuscript on a word processor (Faisel , 2010). Statistical Package for the Social Sciences (SPSS) is a package of computer programs for manipulating, analysing, and presenting data. It is widely used in social and behavioural sciences (Landau & Everitt, 2004). Social science comprises of so many disciplines ranging from business, management, political science, education, arts and humanities (Azman Ong & Puteh, 2017). Research in social sciences takes the form of descriptive, inductive/predictive or evaluative, all with the aim of not only providing answers to the ‘how’ but also to the ‘why’ questions (Dandago & Tanko, 2008). In order to ask the right question as to how or why however, a researcher need to be involved in a fact-finding voyage on the phenomenon, collect relevant information (data), analyse the data and draw conclusions based on the findings (Asika, 2012). One of the key considerations for a researcher is therefore the selection of a primary method of investigation of the given phenomenon, the choice of research method and design (Osuala, 2005).

Research design denotes the art of putting in place the research strategies that will ensure that the study provides answers to the fundamental questions raised in the research (Uji, 2009). The social scientists usually employ *survey/correlational* research design. In this form of research design, the researcher does not manipulate any of the variables of interest but data relating to all variables are collected simultaneously. The researcher therefore collects data by interview, questionnaire, or even observation and then study and analyse the data (Alan & Duncan, 2011). In correlational research, the researcher wants to clarify the relationship among real-world variables. Variables here refer to the range of characteristics which entails physical features, of people, of activities, or of meanings. In its focus on real world circumstances, the researcher simply measures the variables of interest and analyse the relations among them (Groat & Wang, 2013). In order to establish the influence of one variable over the other, statistical data generation becomes necessary (Azman Ong & Puteh, 2017). Statistical techniques may have more meaning and relevance when learned within the context of research. One needs to have an understanding of statistical analyses to conduct professional research competently (Martin & Bridgmon, 2012).

Although mathematics had been (and still is) one of the basic requirement into schools of architecture, many architecture students despise anything to do with calculations. According to Field (2014), the one weapon that helps to neatly circumvent the considerable disability of not

understanding mathematics is the “computer”. Computer generated statistical analysis is the primary method used by quantitative researchers.

Almost all the literature reviewed in this study agree that the IBM SPSS statistical software has been developed over many decades ago and it is one of the most widely used statistics programs in the world. However, emphasis seems to be given to its applications to marketing/management researches. This study set to consider looking at the way its humanities aspects could be applied to the field of architecture. To do just that, the study set the following objectives:

- To examine the applications of SPSS in social sciences and humanities
- To ascertain the pros and cons of data analysis in Humanities research
- To identify the benefits and the future of SPSS in architectural research

This review paper has sought an integrative understanding of the application of SPSS, but has done so from the limited background of architectural research. The contribution to knowledge here is in the area of explaining the potentialities of the tool as well as its future usage in addressing specific data analysis strategies in architectural research.

## **Methodology**

Understanding the perspectives of the use of SPSS as a package of computer programs for manipulating, analysing, and presenting data appears highly relevant in the discus concerning any form of statistical data analysis and presentation in architectural research. To achieve this, an integrative review of related literature was considered much appropriate for this study. Integrative review is a common type of review in which the current state of knowledge on a particular topic is summarised and presented, highlighting agreements and disagreements within it (Neuman, 2014). The review is often combined with a context review or may be published as an independent article as a service to other researchers. In line with this therefore, this study gathered data by first formulating research questions, second, by identifying relevant studies, third by assessing the qualities of those studies, fourth by summarizing the evidences and interpreting the findings to come up with the conclusion.

This study relied principally on extensive review of peer-reviewed journal articles, conference papers and books. Most of these materials were obtained online using Google scholar. The data obtained from the integrative review of literature were subjected to content analysis, involving the thematic coding of the various issues under examination, also identification of the software for data analysis in both the qualitative and quantitative research, using SPSS. Also, the earlier

methods and techniques of doing the analysis and the contributions of the software as well as the challenges associated with the use of the software all found within the contents of the reviewed articles. The following constitute the findings made during this study.

