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USES AND ABUSES OF THE LIKERT SCALE: BIBLIOMETRIC STUDY IN THE PROCEEDINGS OF ENANPAD FROM 2010 TO 2015

USOS E ABUSOS DA ESCALA LIKERT: ESTUDO BIBLIOMÉTRICO NOS ANAIS DO ENANPAD DE 2010 A 2015

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ABSTRACT

This paper aimed at verifying if the original assumptions of the Likert scale were or were not considered in the articles published in the EnANPAD proceedings from 2010 to 2015. This is a quantitative, exploratory and bibliometric research with data processed on Microsoft Excel and SPSS, using frequency distribution and arithmetic means. The research corpus derived from a search in the congress proceedings by using the Likert denomination when it was included in the papers abstract, methodology and/or results. From the 5342 articles published in the period, 742 (13.89%) mentioned such denomination. To verify if the scale's original assumptions were considered, it was tried to identify the following keywords: "sum"; "summation" or "indirect scale". The results showed that in 728 articles (98.1%), the Likert scale original assumptions were not considered, and most of the authors justified that they had been using a Likert-type scale. It must be emphasized that there are important differences between the (original) Likert and Likert-type scales, however, it was verified that its use in the analyzed sample was most of times erroneous. This reality shows that, although very popular, it is necessary an elucidation on the original assumptions of the Likert scale to the Brazilian academy, in order to avoid future misconceptions in its use.

Keywords: Likert scale; Likert-type; Interval; Summation.

RESUMO

O presente trabalho objetivou constatar se os pressupostos originais da escala Likert foram ou não considerados nos artigos publicados nos anais do EnANPAD entre 2010 a 2015. Trata-se de uma pesquisa quantitativa, exploratória e bibliométrica, cujos dados foram processados no Microsoft Excel e SPSS, utilizando distribuição de frequência e média aritmética. O corpus da pesquisa derivou-se de uma busca nos anais do evento pela denominação Likert no resumo, metodologia e/ou resultados dos artigos. Dos 5342 artigos publicados no período, 742 (13,89%) continham tal denominação. Para constatação se foram considerados os pressupostos originais da referida escala, buscou-se identificar as seguintes palavras-chave: “soma”; “somatório” ou “escala indireta”. Os resultados demonstraram que em 728 artigos (98,1%) os pressupostos originais da escala Likert não foram considerados sendo que na maioria os autores justificaram como sendo usada a escala tipo-Likert. Deve-se ressaltar que há importantes diferenças entre as escalas Likert (original) e tipo-Likert, contudo, verificou-se que seu uso na amostra de artigos analisada foi na maioria das vezes equivocado. Tal realidade evidencia que, mesmo muito popular, há necessidade de esclarecimentos para academia brasileira sobre os pressupostos originais da escala Likert para evitar futuros equívocos em seu uso.

Palavras-chave: Escala Likert; Tipo-Likert; Ordinal; Intervalar; Somatório.

1. Introduction

The Likert attitudes scale has been widely used in the Human Sciences field, as well as in Applied Social Sciences, both nationally and internationally. It was named after its creator Rensis Likert (1903-1981); such scale is also known as sum of assessment scale, because the scale score is a sum of the responses over the items (BERNSTEIN, 2005). According to several authors, Balasubramanian (2012); Ary, Jacobs and Razavieh (2006), Camparo (2013), Edmondson (2005), the Likert scale is the most popular way of measuring attitudes.

Rensis Likert was born on August 5th, 1903, in Cheyenne, Wyoming, United States. He graduated in Economics at Michigan University in 1926 and obtained his doctorate at Columbia University in 1932, when he became interested in social psychology. He can be considered as being “ahead of his time” by taking psychological thinking to new frontiers. Likert died on September 3rd, 1981, in Ann Arbor, Michigan, United States (CAMPBELL, 1988 cited by EDMONDSON, 2005).

An attitude is a hypothetical construction that represents an individual’s degree of liking or disliking something, being usually a person’s positive or negative views about a place, thing or event. Attitude scales are an attempt to determine what an individual believes, perceives or feels (BALASUBRAMANIAN, 2012). According to the author, several scales have been used to measure attitudes, such as: the Bogardus social distance scale, Thurstone scale, Likert scale, Guttman scales and Osgood emotional meaning scale.

In the Likert scale (1932), respondents needed to choose only the predetermined points in a system of five-responses categories ranging from “totally

approve” to “totally disapprove”. Likert also introduced the two-dimensional scale with a neutral point in the middle (VIEIRA; DALMORO, 2008).

Although the variations of responses alternatives in the Likert scale became widely spread, its use became popular creating also misunderstandings. One of the most common has been the individual issues’ inadequate analysis in an attitude scale (BOONE JR.; BOONE, 2012).

Clason and Dormody (1994) described the difference between Likert-type scales and Likert scales. The authors identified Likert-type scales as individual questions that use some aspect of the original alternatives response of Likert scales (which originally use summation).

According to Brown (2011), there are some important differences between Likert-type scales and Likert scales. Regarding Likert-type scales, the author states that: 1) it must be thought about Likert-type scales as individual items and Likert scales (summation of several items) in different ways; 2) Likert-type scales represent an item of the scale, not the scale itself; 3) Likert-type scales being ordinal, its use is irrelevant because it should be taken as intervals; 4) in any case, the interpretation should not be relied so much on single items because the individual items are not relatively reliable.

