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LIKERT- TYPE SCALE IN SCIENTIFIC TEXTS OF AGRICULTURAL EXTENSION AND EDUCATION: INTERVAL OR ORDINAL (A CASE STUDY: JOURNAL OF INTERNATIONAL AGRICULTURAL EXTENSION AND EDUCATION)

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ABSTRACT

Reviewing scientific text shows that different statistical method used to analyze data from Likert scales and certain standards accepted by all scientific communities does not exist to analyze of data. Therefore, the main purpose of this study was to investigate Likert scale in scientific texts of agricultural extension and education. For this purpose, all articles published in *Journal of International Agricultural and Extension Education* from 1994 to 2008 for 15 years (313 papers) analyzed by using content analysis. The results show that in 114 articles, different Likert scale has used and in 66 (51.56%) articles five-point Likert scale used to measure the variables. Furthermore, these results show that the majority of articles investigated (80% or 56 out of 70 papers that used statistical analysis) have used parametric statistical tools such as t-test, ANOVA, and Pearson correlation coefficient to analyze data.

Keywords: Likert Scale, Journal of International Agricultural Extension and Education, Interval, Ordinal

INTRODUCTION

Scales based on scaling theory that are a branch of measurement theory, based on Statistical methods, and identified Numbers that should display the characteristics of a trait. The purpose of scaling theory creates proper scale that organized a series of measures all of which measured a trait or characteristic moved (Salimi et al., 2008). In addition, the most common figure of measuring attitudes, opinions and beliefs of Agricultural Extension and Education is using a Likert scale. Clason & Dormody

(1994) in their study showed that in 95 articles (53/50%) of 188 investigated article the Likert scale used to measure the variables. Likert (1932) Scale collection suggest that to assess the attitudes of respondents by using five options strongly agree, agree, neutral, disagree, strongly disagree. Salimi et al (2008) add that many researchers believe that whatever the number of options increased, the measurement will be more accurate. However, according to some experts, the use of more options will not be enhanced assessment and measurement because many respondents could not clearly distinguish their distance from each other. Finally, most experts believe that the number of options depending on the characteristics of society measurement, the subject of measurement and research hypotheses can be different. For example, Azkia and Ghaffari (2004) in their pre-test of study found that rural people cannot distinct between very low, low and very high and high, therefore, its scale of five choices converted to scale of three options (low, medium and high).

Reviewing scientific text shows that different statistical method used to analyze data from Likert scales and certain standards accepted by all scientific communities does not exist to analyze this data (Gob et al., 2007). Some of these terms are as follows;

- Salimi et al (2008) states that this scale does not exceed ordinal scale and it cannot consider as interval scale and they add, "Mean and Standard deviation" are not suitable Descriptive parameters to analyze this data.
- Malek Mohammad and Hosseini Nia (2000) know analytical statisticsas nonparametric statistics(Mann-Whitney U Test**,** Kruskal Wallis Testand Spearman Correlation Coefficient).
- Feli etal (2006),Karami & etal (2007), Zamani & etal (2009)believe the sum of the responses to the questions on the Likert scale achieved scores ranged in the interval scale.
- Gob *et al.* (2007), Schwarz(2006) and Assadi et al (2008)also believe that it is a subinterval scale after their algebraic calculations.
- Cronbach (1951) in his formula has used the variance in the values that close to the mean and Standard deviation for calculating the reliability of the questionnaire (Likert scale).

- Borich(1980) and researchers (Conklin et al., 2003; Edward & Briers, 1999; Garton & Chung, 1996; Gregg, 2002; Joerger, 2002; Layfield & Dobbins, 2002) believed that used his model for the needs assessment based onmathematical calculations such as multiplication and subtraction that did on data got from these spectra to gain needed score was interval.
- Clason & Dormody (1994) believed that allowed statistics for analysis data from Likert scale in compare means could be T test but Kendall's correlation coefficient, Spearman, Phi, V Cramer or agreement were the best correlation coefficients to evaluate its relationship with other variables.
- Jamieson (2004) believed that to avoid any interpretation (ordinal or interval scale in Likert scale) It is best that researchers in the designing a questionnaire, measures the parametric statistics.

