Chapter 7.12
Enhancing e-Business Decision Making:
An Application of Consensus Theory

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ABSTRACT

Statistical analysis is the universally accepted method by which sense is created from raw data. Successful requirements determination is often dependent upon the gathering customer data over the Internet, and it may be largely limited to collecting the responses such as Yes/No and Likert scale categories. These data are then analyzed to identify customer trends or other items of interest to management. The data can be useful, but key to their usage is the application of suitable mathematical tools. Traditionally little more than standard statistics has been used in the analysis of ordinal, or category, data. This chapter introduces measures of agreement and dissent to the field of e-business analysis and shows how ordinal data can be analyzed in meaningful ways.

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INTRODUCTION

Gathering data from customers is a common activity and much research has gone into design and planning (Parsons, 2007; Solomon, 2001), improving response rates (Cook, et al, 2000; Kaplowitz, et. al., 2004; Schmidt, et al, 2005), the study of privacy and ethics (Couper, 2000), mode of questionnaire delivery (Denscombe, 2006), the effect of subject lines of survey responses (Porter and Whitcomb, 2005), the analysis of web usage using traditional statistics (Korgaonkar and Wolin, 1999; Stanton, 1998) and but little has been written about the evolution of ordinal scale survey results, typical of Likert or Likert-like scale surveys. Acknowledging that getting respondents to answer surveys, either paper or digital, can be a challenge, and once the data is collected the effort to squeeze as much information from the data as possible begins.

Traditionally, data analysis is well founded in statistics, even though the same underpinnings of statistics recognize that there are limits to this branch of mathematics. Statistics are at home when dealing with ratio or interval data (Tastle and Wierman, 2006a), but once the scale shifts to ordered categories the use of statistics is circumspect, for what does it mean to say the average of "warm" and "hot" is reported as "warm-and-a-half" (Jamieson, 2004). Ordinal scales of measurement typically consist of ordered category hierarchies such as: "strongly agree (SA)," "agree (A)," "neither agree nor disagree (N)," "disagree (D)," and "strongly disagree (SD)"; "very cold," "cold," "cool," "tepid," "warm," "hot," and "very hot." The instrument typically used to collect this kind of data is called the Likert scale, though there are variations of this scale such as Likert-like, Likert-type, and ordered response scales. Researchers utilize this kind of instrument to collect data that cannot be ascertained using traditional measures, for the data being collected are feelings, perceptions, sensations, emotions, impressions, sentiments, opinions, passions, or the like. Unfortunately, the application of standard statistics to these data can be improper (Cohen, et al, 2000; Jamieson, 2004; Pell, 2005). This paper looks at the different kinds of scales and presents a new measure for analyzing ordinal scale data.

The identification of consensus in a group environment was the motivation for the original research into ways of assessing ordinal data. The authors sought to identify some mathematical way by which a discussion leader could be guided towards getting a group of discussants to arrive at consensus as quickly as possible. The consensus measure can be easily applied to situations whereby a quick survey of perceptions of discussants to one statement is taken. Given the statement "The group has arrived at consensus" the discussants would check either SA, A, N, D, or SD. The resulting calculation of consensus could guide the leader in the direction of conversation or to determine if there is sufficient agreement to move forward. The authors have expanded on this idea to identify the group agreement with a targeted category, such as SA, on a data collection instrument. It would be nice to know if, in response to some survey statement on a matter of critical importance to the organization, the overall percentage of agreement for each Likert category, not just the mode category. Notice we do not use the mean, for the meaning of the average of two ordered categories is not clear, i.e., the average of *acceptable* and *unacceptable* is *acceptable-and-a-half*, or so the interval and ration scale mathematics tells us. Also, standard deviation is based on the presence of at least an interval scale, so its use on ordinal scales is suspect at least, and invalid at most. The dissent measure gives a result that is much easier to interpret and carries more intuitive meaning. In this paper we focus on the agreement measure and how it can be used to foster a group agreement assessment that is especially important when a business is largely limited to Internet activities and must rely on survey type data for assessments that might typically be ascertained through an in-person sales force.

SCALES OF MEASUREMENT

Within the scales of measurement exist four well-known measures:

a. Nominal data that is used merely in classification, like a gender (male or female), in which order plays no role. It would make no sense to order Male > Female. Labels used in nominal scales are arbitrary and can be nouns (or any string), numbers (real, integer, etc), or any possible type of labeling. Even if integers are used they convey no sense of numbering since they merely represent categories.
b. Ordinal data are ordered categories and used typically in all languages to convey a sense of approximate ordering, for example, tea