## **Findings**

### ***The Application of SPSS in Social Science and Humanities***

Research in common parlance refers to a search for knowledge. But research, being an academic activity, must be looked at with academic lens. In this wise, therefore, this study considered the definition by Kothari (2004) who define research as the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analysing the facts and reaching certain conclusions either in the form of solution(s) towards the concerned problem or in certain generalizations for some theoretical formulation. Research process involving a series steps which consists of a number of closely related activities that are sequential and iterative, though not mutually exclusive.

Research process begins generally at the theoretical domain. Hypothesis, which relates to a limited facet of the theory, will be deducted from the theory and submitted to a searching enquiry. In order to assess the validity of a hypothesis, it is necessary to develop measures of the constituent concepts. If a survey investigation is being undertaken, the research must find relevant people to whom the research instrument that has been devised should be administered. Through the use of research instruments, the researcher collects data, either by interview, questionnaire, observation, etc. after data might have been collected, the researcher is likely to want to describe the subjects in terms of variables deriving from the study (Alan & Duncan, 2011).

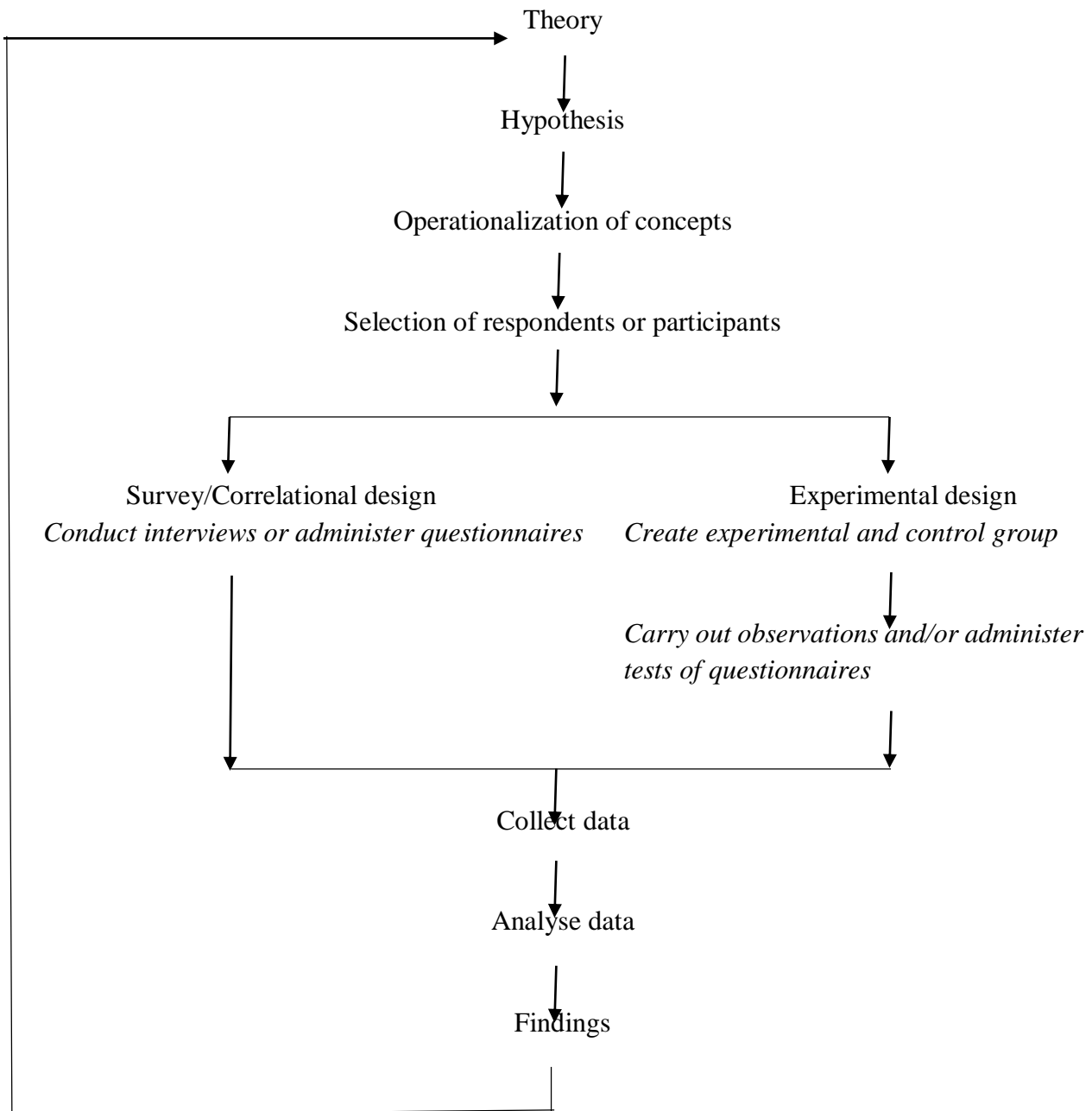


Figure 1: The research process

When data is being collected, the researcher manipulates, either the independent variable, using different entities, or the researcher may choose to manipulate the dependent variable using the same entity (Field, 2013).

The final stage of research process is the analysis of the data collected. Data analysis require a number of closely related procedures such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The interplay among variables after they have been operationalized, allowing a researcher to

measure study outcomes. Essential statistical methods used to assess scores of variables include central tendency, variability, and the characteristics of the normal distribution (Martin & Bridgmon, 2012). If the final analysis of data suggests that a hypothesis is confirmed, the results can then be fed back into the theory that prompted it.