The researchers tried to answer the question that which of these interpretations described right. Perhaps examined the views of international experts in scientific international journals of Agricultural Extension and Education cananswer the question. Therefore, the main goal of this research is to study the Likert scale (ordinal or interval) in the International Journal of Agricultural and Extension Education and analytical statistics (parametric or nonparametric) to analyze the data.

Please note that International Journal of Agricultural Extension and Education by the International Association of Agricultural Extension and Education with the aim of publishing Agricultural Extension and Education Sciences Research in developing countries published since 1994 and nowadays, it mentioned as a tool for realizing the international community (Meaders, 1994).

MATERIALS AND METHODS

In this study, all published articles in the International Journal of Agricultural Extension and Education of Volume One, Number One (1994) to Volume fifteen, No. 3 (2008) for 15 years (313 articles) by using content analysis and a list have examined separately by researchers. Then complete lists compared with each other and if there is any dispute, the issue discussed and revised. Content analysis is the main methods of attributive observation ny which texts, documents and any recording document could be, whether of the past or the present,

evaluated more stable, more accurate and above all the higher degrees of reliability. Sarmad et al (2004) states that in this method obvious content and messages described systematically and quantitatively. Therefore, this method can describe as Conversion quantitative data into qualitative data. The most important use of content analysis is to describe the characteristics of a message. Various stages of content analysis include: Select content related to the topic, explain the objectives and research question, express indicators by which the final analysis will examine, investigate the message and processing of results. Finally, to describe the quantitative characteristics (indicators: (1) the number of articles that have used the Likert scale to measure the variables; (2) the Likert scale used to measure 3. The statistic used to measure the Likert variables) (after the coding and entering data into SPSS software, version 13) used descriptive statistics, frequency and percentage.

RESULTS AND DISCUSSION

The number of International Journal of Agricultural Extension and Education articles (2008-1994), which used the Likert scale

Study published articles from 1994 to 2008 show that in 114 articles (42/36%) of the 313 articles used to measure the variables by Likert scale. Study published articles according to the year showed the use of Likert scale to measure the variables, respectively, in the years 2001 (10 articles, or 50%), 2003 (12 articles, or 50%) and 2000 (two article 20%) more and fewer in all year. To justify the low use of this spectrum in the articles besides measuring interval variables (independent or dependent) (78 articles, or 19/39%), can mention many printed review articles (116 or 29/58%) and Articles with qualitative research methods (5 or 52/2%).

Likert scale type used in the International Journal of Agricultural Extension and Education (2008- 1994)

Studying Likert scale used in the published articles in the International Journal of Agricultural Extension and Education from 2008-1994 shows that Likert five point scale (66 or 56/51%) has the highest use and Likert 8 points scale (1 or 81/0 %) and Likert eleven points scale (2 or 62/1%) have the lowest use. Salimi et al (2008) also believe that in the Likert type scale mediocrity (observing neutrality in some respondents) must consider. Therefore, they believe that Likert five-point scale is the best and the most common Likert scale.

Study articles for each year show that Likert 8 points scale (Dalamini & Miller, 1996) only used in 1996 articles articles and Likert

eleven points scale only used in (Place et al., 2000 & 2002) in articles 2000 and 2002. This situation is while other categories of Likert scale used to study in all the years (low or high).

Table1. The number of articles in the International Journal of Agricultural Extension Education (2008-1994), who have used the Likert scale

Year	Articles that have used the Likert scale		Articles that have not used the Likert scale		Total
	Frequency	Percentage	Frequency	Percentage	
1994	6	30	14	70	20
1995	8	47.05	9	52.95	17
1996	5	33.33	10	66.67	15
1997	7	33.33	14	66.67	21
1998	3	13.63	19	86.37	22
1999	9	37.50	15	62.50	24
2000	2	20	8	80	10
2001	10	50	10	50	20
2002	8	29.62	19	70.38	27
2003	12	50	12	50	24
2004	13	48.14	14	51.86	27
2005	7	31.81	15	68.19	22
2006	8	34.78	15	65.22	23
2007	8	38.09	13	61.91	21
2008	8	40	12	60	20
1994 -2008	114	36.42	199	63.58	313