Regarding the Likert scales, Brown (2011) points out that: 1) Likert scales are summations of responses of several Likert-type scales; 2) Likert scales contain various items and, therefore tend to be more reliable than individual items; 3) naturally, the Likert scales reliability must be verified using Cronbach’s Alpha or other reliability estimation when appropriate; 4) Likert scales, because they contain several items, can be interpreted as interval scales, thus, descriptive statistics can be applied, as well as correlation analysis, factorial analysis, variance analysis, among others.

In summary, it is verified that the Likert scale (1932) has historically been used by some authors who considered its original assumptions (summation of items or variables) and by others that disregarded such assumptions (individual analysis of items or variables).

This finding, on the other hand, exposes a great doubt and controversy regarding the popularity of the Likert scale in the Brazilian academy. This was the major motivation of this study that, in an exploratory way, initially sought to elucidate the following research problem: Have the authors who published scientific papers in the last five EnANPADs (2010 to 2014) used the Likert scale correctly?

In this sense, the present study aimed at verifying, through a bibliometric research, if the original assumptions of the Likert scale were, or were not, considered in the articles published in the Brazilian congress proceedings *Encontro da Associação Nacional de Pós-Graduação e Pesquisa em Administração* (EnANPADs), in the period from 2010 to 2015. Specifically, this study sought to: 1) outline a panorama of the articles general characteristics published on all scientific committees of the event; 2) identify the articles that have or have not considered the original assumptions of the Likert scale per year and by scientific committee; finally, 3) identify the statistical techniques used in those articles.

The main justification for this research is based on the need to clarify and alert the academia about the misconceptions in the use of the Likert scale, mainly in the CAPES area of Management, Accounting Sciences and Tourism.

2. Theoretical Framework

2.1 Types of basic measurement scales

In general, there are two basic types of scales: metric and non-metric. The metric scales are often called quantitative, and the non-metric scales are called qualitative (Hair Jr. et al., 2005).

According to Hair Jr. et al. (2005), Malhotra (2001) and Mattar (1996), the variables measured at the nominal or ordinal level are distinct and are called categorical, qualitative or non-metric. On the other hand, variables measured at the interval or ratio level are continuous and are called quantitative or metric. The characteristics of such scales are detailed as follows:

- **Nominal Scale:** each number serves only as a label to identify and classify objects. It is important to note that the numbers on a nominal scale do not reflect the degree of the characteristic possessed by the objects. That is, nominally scaled numbers serve only as labels for classes or categories. The nominal scale allows the application of frequency distribution (counting) as a statistical analysis tool, besides mode, percentages and non-parametric statistics.
- **Ordinal Scale:** the numbers are ranked in an increasing or decreasing order that indicates the relative position, but not the magnitude of the differences among the objects. Thus, an object ranked as first has the characteristic in a higher degree than an object ranked as second, but the magnitude of the difference among them is unknown. According to the authors, for this scale, besides the statistical techniques used for nominal scale, one can also calculate the median and non-parametric statistics.
- **Interval Scale:** it has all the qualities of the nominal and ordinal scales, in addition to the differences among the points that are considered equal. Therefore, it is possible to compare the difference among objects. The difference between 1 and 2 is the same as the difference between 2 and 3, which is the same difference between 5 and 6. A typical example are the temperature scales (Celsius, Fahrenheit and Kelvin), in which the point zero is arbitrary, being different in each scale. The possible statistical techniques for this scale, besides those used for ordinal scale, also include the average, interval, total amplitude, average amplitude, average deviation, standard deviation, Z-test, T-test, F-test, variance analysis and Pearson's correlation.
- **Ratio Scale:** is the type of scale that offers the highest level of measurement. In ratio scales it is possible to identify or classify objects, arrange them in positions and compare intervals or differences. Thus, it also makes sense to calculate ratios of scale values. Not only the difference between 2 and 5 is the same as 14 and 17, but also 14 is seven times more than 2 in the absolute sense. Other examples of ratio scale are: height, weight, age, and money. The statistical techniques that can be used for data in ratio scale include all the ones from previous scales, and also geometric average, harmonic average, variation coefficient, among others that require metric scales.

Table 1 summarizes the characteristics of the four basic measurement scales, the ordinary marketing uses and the possible statistics.

Table 1. Characteristics of basic measurement scales.

Scale	Characteristics	Uses in marketing	Possible statistics*
Nominal	Identity, single definition of numbers	Brands, Gender, Race, Colors, Types of stores, Regions, Use/non-use, Like/dislike, and any variable to which numbers can be associated for identification	Frequency distribution, Mode, Percentages, Binomial test, Chi-square test, McNemar, Cochran's Q
Ordinal	Numbers order	Attitudes, Preferences, Opinions, Social classes, Occupations	All the ones from nominal scale plus: Median, Quartiles, Deciles, Percentile, Mann-Whitney Test, U-Test, Kruskal Wallis, Correlation of Spearman or Kendall
Interval	Comparison of intervals	Attitudes, Opinions, Awareness, Preferences, Index Numbers	All the ones from nominal and ordinal scales plus: Average, Interval, Total amplitude, Average amplitude, Average deviation, Standard deviation, Z-Test, t-Test, F-Test, Analysis of variance, Pearson's correlation
Ratio	Comparison of absolute measures, Comparison and proportions	Age, Price, Number of consumers, Sales volume, Income, Inheritance	All the ones from nominal, ordinal and interval scales plus: Geometric average, Harmonic average and Coefficient of variation

* Appropriate statistics to a scale are cumulative the higher the scale level is, all are allowed in the ratio scale.

Source: Created by the authors based on Prearo (2008), Pasquali (2003), Malhotra (2001) and Mattar (1996).