### ***The Advantages and Disadvantages of Quantitative Data Analysis in Social Science Research using SPSS:***

Analysis can simply be referred to as the manipulation of data using certain formula through incisive examination of patterns of relationship that exist among the data groups. To analyse a survey or experimental data, the analyst estimates the values of unknown parameters of the population and tests the hypothesis for drawing inferences (Kothari, 2004). It is necessary to remember that an extremely large proportion of the empirical research undertaken by social scientists is designed to generate quantitative data. In order to be able to appreciate the kind of analyses that are conducted in relation to such data and possibly to analyse their own data, an acquaintance with the appropriate methods of analysis is highly desirable for social science researcher (Alan & Duncan, 2011).

Quantitative data analysis and statistics is often a frightening hurdle for many social science students (Greasley, 2008). Many of us have a non-mathematical background, and that makes it difficult for us to understand complex statistical equations (Field, 2013). In order to be able to generalize samples to a large population, quantitative measurements in social science discipline are commonly employed (Azman Ong & Puteh, 2017). Analysis may be categorised as descriptive analysis and inferential (statistical) analysis (Kothari, 2004). The descriptive analysis which is largely the study of distributions of one variable, provides profiles on any of the multiple of characteristics such as size, composition, efficiency, and preferences. This sort of analysis may be in respect of one variable (unidimensional analysis), or in respect of two variables (bivariate analysis) or even in respect of more than two variables (multivariate analysis) (Kothari, 2004). Where a study is to determine the amount of correlation between two or more variables, it is referred to as correlational analysis. On the other hand, where the study is to determine how one or more variables affect changes in another variable, it is termed as causal analysis. Generally, four main types of variables are generated in the course of research which include Interval/ratio variable, ordinal variables, nominal variables and dichotomous variables.

