



REVIEW ARTICLE

ADVANCING SOCIAL SCIENCE RESEARCH: A COMPREHENSIVE REVIEW OF SPSS APPLICATIONS AND FUTURE DIRECTIONS

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ABSTRACT

Statistical Package for the Social Sciences widely known as SPSS is one of the most effective tools for quantitative data analysis in the field of social science. This review article examines the applications, advantages, and limitations of SPSS in social science research, highlighting its utility in descriptive statistics, inferential statistics, correlation, and regression analysis, ANOVA, factor analysis, and non-parametric tests. Due to its user-friendly interface and better functional ability, it has gained more popularity among researchers. The future direction for SPSS includes advancing its ability to manage big data achieved through cloud integration, advancement of real-time analytics, and integration with AI and advanced machine learning. Improvement in data visualization along with interactive tutorials that can easily be assessed plus fostering open-source collaboration. Nevertheless, despite these technical enhancements, we should still remember that it's aimed at being a tool used within social science research which means that the ultimate goal would be to make it easier for such researchers, allowing them to perform sophisticated analyses without difficulty obtaining meaningful insights. The use of SPSS offers advantages and limitations; thus, any potential user should be aware of what they can expect when utilizing this software package for their research needs.

KEYWORDS

SPSS, Statistical tools, Social Science Research, Data Analysis, Research tools

1. INTRODUCTION

Social science research is a broad field that studies include the study of human life and relationships. It includes disciplines such as sociology, psychology, anthropology, economics, politics, and education (Cherney et al., 2013). It plays an important role in social development. Research on social inequality can influence policies to reduce poverty and promote social justice, and analysis of financial data can guide economic policy and market regulations to stimulate economic growth. Social science researchers mostly have to deal with large sets of data collected online or offline through surveys, interviews, group discussions, and observations. The best part of SPSS is that the program is designed to handle large data sets with many variables (Jasrai, 2020).

SPSS, mostly used by social science researchers is a statistical software suite developed by IBM used to explore the critical data by simple methods. Statistical Package for the Social Science widely known as SPSS was developed at the University of Stanford by three students, Norman H. Nie, C. Hadlai (Tex) Hull, and Dale H. Bent in 1968 (McCormick and Salcedo, 2015). This SPSS software program was acquired by IBM in 2009 (Bala, 2016).

SPSS has several uses in social science research like data management, data analysis, descriptive and inferential statistics, and visualization and reporting and its user-friendly interface has made it more popular among user (Tumiran, 2023). With the help of SPSS complex and time-consuming data can be handled and operated by using various technical methods, this is very useful to researchers for easy analysis and transformation of data features of the different variables (Pallant, 2020). Nowadays it has great importance in research activities. SPSS uses a wide variety of functions

including regression analysis, clustering and classification, multivariate analysis, measuring of central tendency and variability, interaction tests, etc. (Pallant, 2020; Field, 2013; Everitt et al., 2011; Tabachnick and Fidell, 2013; Field, 2013). SPSS provides clear communication of statistical findings with detailed results through tables, charts, and graphical representations. SPSS is a strong tool for marketing, consumer behavior, and forecasting (Carvalho de Mesquita and Kosteljik, 2021). This is a simple tool to run for different data analyses where no need for a strong background in statistics or programming.

The objective of this review article is to comprehensively examine the importance of SPSS in social science research, its applications, advantages, limitations, and future direction. We aim to synthesize existing literature to provide insight into patterns and best practices in using SPSS for statistical analysis in the social sciences. By doing this, we hope to educate and guide current and future researchers on the effective use of this tool in research studies.

2. METHODOLOGY

This review article employs a comprehensive literature review methodology to extract information on applications, advantages, disadvantages, limitations, and future directions of SPSS in social science research. The secondary data sources for review include peer-reviewed journal articles and books. Second, the reference section of articles was also searched to find additional articles. Sources were accessed through academic databases such as PubMed, Google Scholar, SpringerLink, and ResearchGate. All the information sources are cited properly to acknowledge the contribution of the original author and avoid plagiarism. Through systemic review, this article aims to provide detailed information

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on the application, benefits, limitations, and potential future enhancements in SPSS.