2.2 Assumptions of the original Rensis Likert scale

Mattar (1996) classifies as indirect the Thurstone and Likert scales. According to the author, the indirect scales combine a set of interviewees' responses about the object on question to determine their position on the developed attitude scale. It is useful when it comes to controversial issues or involving the exposure of values and attitudes towards issues that are considered as intimate, whose respondents may not be honest in answering direct scales (for each item).

In response to the difficulty measuring character and personality traits, Likert (1932) developed a series of questions with five alternative responses: totally approve (1), approve (2), undecided (3), disapprove (4), and totally disapprove (5). He combined the answers of the series of questions to create an attitude measurement scale. His data analysis was based on the composed index of the sum of the questions series that represents the respondents' attitudes scale. Hence, the procedure proposed by Likert does not analyze the individual questions or items, but rather the summation of them (BOONE JR.; BOONE, 2012).

Likert is a widely-used classification scale, which is assigned to each statement a numerical value ranging from 1 to 5 or from -2 to +2. Each respondent has a final score assigned to the summation of points that are obtained in the alternatives, that is, the respondents are asked to inform the degree of agreement/disagreement, where it

is assigned to each answer cell a number that indicates the direction of the attitude of each statement. The total score of the attitude of each respondent is given by the summation of the scores obtained for each statement (MALHOTRA, 2001).

A score is considered high or low according to the number of items and the values assigned to each point of the scale. For example, if a scale contains 10 statements (or items) that were coded from 1 to 5, the minimum possible score for each respondent will be 10 and the maximum 50 (MARTINS; THEÓPHILO, 2009).

According to Hair Jr. et al. (2005) and Martins and Theóphilo (2009), Likert is a scale that seeks to measure attitudes or opinions, traditionally using five points to assess the intensity that someone agrees or disagrees with a set of statements. In consonance, Malhotra (2001) states that the Likert scale is a summation scale of measurement with five categories of responses ranging from “totally disagree” to “totally agree”.

The Likert scale is easy to construct and apply. Respondents quickly understand how to use it, adapting it to postal, telephone or personal interviews, and even through internet. The main disadvantage of this scale is that it requires more time to be completed than other classification scales, since respondents have to read each statement (MALHOTRA, 2001). However, to reach the final version of a Likert scale, it is necessary to perform some pre-test sessions in order to improve the instrument. (MARTINS; THEÓPHILO, 2009)

Bernstein (2005), when analyzing the Likert scale, shows its characteristics and singularities and also the correct application forms. Duncan and Stenbeck (1987) in studying whether Likert scales are one-dimensional, found that the methods frequently used to analyze Likert-scale data may not be as generalizable to the surveys as researchers had assumed. For the authors, the validation of measures involving scales of agreement should be an essential part of any research using Likert's design (1932).

To construct the Likert scale, according to Lima (2000) cited by Cunha (2007) and Mattar (1996), these 10 steps should be followed:

- 1) To Generate a large number of declarations or affirmations related to attitudes (from 100 to 200), based on previous experiences, exploratory research, group discussions, etc.;
- 2) To Edit the declarations, eliminating duplicities, ambiguities, etc.;
- 3) To Assign degrees of unfavorable or favorable connotation with 5 points and the neutral core: approval or concordance. In this sense, Cunha (2007) and Clason; Dormody (1994) argue that Likert advocated a scale of 5 points, but nowadays, in the most diverse bibliographies, the use of 3, 4, 7 or 11 point scales is advocated, alleging the lack of discriminatory power of each subject when the scale has many answers possibilities, or vice versa, arguing that, only with many points, the scale resembles the continuum of our opinion;
- 4) To Submit the statements to a large test-group (from 100 to 200 people) belonging to the research target audience, to position their degree of disapproval/approval or agreement/disagreement;
- 5) To Score the gradations (in general: 1, 2, 3, 4, 5 or -2, -1, 0, +1, +2) such that the sequence is inverted according to the nature of the statement (positive or negative);
- 6) To Assign grades to people, adding up the scores of each statement;

- 7) Based on the test-group, reduce the number of declarations to 20 or 30, selecting the most discriminatory for the attitude to be measured;
- 8) Scale application: randomly expose the 20 or 30 declarations and present them to people to indicate their degree of disapproval/approval or agreement/disagreement;
- 9) To Assign grades to people, according to the sum of the points per statement. Example: if there are 20 statements and the gradations are -2, -1, 0, +1, +2, the minimum possible summation is -40 and the maximum is +40, for each respondent.

On the other hand, one of the main problems comes from the debate that raises the question whether a Likert scale is an ordinal or interval scale (JAMIESON, 2004). Although Likert himself assumed that the method has an interval scale characteristic, many people consider it as an ordinal scale (HODGE; GILLESPIE, 2003).

In fact, Likert-type scales fit the ordinal scale. The descriptive statistics recommended for ordinal scale items include mode or median of central tendency and frequencies for variability. Some additional analysis procedures appropriate for the ordinal scale include the Chi-square test and Kendall's correlation (BOONE JR.; BOONE, 2012). According to Malhotra (2001), for ordinal scales it is possible to use Spearman's or Kendall's correlation.

The Likert scale, in contrast, is analyzed in the interval measurement scale, since the result of the Likert scale is created by the summation of the items; therefore, the added value of the Likert scales should be analyzed in the interval measurement scale. The descriptive statistics recommended for the interval scale include average of central tendency and standard deviations for variability. Additional data analysis procedures can be: pearson's correlation, T-test, ANOVA and regression procedures (BOONE JR.; BOONE, 2012).