In order to adequately deal with all the complexities involved in data analysis, which hitherto were handled through some cumbersome mathematical calculations, computer has now come to the rescue. Computer, according to Field (2013) allows us to neatly circumvent the considerable disability of not understanding mathematics. He however warns that using a computer without any statistical knowledge at all can be a dangerous thing. Several statistical computer software are available for performing statistical analysis, these include Statistical Package for Social Sciences (SPSS), Minitab, SAS, R-Programming, STATA, SEM-SmartPLS, and WarpPLS (Azman Ong & Puteh, 2017). However, among all these varieties of statistical software available, IBM SPSS is the most widely used globally by researchers and academicians (Martin & Bridgmon, 2012, Azman Ong & Puteh, 2017) and hence its consideration in this study. SPSS is a statistical package designed by the IBM Corporation and is considered to be very user friendly and various statistical tests could be conducted using this software. This software undertakes both comparison and correlational statistical tests with respect to univariate, bivariate and multivariate analysis for both the parametric and non-parametric statistical techniques (Azman Ong & Puteh, 2017).

#### ***The Benefits and Future of Statistical Software for Data Analysis in Architectural Research:***

The use of statistical software is an essential tool of researchers. Architectural research typically has multifactor or multivariate explanations. Statistical software provides a researcher with sophisticated techniques to analyse the effects and relationships among many independent variables (factors) and dependent variables (variates) several combinations all at once and instantly (Martin & Bridgmon, 2012).

In choosing the right statistical software for performing the data analysis, the researchers usually look at their research objective. In a situation where the research objective is comparison analysis, SPSS becomes the preferred statistical software. This is because SPSS can perform both the parametric and non-parametric comparison analysis without much challenges in the process. It also enables simple checks on the assumptions of the tests, such as the normality test and outliers test. Besides that, this statistical package enables a frequency analysis to be perfectly conducted (Azman Ong & Puteh, 2017).

The role of statistics in research is concerned with the various tests of significance for testing hypothesis in order to determine with what validity data can be said to indicate some conclusion or conclusions. It is mainly on the basis of inferential analysis that the task of interpretation (drawing conclusion) is performed (Kothari, 2004).

In research, statistics is the factor that necessitates the designing of the research, the analysis and subsequently, the conclusions drawn. During research studies, a large volume of raw data is collected. These must be appropriately reduced in a manner that the same can be easily read and replicated where necessary.

Although sometimes by just classification and tabulation of data, an architectural researcher could achieve his/her research objectives, in most instances, it is essential for the researcher to advance into developing certain indices in order to summarise the collected and classified data. Only after this then can we adopt the process of generalization from small groups (sample) to population. In this situation therefore, the research has to use the following measures previously used to summarise the data. These are: (i) measure of central tendency or statistical averages; (ii) measures of dispersion; (iii) measures of asymmetry (skewness), and (iv) measures of relationship. Among the measures of central tendency, the three most important ones are the arithmetic average or means, median and mode. From among the measures of dispersion, variance, and its square root, the standard deviation is used. In the measures of skewness and kurtosis, the first measure of skewness based on mean and mode or mean and median are used. Karl Pearson's coefficient of correlation is the measures of relationship.

## **Discussions**

Agreeing with James Snyder (1984), Groat and Wang (2013) defined research as a systematic inquiry directed toward the creation of knowledge. They went on to say that this brief definition remains entirely consistent with characterizations of research in contemporary architectural discourse and academic parlance more generally. Research is seen as the systematic method which consists of enunciating the problem enunciation, formulation of a hypothesis, data collection, data analysis and reaching certain conclusions (Kothari, 2004). However, architectural research, has characteristics of both scientific or technical research, on one hand, and artistic or humanistic research, on the other hand. While the scientific researchers ask testable questions, conduct replicable experiments, draw general conclusions, and communicate through peer – reviewed journals or databases, the humanistic researchers, (the architectural practitioners) engage primarily in a far more applied form of research. The humanistic (artistic) researchers ask questions particular to a project, gather information mostly from existing sources, make decisions based on these findings, and communicate them through such vehicles as memos, drawings, models, and contract documents (The American Institute of Architects; Eleventh Edition, 2007).



