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Teresa M. Shaft
University of Tulsa, shafttm@centum.utulsa.edu

Mark P. Sharfman
University of Oklahoma, Sharfman@aardvark.ucs.uoknor.edu

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TERESA M. SHAFT
Department of QM/MIS
College of Business Administration
University of Tulsa
Tulsa OK 74104-3189
shafttm@centum.utulsa.edu
MARK P. SHARFMAN
Division of Management
College of Business Administration
University of Oklahoma
Norman OK 73019-0450
Sharfman@aardvark.ucs.uoknor.edu

Abstract

A confirmatory factor analysis was performed on the ATCI to test if it has a unidimensional structure. Data from 176 students was used to investigate the hypotheses. The results indicate that the instrument is a good fit with a single factor model.

Introduction

Computer-based information systems (IS) are an integral part of managerial decision making (cf. Galletta & Lederer, 1989). Many organizations do not gain the full benefit of their IS because some individuals resist using them. In fact, "(u)nderstanding why people accept or reject computers has proven to be one of the most challenging issues in information systems research" (Davis, Bagozzi & Warshaw, 1989:982). In response to this challenge, a large body of research has been conducted to determine the effects of attitudes and beliefs on individuals' use of computers (e.g. DeSanctis, 1983). However Davis et. al (1989:983) suggest that "these research findings have been mixed and inconclusive. In part this may be due to the wide array of different attitude, belief and satisfaction measures which have been employed, often without adequate theoretical or psychometric justification."

The research we present is one step toward the goal of a theoretically and psychometrically justified set of IS-related measures. One fundamental psychometric issue is whether an instrument measures the construct space of interest and only the construct of interest. We address this question with respect to the Attitudes Towards Computers Instrument (ATCI) by conducting a confirmatory factor analysis to test the hypothesis of unidimensionality. We focus on the ATCI because it was designed to be appropriate for a wide variety of circumstances. Other attitudes towards computer instruments have been used extensively, (e.g. the Reece and Gable (1982) Attitudes Towards Computers Scale and the Computer "Liking" subscale of the Gressard and Loyd (1986) Computer Attitude Scale). However, both focus on educational settings. Hence, they are less usable in the investigation of a broad range of computer-related phenomena than the ATCI.

Our motivation to study the ATCI exceeds developing a set of instruments. Investigating attitudes towards computers plays an important part in understanding the decisions that individuals make regarding computer usage. As such, attitudes towards computer have been used to predict constructs as varied as satisfaction with end-user computing (e.g. Rivard & Huff, 1988) and the effect of implementing IS on organizational power distributions (Burkhardt & Brass, 1990).

The Theoretical Relationship Between Attitude And Behavior

As mentioned previously, we believe that the attitude-behavior link is a fruitful one to pursue. Towards that end, we briefly describe the theoretical relationship between attitudes and behavior. Swanson (1982) argued that studying MIS users' attitudes was basic to the creation of "a theory of MIS development in which MIS success and failure is explained" (p. 157). Galletta and Lederer (1989) suggest that attitudes provide people with a framework to interpret the world and integrate new experiences. Ajzen and Fishbein argue that by understanding an individual's attitudes towards something, one can predict that individual's "overall pattern of responses to the object" (1977: 888) as new experiences occur. Ajzen and Fishbein (1977) also argue that when there is a clear linkage between the target action and any attitudes that are formed, the degree of predictability will be highest. Investigations of attitudes towards computers should be fruitful based on the following reasoning. Given the pervasiveness of computers in society, it is likely that any research participant will have developed some attitudes towards these machines. As such, intentions concerning computer use should also be well developed. Therefore, consistent with Ajzen and Fishbein (1977), if we understand attitudes towards computers, we should be able to predict computer-related behaviors and choices.

Distinction Between Attitude Towards Computers and Related Concepts

Attitudes towards computers must be distinguished from two other concepts commonly found in the IS literature: computer anxiety and user information satisfaction (UIS). In the past, computer anxiety and attitudes towards computers have been seen as synonymous (i.e., an individual who experiences high levels of computer anxiety are said to have a negative attitudes towards computers or as separate variables with common antecedents. However, evidence suggests that computer anxiety is an intervening variable between variables such as demographics and attitudes towards computers (Igbaria & Parasuraman, 1989). Regarding UIS, such instruments measure the success or failure of IS (Galletta & Lederer, 1989). Although attitudes and satisfaction are related (Galletta & Lederer, 1989), instruments to assess UIS and attitudes towards computers operate at different levels. Attitude towards computers instruments focus on an individual's attitudes, a relatively stable individual characteristic, irrespective of a specific system. UIS instruments focus on a referent: a company's IS or a specific program. Although an interplay between attitudes towards computers and UIS exists (Galletta & Lederer, 1989), the ATCI focuses on an individual's attitudes towards computers in general, distinguishing it from UIS.