Hence, as the Likert scale (1932) is considered to be interval, the possible statistical techniques are, according to Mattar (1996), Malhotra (2001), Aaker, Kumar and Day (2001), all the ones predicted for the nominal and ordinal scales, plus: average, total amplitude, mean amplitude, mean deviation, standard deviation, Z-test, T-test, F-test, variance analysis and Pearson's correlation, as previously described in Table 1. So, it is incorrect to use these statistical techniques to the Likert-type ordinal scale.

2.3 Misconceptions in using the Likert scale

With the creation of the Likert scale (1932), several issues and other questions arose among the researchers, mainly, if this scale (originally ordinal) can be assumed as interval. This confusion has led many people to use statistical methods, such as averages and standard deviations, which are not appropriate for Likert-type scales (EDMONDSON, 2005).

A number of papers argue or assume that items of the Likert scale do not form an interval scale, but instead, must be considered as ordinal scales and should be analyzed as such. Other articles propose ways of circumventing this problem of ordinal/interval perception by proposing alternative formats such as Likert-type scales.

Despite this discussion about the ordinal nature of the Likert scales, most of the published research treat them as interval scales and analyze them as such, using descriptive statistics like average, standard deviation, etc., and inferential statistics such as correlation coefficients, factorial analysis, analysis of variance, among others (BROWN, 2011). According to the author, much of this confusion between ordinal and interval arises from the fact that many authors use the term Likert scale to refer to both Likert-type scales (individual analysis of variables - items) and Likert scales (summation of the set of items). Reinforcing the discussion, Carifio and Perla (2007, p.114) list ten myths about Likert and Likert-type scales:

- Myth 1: There is no need to distinguish between a Likert scale and a Likert-type scale; they are basically the “same thing” and what is true for one, is also true for the other;
- Myth 2: The items of the scale (Likert-type) are independent and autonomous, with no conceptual, logical or empirical underlying structure that gathers and synthesizes them;
- Myth 3: Likert scales imply Likert-type scales and vice versa, they are isomorphic.
- Myth 4: Likert scales cannot be differentiated into macro and micro conceptual structures;
- Myth 5: Likert scale items should be analyzed separately;
- Myth 6: Since Likert scales are ordinal level scales, only non-parametric statistical tests should be used;
- Myth 7: Likert scales are empirical and mathematical tools without meaning and without underlying deep structure;
- Myth 8: Likert-type scales can be unpunished separated from the Likert scale and its underlying logic conceptual structure;
- Myth 9: The Likert-type scale format is not a system or process for capturing and coding information about the stimulus questions on the underlying construct to be measured;
- Myth 10: Little care, knowledge, vision, and understanding are necessary to build or use a Likert scale.

Thus, for the analytical effect, this study considers as premise the original scale proposed by Likert (1932) that presents clear assumptions, which the users must be faithful. As for the use of gradations (number of points) different from the original five, it is here understood that this cannot be considered a mistake, because it does not affect the essence of the original scale. On the other hand, there are misconceptions that have seriously violated the assumptions of the original Likert scale and which will be taken into account in this specific study:

- 1) To consider the answers for each item or variable (called Likert-type scales), which is characterized as an ordinal scale;
- 2) Not to use the summation of the answers for the set of items or variables, that is, not to consider the Likert scale as indirect and interval.

3. Methodological procedures

The present research is classified as being quantitative and exploratory. The quantitative research represents the statistical study that numerically explains the raised hypotheses, allowing the compilation of a large volume of information, because it adopts as main characteristic a structured study, with objective questions (PINHEIRO et al., 2006). The exploratory research seeks to carry out a preliminary study of the main objective of the research that will be done, it is widely used to get familiarized with the phenomenon under investigation, so that subsequent research can be performed with a greater understanding and precision (GIL, 2008; COLLIS; JUSSEY, 2005).

One of the ways to evaluate the scientific production in a certain area of knowledge is by the bibliometric study, that aims to study the bibliographical references and publications, being one of the basic instruments in the study of the phenomena of scientific communication, acquiring its importance by adopting a useful method to measure the repercussion and impact of certain authors or journals, allowing to know the occurrences of variations and their trends (CARDOSO et al., 2005).

Bibliometric study deals with a methodology of census of scientific activities and correlated ones, through data analysis that present the same particularities (KOBASHI; SANTOS, 2008). According to the authors, through this methodology, one can, for example, identify the amount of papers about a specific subject; published on an accurate date; published by an author or by an institution or disseminated by a scientific journal; the development degree of R&D and innovation, among others. By bibliometric means, for example, it is possible to compute data to compare and contrast the elements present in bibliographical references of representative documents in the publications.

The study was carried out through a bibliometric study of all papers published in the Brazilian congress proceedings Encontro Nacional da Associação de Pós-Graduação e Pesquisa em Administração (EnANPAD), from 2010 to 2015. This event was selected because of its national importance, tradition and representativeness in the CAPES area of Management, Accountability and Tourism. As the data collection technique, the bibliographic research was used, since scientific papers were used as research source (GIL, 2008). It is worth highlighting that the year of 2016 was not included because the proceedings for such year were not available at the time this study was carried out.

For the selection of the papers, a search was made in the proceedings of the event by using specifically the denomination "Likert", considering when it was included in the abstract, methodology and/or results of the articles. Thus, from the 5342 articles published in EnANPAD in this six-year interval, 742 articles or 13,89% contained the "Likert", denomination, therefore, such number was considered as the research corpus. For the analysis of the correct or incorrect use of the Likert scale, the theoretical-analytical model synthesized in Figure 1 was created.