Even though the architectural researcher may not have occasion to use statistical methods in all details and ramifications, the science of statistics cannot be ignored. It is easy to say, in retrospect, that data analysis is simply a body of methods that help to describe facts, detect patterns, develop explanations, and test hypotheses. One of the important parts of architectural research is the data collection, data analysis and data presentation in an easily understood format. These operations are often easily achieved even with high level of accuracy with the aid of data analysis software.

### **Conclusion**

The first thing that a review of the literature reveals is that there has been an abundance of positive claims published in recent years about the prospects of the use of SPSS as a Statistical Analysis Computer Package, but there is, however, little availability of empirical evidence to support these claims. There is apparently the growing need for analysts with expertise in big data software. With the tremendous and growing focus on big data in today's society, businesses, universities, and future students need to actively participate in the scheme of things.

### **Recommendations**

Architectural researchers would find SPSS quite helpful especially now that even the major architectural processes are done electronically. Schools of architecture therefore should intensify effort to include use of SPSS in the curriculum.

## References

- Alan, B., & Duncan, C. (2011). *Quantitative Data Analysis with IBM SPSS 17, 18, & 19: a guide for social scientists*. London: Routledge.
- Asika, N. (2012). *Research Methodology in the Behavioural Sciences*. Lagos: Learn Africa Plc.
- Azman Ong, H. M., & Puteh, F. (2017). Quantitative Data Analysis: Choosing Between SPSS, PLS and AMOS in Social Science Research. *International Interdisciplinary Journal of Scientific Research*, 14-25.
- Azman Ong, M. H., & Puteh, F. (2017). Quantitative Data Analysis: Choosing between SPSS, PLS and AMOS in social science research. *International Interdisciplinary Journal of Scientific Research*, 14-25.
- Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative and Mixed methods approaches (3rd Edition)*. California: Sage Publications, Inc. Thousand Oaks.
- Dandago, I. K., & Tanko, I. A. (2008). Ethics in Social Science Research. In B. U. Faculty of Social Science and Management Sciences, *Readings in Social Science Research* (pp. 18-26). Kano: Adamu Joji Publishers.
- Evans, D., Gruba, P., & Zobel, J. (2014). *How to Write a Better Thesis (3rd Edition)*. Switzerland: Springer International Publishing.
- Faisel, Y. (2010). Statistics Using SPSS: An Integrative Approach. *Journal of Applied Statistics*, Vol. 37; No. 12, 2119-2120.
- Field, A. (2013). *Discovering Statistics Using IBM SPSS Statistics, 4th Edition*. London: SAGE Publications Ltd.
- Greasley, P. (2008). *Quantitative Data Analysis Using SPSS: An introduction for health and social science*. Maidenhead Berkshire: Open University Press, McGraw-Hill .
- Groat, L., & Wang, D. (2013). *Architectural Research Methods*. New Jersey: John Wiley & Sons, Inc.
- James, S. (1984). *Architectural Research*. New York: Van Nostrand Reinhold.
- Kothari, C. R. (2004). *Research Methodology: Methods and Techniques, 2nd revised Edition*. New Delhi: New Age International (p) Limited Publishers.
- Landau, S., & Everitt, S. B. (2004). *A Handbook of Statistical Analysis Using SPSS*. Florida: Chapman & Hall/CRC.
- Martin, E. W., & Bridgmon, D. K. (2012). *Quantitative and Statistical Research Methods: From Hypothesis to Results*. San Fransisco: John Wiley & Sons Inc.
- Neuman, W. L. (2014). *Social Research Methods: Qualitative and Quantitative Approaches*. Edinburgh Gate, Harlow: Pearson Education Limited.
- Osuala, E. C. (2005). *Introduction to Research Methodology*. . Onitsha: Africa-First Publishing Limited.
- The American Institute of Architects; Eleventh Edition. (2007). *Architectural Graphic Standards; Eleventh Edition*. Hoboken, New Jersey: McGraw Hill Publishing.
- Uji, Z. A. (2009). *Tools and Instruments of Research in the Design and Allied Discipline*. Jos: Ichejum Publications .