Method and Analysis

We developed the ATCI consistent with Triandis' (1971) argument about attitudes. Triandis' argument was that attitude was composed of three elements: affective, behavioral, and cognitive components. In creating the items, we also intended to represent the various areas where research had occurred on the effect of affective reactions towards using computers. Therefore, the instrument included cognitive and affective items. The behavioral items were subdivided into two components, ease of use and productivity enhancement because the growing body of literature at the time suggested that these two categories were equally important. We chose the semantic differential format because of its flexibility and robustness in measuring attitudes. The scale is composed of 8 pairs of adjectives and adjectives phrases e.g. harmful/helpful, easy to use/hard to use etc.

At this time, we examine the ATCI for unidimenstionality. We analyzed the instrument's reliability (Shaft & Sharfman, 1991) and concurrent validity (Shaft & Sharfman, 1996) previously. To test the unidimensionality of the ATCI we conducted a confirmatory factor analysis of the instrument using Analysis of Moment Structures (AMOS) (Arbuckle, 1997), a structural equations modeling tool. AMOS is in the same class of analytic tools as LISREL and EQS.

A sample of 176 juniors and seniors from a large southwestern university completed the ATCI. The participants were part of a study of computer-based and inventory-management choices (Sharfman & Gleeson, 1984). The students were volunteers and were given class credit for participating in the study. Confirmatory factor analysis "involves the specification of one or more putative models of factor structure, each of which proposes a set of latent variables (factors) to account for covariance among a set of observed

variables" (Doll, Xia & Torrkzadeh, 1994:453). In this analysis, we hypothesize that one first order factor including all items accounts for the common variance.

Results

Table 1 presents the standardized regression weights of the observed items on the computer attitude construct (analogous to the factors loadings in an exploratory factor analysis) and the estimated standard error of the estimate. For the regression weights we also present the Critical Ratio. This statistic, distributed as a "t," tests the hypothesis that the regression weight is different from zero. Critical Ratios greater than 1.96 demonstrate significance at $p < .05$. The coefficient of ATT8 was set at 1.00 in unstandardized form as the minimum identification requirement for the model (Arbuckle, 1997). As such, no critical ratio or standard error is calculated for this variable.

Table 1

	Regression	**Critical**	
ITEM	**Weight**	**Ratio**	**S.E.**
ATT1	.57	4.97	.35
ATT2	.61	5.17	.26
ATT3	.73	5.57	.44
ATT4	.73	5.57	.37
ATT5	.44	4.32	.24
ATT6	.70	5.49	.39
ATT7	.57	5.00	.42
ATT8	. 46	-	-

Several indices are calculated to determine the degree to which the hypothesized model fits the data. The most basic index is the Chi-square statistic. For this analysis the chi-square is 59.94 with 20 df, $p = .0000$ supporting the hypothesis that the univariate model is appropriate. Other relevant fit indices include: Goodness of Fit Index (.92), Adjusted Goodness of Fit Index (86), Bollen's Incremental Fit Index (.90), Bentler's Comparative Fit Index (.90), and Chi-square/df ratio of 2.997. All of these statistics indicate good to substantial fit for the model (Doll et al. 1994).

Discussion

The results of the analysis demonstrate that the data conform to a univariate model. Providing evidence that the ATCI items measure the same construct, i.e., the ATCI is unidimensional. Developing and validating measures such as the ATCI moves the IS field one step closer to the goal of a set of measures that "provide a common frame of reference within which to integrate various research streams" (Davis et. al 1989, p. 983).

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Appendix
Attitudes Towards Computers Instrument

This questionnaire contains eight pairs of adjectives that are used to describe computers. Please circle the number that best reflects your opinion. Think of computers in general terms and do not dwell on each specific answer.

1. restrain creativity — enhance creativity

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

2.* helpful — harmful

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

3.* enjoyable to use — frustrating to use

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

4. boring — intriguing

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

5.* a sound investment — a waste of money

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

6. difficult to use — easy to use

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

7.* non-threatening — threatening

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

8. decrease productivity — increase productivity

I-------I-------I-------I-------I-------I-------I

1 2 3 4 5 6 7

*indicates an item to be reversed scaled