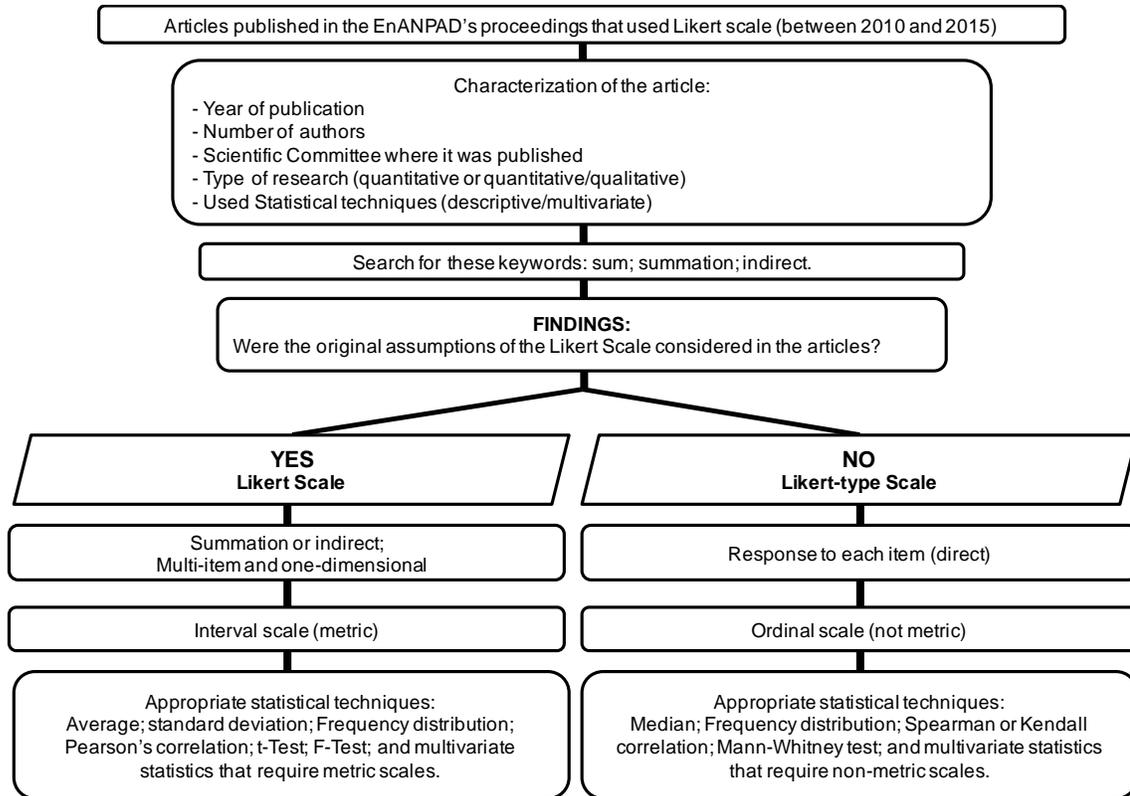


Figure 1. Theoretical-analytical model for the decision about the correct or incorrect use of the Likert scale.

Source: Created by the authors based on Boone Jr.; Boone (2012), Carifio and Perla (2007) and Mattar (1996).

Data were tabulated and processed using Microsoft Excel and Statistical Package for Social Sciences (SPSS) software and descriptive statistics were used for analyzes (frequency distribution and average).

4. Results and discussion

The results analysis is centered on two main objectives: first, a panorama is outlined of general characteristics of the papers published at EnANPAD from 2010 to 2015, which used the Likert scale, and second, it was analyzed whether or not the original assumptions of the Likert or Likert-type scale were considered in the articles and at last the statistical techniques used in such papers were identified.

4.1. Overview of the general characteristics of papers published in the studied time period

As previously mentioned in the methodology of this study, the research corpus was composed of 742 papers which used the Likert or Likert-type scale, in a universe of 5342 articles published in the event proceedings in the analyzed period. Table 2

shows the papers distribution in each year and each scientific committee where they were published.

Table 2. Absolute frequency of papers using the Likert or Likert-type scale

	2010		2011		2012		2013		2014		2015	
	Total of papers per committee	Likert or Likert-type papers	Total papers per committee	Likert or Likert-type papers	Total papers per committee	Likert or Likert-type papers	Total papers per committee	Likert or Likert-type papers	Total papers per committee	Likert or Likert-type papers	Total papers per committee	Likert or Likert-type papers
ADI	49	10	43	10	52	15	45	6	63	16	56	17
APB	103	4	131	9	118	6	136	8	130	10	156	11
CON	47	6	60	5	68	9	45	6	49	3	52	8
EOR	126	12	113	10	113	8	109	3	98	9	124	5
EPQ	74	5	64	8	73	3	82	11	67	6	72	13
ESO	115	13	135	20	126	20	107	13	133	14	144	18
FIN	54	0	50	2	43	0	25	1	40	1	47	3
GCT	52	4	60	6	60	7	59	9	51	8	83	13
GOL	37	6	37	4	48	10	52	12	49	8	60	11
GPR	96	18	92	14	90	16	106	18	89	21	125	29
MKT	89	29	92	31	76	28	96	27	82	23	124	33
Total	842	107	877	119	867	122	862	114	851	119	1043	161

Table caption: ADI - Information Administration; APB - Public Administration; CON - Accounting; EOR - Organizational Studies; EPQ - Teaching and Research in Administration and Accounting; ESO - Strategy in Organizations; FIN - Finance; GCT - Science, Technology and Innovation Management; GOL - Operations and Logistics Management; GPR - Personnel Management and Work Relationships; MKT - Marketing.

Source: Research data.

Analyzing the total of papers, it is noticed that between 2010 and 2015, the average was 890 articles published per year, and 2015 was the year with most publications (1043 articles) and 2010 the year with fewer publications (842 articles).