3. APPLICATIONS OF SPSS IN SOCIAL SCIENCE RESEARCH

3.1 Descriptive Statistics

Descriptive statistics are specific methods to calculate, summarize, and describe the main features of collected research data. The three measures of central tendency are mean, median, and mode (Motulsky, 2010). Another important measure of research data is a measure of its dispersion, range, standard deviation, and interquartile range are the three measures of dispersion (Mendenhall and Beaver, 2013). SPSS provides many tools to calculate statistics, including mean, median, mode, standard deviation, range, variance, and frequency distributions. These help researchers understand the fundamental characteristics of data, detection of trends, and discovery of abnormalities.

3.2 Inferential Statistics

Inferential statistics includes developing population forecasting or prediction by using sample data. Numerous statistical tests such as significance tests, confidence intervals, and hypothesis testing, are supported by SPSS (Field, 2013). With the use of these methods, researchers can extrapolate results whether observed patterns in the data are statistically significant or not and generalize findings from a sample to a broader population.

3.3 Correlation and Regression Analysis

Correlation analysis helps to measure the degree and direction of association between two variables (Pallant, 2020). Pearson Correlation Coefficient is the most commonly used parametric method and in non-parametric methods, Spearman's rank correlation and Kendall's tau are mostly used which all can be calculated by using SPSS (Field, 2013). Regression analysis is used to estimate the relationship between one or more independent variables and one dependent variable. Both linear and nonlinear regression are included in the regression analysis (Hair et al., 2010). With the broad range of regression analysis capabilities offered by SPSS, researchers may investigate correlations and generate predictions using the data.

3.4 Analysis of Variance (ANOVA)

ANOVA is a well-known method used to compare the means of 3 or more groups and determine the presence of significant differences between their means (Field, 2013). SPSS helps in the analysis of different types of ANOVA including one-way ANOVA, repeated measures ANOVA, and factorial ANOVA (Pallant, 2020). These are the essential tools for experimental research designs and data analysis from studies with multiple groups or conditions (Hair et al., 2010).

3.5 Factor Analysis

Factor analysis is a technique used to explore underlying dimensions that explain correlation among observed variables. There are two most important types of factor analysis, Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) (Tavakol and Wetzel, 2020). Factor analysis is a technique used to identify underlying factors or constructs that explain the pattern of correlations among observed variables. SPSS offers both EFA and CFA, helping researchers to reduce data complexity and to develop and test theoretical models (Pallant, 2020).

3.6 Non-Parametric Tests

Non-parametric tests are statistical analysis method that makes fewer assumptions about the underlying distribution of population data compared with parametric tests and are also known as distribution-free tests. SPSS provides a range of non-parametric tests, including the Mann-Whitney U test, Kruskal-Wallis H test, Wilcoxon signed-rank test, and Spearman's rank correlation (Field, 2013). These tests are valuable for analyzing ordinal data.

4. FUTURE DIRECTIONS AND RECOMMENDATIONS

SPSS is a powerful and versatile tool for social science research and to maintain its position here some potential future directions and recommendations for its better development are discussed below:

4.1 Future Directions

To remain valuable for social science research in the advancing field of

data analysis and growing needs of researchers and increasing data complexity to analyze following points should be considered for the capability's enhancement of SPSS.

4.1.1 Integration with big data technologies

With the data set growing more complex, SPSS must first improve its ability to process very large datasets and handle them efficiently. If data processing is optimized, SPSS will remain fast and effective even with massive amounts of data. Furthermore, the capacity for real-time analysis is important in enabling researchers to quickly process and evaluate data as it is collected, thus providing timely insights needed for time-sensitive studies. Developing cloud-based solutions like integration with the Google Cloud Platform, amazon web services, and Microsoft Azure will improve accessibility, collaboration, and data security, allowing researchers to work on data from anywhere.

4.1.2 Enhancements in machine learning and AI (artificial intelligence)

The importance of machine learning and artificial intelligence in data analysis is increasing (James et al., 2014). SPSS should focus on developing such interfaces requiring less knowledge about programming as machine learning seems complex for research with no programming background. This improves the working ability of SPSS and provides better and deeper insights into social phenomena.

4.1.3 Improved user experience and accessibility

Providing tutorials and guided analysis paths on conducting different analyses step by step will help the new users to understand and perform data analysis activity easily and quickly. SPSS should improve its interactivity and quality of data visualization that allows researchers to customize graphs and charts, advancing the ability to understand and describe data easily.

