Chapter 20
Comparison of Parametric and Non-Parametric Methods to Analyse the Data Gathered by a Likert-Type Scale

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ABSTRACT

The aim of this chapter is to reveal whether the results of the analysis of the data obtained using Likert type scales (LTSs) with parametric and non-parametric methods in different response alternative (DRA) numbers will differ in terms of statistical significance. In this respect, the data were obtained from 271 university students with CETSCALE prepared using LTS in five different response alternatives (DRAs). The data were analysed using the one sample t test and Wilcoxon signed rank test. Significant findings of the study in the analysis of the data obtained using midpoint LTSs and with the normal distribution with both parametric and non-parametric methods couldn't be found. Similarly, the data obtained by four response alternative numbers with the normal distribution were analysed by both methods, and the significant findings were revealed. However, the results of the data obtained by six and eight response alternative numbers with parametric methods were found to be statistically significant while their analysis by non-parametric methods did not reveal significant findings.

INTRODUCTION

The Likert-type scale was put forth by Rensis Likert (1932) in his work titled "A Technique for the Measurement of Attitudes" and is named after him. These types of scales are most commonly used by researchers in many areas ranging from social science to educational science. Likert-type scales are also discussed by applied data scientists in different contexts, besides collecting data. In the context of applied data, whether Likert-type scales are ordinal or interval scales is one of the most controversial

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topics among applied data scientists. This discussion is crucial because the result of the controversy also leads to finding an answer to the question of how to analyze the data obtained from these scales.

Although a number of authors (Aaker et al., 2007; Burns and Bush, 2000; Churchill, 1999; Malhotra, 2004) consider Likert type scales as an example of the interval scale, there are others (for example Jamieson, 2004; Knapp, 1999; Mircioiu and Atkinson, 2017) who claim that Likert-type scales are not interval but ordinal scales. This discussion raises the question of whether the data obtained using Likert-type scales should be tested by parametric or non-parametric methods. Even though there are studies related to this question in different fields such as education (Turan et al., 2015), medicine (Jamieson, 2004; Norman, 2010), and statistics (Sangthong, 2020), the subject has not been discussed enough in the field of social sciences.

Moreover, although Norman (2010) claimed that there is no disadvantageousness in analyzing the data obtained from small samples with Likert-type scales by parametric methods, Wadgave and Kharnier (2016) emphasized that there is a lack of studies to prove this claim. This study was conducted with the motivation to fill this gap in the literature.

The aim of this study is to determine whether the data obtained using Likert-type scales in the different response alternative numbers can be analyzed with parametric and non-parametric methods in terms of statistical significance. For this purpose, the research question of our study is as follows:

Research Question: Would there be a statistical difference in the findings as a result of the analysis of data obtained with Likert-type scales from small samples at different response alternatives with parametric or non-parametric tests?

In order to find an answer to the research question, the chapter is organized into four main sections: In the first section, the literature was reviewed regarding the Likert-type scale. This section has been divided into four sub-sections. In the first sub-section, the emergence and definition of the Likert-type scale are mentioned and information about the use of the Likert-type scale in the literature has been presented. Later, a discussion has been made regarding which type of scales the Likert-type scale conforms to. The last sub-section discusses the different analysis methods suitable for analyzing these scales. In the second main section, the methodology of the study has been explained in detail. In the third main section of this chapter, the findings of the study are presented. In the last section of the chapter, the conclusion, recommendations, and suggestions regarding the topic have been stated.

LITERATURE REVIEW

Likert Type Scales and Using Likert Type Scales in the Literature

Likert type scale, which was first put forward by Rensis Likert in 1932 and named after him, is one of the most frequently used psychometric scales by researchers to evaluate the perception of the participants (Wadgave and Khairnar, 2016). In this type of scale, researchers try to obtain data through numerical values assigned to response alternatives they have created to determine the participants' level of participation to scale items (Chyung et al., 2017). Likert-type scales are one of the most frequently used scales by researchers in many fields, especially due to their benefit in measuring attitudes. Using the Likert scale to measure attitudes and values, researchers can develop their own scales by assigning numbers to levels of participation. The Likert-type scales are used in two ways: (1) for the summarized scale; and (2) for individual items or rating scales from which the aggregated scale is calculated. Likert items are