On the other hand, in the analyzed period, a total of 742 articles were identified as using Likert or Likert-type scales, with an average of 124 papers per year. Therefore, 2015 was the year with the largest number of publications (161 articles) and 2010 the year with the lowest number (107 articles). On average, it is possible to say that during the analyzed period, per year, approximately 15,4% of the published articles used Likert or Likert-type scales.

Moving the level of analysis to the scientific committees, it was possible to observe that, although the EOR (Organizational Studies) and ESO (Organizational Strategy) committees were the ones with the most articles published over the years, they were not the ones that used the Likert or Likert-type scales the most.

In this sense, it was observed that the Marketing (MKT) committee presented most of publications using Likert or Likert-type scales (annual average of 28.5 articles in the analyzed period). In contrast, the Finance (FIN) Committee presented the lowest

number of publications, and in 2010 and 2012, none of the published papers in this committee used Likert or Likert-type scales.

Regarding the number of authors, Figure 2 clearly states the predominance of two or three authors in all the analyzed years, in the published papers using Likert or Likert-type scale. This fact was also observed in other bibliometric studies already carried out on the proceedings of EnANPAD (ZANINI; PINTO; FILIPPIM, 2012; BARROS; MORAIS; ARAÚJO; SILVA, 2011; TROCOLLI; GIMENEZ; REIS; FARIA, 2011; ARAÚJO; OLIVEIRA; SILVA, 2009).

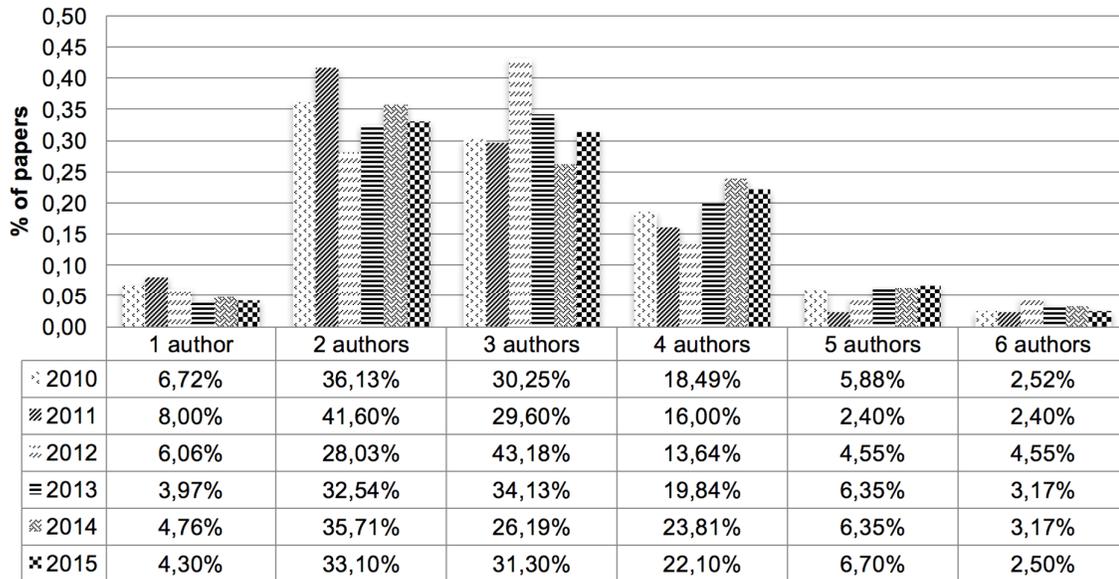


Figure 2. Number of authors per paper using the Likert or Likert-type scale
Source: Research data.

Regarding the quantitative or quanti-qualitative nature of the papers, it can be seen in Table 3 that in all the analyzed years, the majority of published articles were quantitative (annual average of 95.5 articles) and for papers with mixed approach (qualitative and quantitative) the average was of 29.7 articles, that is, approximately 1/3 in relation to the number of quantitative papers.

As for the scientific committees, the one with most quantitative articles published over the years was Marketing - MKT (annual average of 24.8 articles), which indicates the trend of quantitative research in this area of knowledge, as corroborated by Barros et al. (2011). For the other committees, the ones that presented greater number of quantitative articles were: Personnel Management and Work Relationships - GPR (average of 13,7 articles); Strategy in Organizations - EOR (average of 12.8 articles) and Information Administration - ADI (average of 9.83 articles); values which are approximately half of the number of publications in the Marketing committee.

Regarding the articles with a mixed approach (quantitative/qualitative), the committee with the highest number of publications was Personnel Management and Work Relationships (GPR), with an average of 6.17papers per year, followed by the committee of Public Administration - APB (average of 3.83 articles) and just then,

appears the Marketing committee (MKT) with an average of 3.67 papers per year, a fact that also corroborates the quantitative nature of the field.

Table 3. Types of approach in the papers using Likert or Likert-type scale

	2010		2011		2012		2013		2014		2015		Averages	
	Quanti*	Quali / Quanti**	Quanti	Quali / Quanti	Quanti	Quali / Quanti	Quanti	Quali / Quanti	Quanti	Quali / Quanti	Quanti	Quali / Quanti	Quanti	Quali/quant
ADI	10	0	5	5	13	2	3	3	14	2	14	3	9.83	2.50
APB	0	4	2	7	3	3	5	3	8	2	7	4	4.17	3.83
COM	3	3	5	0	9	0	5	1	3	0	8	0	5.50	0.67
EOR	8	4	8	2	4	4	3	0	8	1	3	2	5.67	2.17
EPQ	5	0	5	3	2	1	7	4	5	1	10	3	5.67	2.00
ESO	9	4	14	6	17	3	11	2	10	4	16	2	12.83	3.50
FIN	0	0	2	0	0	0	1	0	1	0	3	0	1.17	0.00
GCT	4	0	4	2	6	1	6	3	6	2	10	12	6.00	3.33
GOL	3	3	3	1	8	2	12	0	5	3	9	2	6.67	1.83
GPR	10	8	8	6	12	4	13	5	15	6	21	8	13.17	6.17
MKT	23	6	26	5	27	1	26	1	18	5	29	4	24.83	3.67
Total	75	32	82	37	101	21	92	22	93	26	130	40	95.50	29.67

* Quanti: quantitative research / ** Quali/Quanti: qualitative and quantitative research. Source: Research data.