Table 2: Likert type used in the International Journal of Agricultural Extension and Education (2008- 1994)

year	3 points	4 points	5 points	6 points	7 points	8 points	11 points
1994	0	1	5	0	0	0	0
1995	1	1	6	0	1	0	0
1996	1	1	1	1	1	1	0
1997	1	0	3	2	2	0	0
1998	0	1	2	0	1	0	0
1999	3	0	5	3	0	0	0
2000	0	0	2	0	0	0	1
2001	0	0	9	1	1	0	0
2002	0	5	2	2	0	0	1
2003	5	1	6	3	0	0	0
2004	1	2	5	4	1	0	0
2005	0	2	5	0	0	0	0
2006	1	1	6	0	0	0	0
2007	1	0	6	1	0	0	0
2008	0	4	3	2	0	0	0
-1994 2008	(%91.10) 14	(%14.84) 19	(%51.56) 66	(%14.80) 19	7 (%5.46)	1 (%0.81)	2 (%1.62)

*** In some articles, more than one type of scale is used.**

Statistical analysis of the variables measured with Likert scale in the International Journal of Agricultural Extension and Education (2008- 1994)

Study of published articles in the International Journal of Agricultural Extension and Education (2008-1994) showed in 109 articles of 114 articles have

used the Likert scale for measuring variables (dependent or independent) used descriptive statistics only in 70 articles of inferential statistics. Using "mean, standard deviation, frequency and percentage" (59 or 14/54%) have the highest frequency in descriptive findings and using "mean and percent" (13 or 92/11%) have the least frequency in descriptive findings.

In addition, the results showed the majority (56 to 80%) of researchers in their study used inferential statistics; Likert scale considered as an interval variable and used parametric statistics such as t-test, one-way analysis of variance and Pearson correlation coefficient. In this situation, only 14 (20%) articles examined during analysis variables usedMann-Whitney U Test**,** Kruskal Wallis Testand Spearman correlation coefficient. It is noteworthy that in published article in 1997 (Dolly, 1997) and 2003 (Nazari, 2003), Likert scale considered interval in compare means (t-test and one-way analysis of variance) but in examine the relationship considered ordinal (Spearman correlation coefficient). Clason & Dormody (1994) also quoted from other scholars that most researchers do not have any problem Using statistical parametric t-test during analyzing Likert scale data.

Table 3.Statistical analysis of the variables measured with Likert scale in the International Journal of Agricultural Extension and Education (2008- 1994)

Year	Descriptive statistics (n=109)			Inferential statistics(n=70)	
	Frequency + percent	The mean + SD	The mean + SD + frequency + percent	Parametric statistics	Nonparametric statistics
1994	0	2	4	4	0
1995	1	3	3	3	2
1996	0	2	3	4	0
1997*	3	1	3	4	1
1998	0	2	1	1	1
1999	3	1	5	5	1
2000	0	1	1	0	1
2001	2	2	5	3	2
2002	0	3	4	5	1
2003*	3	2	5	7	1
2004	1	5	7	5	0
2005	0	4	3	3	2
2006	0	3	5	6	0
2007	0	4	4	3	1
2008	0	2	6	3	1
1994-2008	13 (%11.92)	37 (%33.94)	59 (%54.14)	56 %80	14 %20

*** in compare means used Parametric statistics and in relationship used nonparametric statistics.**

CONCLUSION

An important question that has occupied the minds of the researchers, is that how is the statistical analysis of data from Likert scale? Should parametric statistics use to analyze the data or non-parametric statistics? Clason & Dormody (1994) claimed that this question is not right and not wrong.

Studying scientific research articles in reliable journals is one of the ways to answer the question. The statistical analysis of articles in the International Journal of Agricultural Extension and Education show that majority of researchers and authors (56 or 80%) during statistical analysis of data from this scale used parametric statistics such as t-test, one-way analysis of variance and Pearson correlation coefficient. It is noteworthy that ensuring having Normal data is the main condition to use these statistics (parametric test). Of course should not pass easily from Clason & Dormody (1994) claim. They convinced that analysis of data from Likert scale should be answer the main research questions whether interval either ordinal.

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