4.1.4 Open-source collaboration

To bring innovation and flexibility in SPSS collaborating with the open-source community should be considered. Encouraging to development of plugins and extensions by the open-source community will help to create innovative results that address diverse research challenges and needs. Better integration with open-source tools like R and Python will provide a comprehensive solution for complex research projects by combining the strengths of these platforms with SPSS (Kangtangen, 2016). Establishing a collaborative environment where users can contribute to SPSS development will foster a community of practice, accelerating the software's evolution and enhancing its capabilities.

4.1.5 Data privacy and security

As data privacy and security concerns continue to grow, SPSS must ensure compliance with relevant regulations and standards. Implementing robust encryption methods will protect sensitive data both in transit and at rest, maintaining data integrity and confidentiality. There must be prevention from unauthorized access and maintain data integrity.

4.2 Recommendations

To effectively implement these future directions, the following recommendations are proposed:

- **Integration with big data technology:** Researchers should utilize cloud integration to access scalable computing resources and enable remote collaboration. This approach will facilitate efficient data processing and enhance research productivity
- **Enhancing machine learning:** SPSS should focus on a user-friendly machine learning interface so that researchers who are unfamiliar with programming can also operate. Prioritizing automated feature selection and model evaluation tools will streamline the machine learning workflow and improve efficiency
- **Improved User Experience and Accessibility:** Providing interactive tutorials and guided analyses will help new users become proficient quickly. Enhanced visualization tools and streamlined workflows will improve the overall user experience and increase productivity
- **Open-source collaboration:** SPSS should open the path to use the open-source community to develop plugins and extensions that will develop new features and functionalities. Ensuring seamless including with open-source tools like R and Python will combine the

strengths of SPSS with the specialized capabilities

- Data privacy and security: Sensitive information should be protected with the enhancement of data encryption methods in SPSS. To manage data access and ensure accountability advance user access controls and auditing capability

5. ADVANTAGES AND LIMITATIONS OF USING SPSS IN SOCIAL SCIENCE RESEARCH

5.1 Advantages of using SPSS

The advantages of using SPSS in social science research activities are as follows:

- SPSS provides a broad range of statistical procedures which makes it suitable for various types of social science data and research questions
- It has user user-friendly interface, and even with simple knowledge of statistics can operate and interpret the result
- It provides comprehensive output with tables, charts, and graphical representations that help in the clear communication of statistical findings
- Large data like election results and census results can easily be collected by this software
- Data analysis can be done in a very short time only data entry time may take more time
- It provides normal descriptive analysis to advance complex analysis
- SPSS allows to export of analysis directly to PDF, Excel sheet, Word file, etc. and researchers can change their graphical analysis report in PNG, JPG, BMP, etc. format which is another benefit of it

5.2 Limitations of SPSS

Although SPSS is a powerful statistical tool, it poses some limitations which are as follows:

- Expensive and requires a license, which may be a barrier for some researchers, particularly in developing countries. Its free version is available but with limited features and for limited days
- Sometimes it becomes difficult without the help of an expert in statistics
- This software is primarily for quantitative data analysis and qualitative data have to utilize complementary software programs
- Researchers may need additional costs to update this software regularly for the latest features and fixes
- Requires additional training to completely exploit all features available in SPSS

6. CONCLUSION

SPSS is a significant tool used by social science researchers that does not need to be advanced knowledge about programming to run. Due to its user-friendly interface, this tool attracts more researchers. This review highlights various core techniques used in SPSS, including descriptive and inferential statistics, correlation and regression analysis, ANOVA, factor analysis, and non-parametric tests, which are important for conducting comprehensive and accurate research in social science.

Stabilizing its position among researchers depends upon its ability to adapt as needed by researchers in the future. To further improve the accessibility and usability of SPSS as a researcher-friendly tool, emphasizing user experience through interactive tutorials and streamlined workflows is an important direction. Collaboration with open-source communities could enable further innovation while

maintaining data integrity and confidentiality through data privacy and security best practices.

Improvements through including big data integration, machine learning and AI features, data visualization capabilities, and user experience also be done while SPSS provides a stable base for research. Keeping the complex and dynamic nature of social science research in mind while improving usability will ensure that SPSS remains a staple in the quantitative research toolbox; this stability will only help to advance the social sciences. These changes could further establish SPSS as a tool that enhances methodological approaches, contributes to fostering advancement in knowledge, and functions toward the greater social good.

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