In general, it is noticed that when using Likert or Likert-type scales, researchers have been adopting quantitative approaches instead of a mixed approach (quantitative/qualitative). It should be noted that no exclusively qualitative articles were found, since the use of Likert or Likert-type scales necessarily implies the use of quantitative approaches.

4.2. Uses and Abuses of the Likert Scale in the papers published during the studied period

After outlining an overview of the general characteristics of the articles, the aim was to verify if the original assumptions of the Likert scale were, or were not, considered in the papers that composed the research corpus.

Therefore, the study sought to identify the following keywords in the 742 articles published in EnNANPAD during the analyzed period (2010 to 2015), which used the Likert scale: “sum”; “summation” and “indirect scale”, characteristics that one should consider in order to follow Likert’s original assumptions (1932). Table 4 presents the results found.

From the 742 published papers, it was observed that a majority of 728 articles (98.1 %) did not consider the original assumptions, since in any of these articles was not detected the use of the keywords described above, and so, the scale used in such articles was actually the Likert-type and not the original Likert per say.

On the other hand, only a minority of fourteen articles (1.9%) considered the original assumptions of the Likert scale, assuming it as summation and indirect.

This misconception could be observed in all scientific committees of the event, however, the Marketing committee (MKT), despite being the one that most used Likert and Likert-type scales (see Table 2), in none of these articles the scale was correctly used (Table 4). This fact is worrying and alarming, since this field of study can be considered as the one that has most developed in quantitative research methodology. It is also worth noting that, in the EOR, GOL and GPR committees, no article considered the original assumptions of the Likert scale.

Table 4. Papers that did follow and did not correctly follow the assumptions of the Likert Scale

	2010		2011		2012		2013		2014		2015		Total		Percentage	
	No	Yes	No	Yes												
ADI	9	1	10	0	14	1	5	1	16	0	17	0	71	3	95.9%	4.1%
APB	4	0	9	0	6	0	8	0	9	1	10	1	46	2	95.8%	4.2%
COM	6	0	4	1	9	0	6	0	3	0	8	0	36	1	97.3%	2.7%
EOR	12	0	10	0	8	0	3	0	9	0	5	0	47	0	100.0%	0.0%
EPQ	5	0	8	0	3	0	11	0	6	0	12	1	45	1	97.8%	2.2%
ESO	13	0	20	0	20	0	12	1	14	0	17	1	96	2	98.0%	2.0%
FIN	0	0	1	1	0	0	1	0	1	0	1	2	4	3	57.1%	42.9%
GCT	3	1	6	0	7	0	9	0	8	0	12	1	45	2	95.7%	4.3%
GOL	6	0	4	0	10	0	12	0	8	0	11	0	51	0	100.0%	0.0%
GPR	18	0	14	0	16	0	18	0	21	0	29	0	116	0	100.0%	0.0%
MKT	29	0	31	0	28	0	27	0	23	0	33	0	171	0	100.0%	0.0%
Total	105	2	117	2	121	1	112	2	118	1	155	6	728	14	98.1%	1.9%

Source: Research data.

In the 728 articles that did not consider Likert's original assumptions, to alleviate this misconception, most of the authors presented justifications such as: Likert-type option; response for each item or, that the ordinal scale was assumed to be interval. These justifications do not exempt them from the mistake, because the summation of the scale items was not carried out.

Table 5 presents the statistical techniques adopted in the 742 articles that used the Likert or Likert-type scale in the analyzed period. It is noted that among the fourteen articles that considered Likert's original assumptions, all of them (100%) used descriptive statistics techniques, eight (57.14 %) used parametric tests of averages comparison, two (14.29%) used non-parametric tests, one (7.14%) used hypothesis test, three (21.43%) used scale reliability tests and three (21.43%) used correlation analysis. Regarding the use of multivariate statistics, among the fourteen articles, four (28.57%) used cluster analysis, five (35.71%) used the factorial analysis, one (7.14%) used the logistic regression analysis and two (14.29%) used structural equation modeling.

It should be emphasized that in these fourteen articles, as the Likert scale was used in the summation way (considered interval scale), the used statistical techniques were supported by the use of metric scales; therefore, the basic statistical assumptions were correctly considered.

In contrast, in the 728 articles that did not consider the original assumptions of the Likert scale, 638 (87.64%) used descriptive statistics techniques; 138 (18.96%) used parametric tests of averages comparison; 47 (6.46%) used non-parametric tests and 60 (8.14%) tested hypotheses. Regarding the reliability test of the scale, 120 (16.48%) used it; 70 articles (9.62%) used correlation. On the other hand, only 2 articles (0.27%) used a normality test and 3 articles (0.41%) worked with the information entropy analysis.

About the multivariate techniques, the most used among the 728 papers that did not consider the original assumptions of the Likert scale was the factorial analysis (296 articles, 40.80%) and the second most used technique was the structural equation modeling, used in 192 articles (26.7%). It is also noted that the regression analysis was used in 100 papers (13.74%), the cluster analysis was used in 49 articles (6.73%) and the discriminant analysis was used in 18 articles (2.47%). Among the least used multivariate techniques in these papers, 16 cases were found of logistic regression (2.20%), 8 cases of MANOVA (1.1%), 6 cases of correspondence analysis (0.82%), 4 cases of canonical correlation (0.55%), 2 cases of joint analysis (0.27%) and finally, 1 case of multidimensional scaling (0.14%).

Regarding the statistical techniques used in the articles (Table 5), it is emphasized that this type of analysis was not the focus of the research, therefore, it deserves further study in future works. Although, it is worth investigating among the 728 articles that did not consider the original assumptions of the Likert scale (classified as an ordinal scale, so, not metric), whether or not they correctly met the basic statistical assumptions imposed by the listed statistical techniques, in particular the multivariate, because according to Hair Jr. et al. (2005), most of them require metric scales for their correct processing.

Table 5. Statistical techniques processed in the 742 papers using the Likert scale

Used Statistical Techniques	Articles that considered the original assumptions of Likert Scale		Articles that did not consider the original assumptions of Likert Scale	
	(14 articles)		(728 articles)	
	Number of articles	%	Number of articles	%
1. Descriptive statistical techniques¹	14	100.00%	638	87.64%
2. Comparison tests of averages (parametric)²	8	57.14%	138	18.96%
3. Non-parametric tests³	2	14.29%	47	6.46%
4. Hypothesis tests	1	7.14%	60	8.24%
5. Reliability test (Cronbach's Alpha)	3	21.43%	120	16.48%
6. Correlation (Pearson, Spearman, Kendall)	3	21.43%	70	9.62%
7. Normality test	0	0.00%	2	0.27%
8. Entropy of Information	0	0.00%	3	0.41%
9. Multivariate statistical techniques				
9.1. Conglomerate Analysis (Clusters)	4	28.57%	49	6.73%
9.2. Factorial Analysis	5	35.71%	297	40.80%
9.3. Discriminant Analysis	0	0.00%	18	2.47%
9.4. Multidimensional Scaling	0	0.00%	1	0.14%
9.5. Canonical Correlation	0	0.00%	4	0.55%
9.6. Correspondence Analysis	0	0.00%	6	0.82%
9.7. Multivariate Analysis of Variance (MANOVA)	0	0.00%	8	1.10%
9.8. Joint Analysis	0	0.00%	2	0.27%
9.9. Regression Analysis	0	0.00%	100	13.74%
9.10. Logistic Regression Analysis	1	7.14%	16	2.20%
9.11. Structural Equations Modeling	2	14.29%	192	26.37%
9.12. Linear Probability Models	0	0.00%	0	0.00%

¹Descriptive techniques: frequency distribution; average; mode; median; standard deviation; Crosstab, etc.

²Tests of Comparison of Averages (Parametric): ANOVA; t-Test; Tukey; Levene; Dunnett; Stone-Geisser.

³Non-Parametric Tests: Chi-square; Mann-Whitney; Kruskal-Wallis; Friedman; Wilcoxon; Cochran's Q; Kolmogorov-Smirnov; Fisher; Moses.

Source: Research data with the theoretical part based on Prearo (2008); Siegel and Castellan Jr. (2006); Hair *et al.* (2005); Anderson, Sweeney and Williams (2002); Malhotra (2001).

5. Conclusions

The results presented herein attest to a worrying and alarming reality, because in 98.1 % of the articles published at EnANPAD, in the analyzed period (from 2010 to 2015), the original assumptions of the Likert scale were not considered (indirect scale through the summation of items), as proposed by Likert (1932). Most authors justify that they used the Likert-type scale, that is, a response for each item or variable.

It is noteworthy that, actually, the original Likert scale is ordinal in each item or variable, however, the sum or summation of the items transforms it into an indirect and interval scale. On the other hand, the Likert-type scale, which adopts the response for each item or variable, by definition, is a direct and ordinal scale.

To alleviate this impasse, it is suggested for researchers that do not consider the original assumptions of the Likert scale to avoid using the Likert or Likert-type denomination and citing something like “scale of approval or agreement of ‘X’ points”. For those who need to use statistical techniques that require metric scales (interval or ratio), an acceptable path would be adding something like “ordinal scale assumed as interval”.

Another important aspect detected, which was not the focus of this paper, was that most articles using the Likert-type scale, therefore ordinal scale, could not have used several statistical techniques mentioned in Table 5, because most of them require metric scales (interval or ratio) for their correct processing. In practice, this fact has been historically occurring and has become a kind of “jurisprudence” in the Applied Social Sciences field. As the theory points out, the Likert-type scale, because of its ordinal nature, allows only the use of frequency distribution, mode, median, percentages and non-parametric statistics (see Table 1).

It is noted that there are important differences between the original Likert scale and the Likert-type scale; however, it has been found that its use in the sample of analyzed articles is questionable most of times. This reality shows that, although it is very popular, it is necessary to clarify the original assumptions of the Likert scale for the Brazilian academy to avoid future misunderstandings in its use.

For future research, it is suggested: 1) that the bibliometric approach regarding this topic should be extended to other periods of time, to other national and international databases, as well as other academic events, journals, repositories of thesis and dissertations, among others; 2) to carry out qualitative research to raise information among the Brazilian researchers in the CAPES area of “Management, Accountability and Tourism”, about the knowledge level of the theoretical assumptions of Likert (original) or Likert-type scales, and also about the issues and questions regarding the use and the justifications for the misuses of such scales.

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