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Triandis' Theoretical Framework as a Theoretical Foundation for User Behavior Testing in Information Systems Use and Acceptance Research

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Abstract

Theoretical models from social psychology have been widely used by information systems (IS) researchers as theoretical foundations to explain and predict information systems use and acceptance. Unfortunately none of these models explicitly addresses: individual personality traits that trigger intentions within the individuals leading to the observable behaviors of the individual; how environmental factors, such as Culture and Social Situations within which the individual lives impact on the individual's personality traits leading to goal directed behaviors; and how environmental factors such as Facilitating Conditions, Social Situations, Genetic/Biological Factors cumulate into objective consequences of an individual's behavior, the interpretations of such behavior and the reinforcement of that behavior in the individual. This paper presents Triandis' Theoretical Framework that explicitly addresses these personality traits and environmental factors which impact on individual's behavior towards the use and acceptance of IS. An application of the Framework in an IS research study is presented.

Keywords

IS Research Theories; Triandis' Theoretical Framework; IS Use and acceptance; Attitude; Behavior; Habits; Affect; Facilitating Conditions; Culture; Organizational environment; Social Factors

1. Introduction

The field of information systems continues the search for appropriate approaches to information systems (IS) research that would marry the individual, social, psychological and technological aspects of information systems and the search for a unifying theoretical foundation for IS research continues (Gregor, 2006). As information technology advances so rapidly and the use of IS increases by the day, weaknesses in some theoretical foundations in IS research studies are beginning to appear. History, time, the socio-technical nature of IS and, perhaps most importantly, the absence of strong and unifying theoretical foundations may have contributed to these weaknesses (Markus, 2000).

Debates about the nature of the field of information systems still rages on in the IS community. Information systems researchers have suggested the use of social psychology models as potential theoretical foundations for research on the determinants of user behavior and system use (e.g., Christie 1981, Burton, et al., 1993; Szajna and Scamell 1993; Davis, Bagozzi and Warshaw, 1989; Netemeyer and Bearden, 1992, Bagozzi et al., 1992; Martocchio, 1992; Nataraajan, 1993; Kelloway and Barling, 1993; Mykytyn and Harrison, 1993; Wishnick and Wishnick, 1993; Saga and Zmud, 1994). Among the most commonly used theories for research in this area are the Theory of Reason Action (TRA), the Technology Acceptance Model (TAM), the Expectancy Theory, the Theory of Planned Behavior (TPB), and the Social Cognitive Theory (SCT).

Despite the large amount of research surrounding the area of IS use and acceptance, studies (Franklin et al., 1992; Hornby et al., 1992; Hovmark and Norel, 1993; Williams, 1994; Markus and Keil, 1994) suggest that most systems fail to meet the objectives and aspirations held for them**,** not because they are not technically sound, but because social, psychological and organizational issues were not well addressed during the design, development, implementation and use of the systems.

This paper presents Triandis' Theoretical Framework as an alternative theoretical foundation for IS research to address some of the shortcomings of the current theoretical approaches. The paper first takes a brief look at some commonly used social psychology theories in IS research. The paper then presents an overview of Triandis' Theoretical Framework followed by a discussion of Triandis' Theoretical Framework as a theoretical foundation for IS research. An application of the Theoretical Framework in an IS research is next presented. The paper continues by pointing out some problems and limitations in applying the Framework in IS research before concluding.

2. Some Commonly used Theories in IS Research

A variety of theoretical perspectives have been used by IS researchers to study different aspects of an individual's reactions to information technology. These include Diffusion of Innovations (e.g., Compeau & Meister, 1997; Moore & Benbasat, 1991); the Technology Acceptance Model (TAM) which is an adaptation of the Theory of Reason Action (TRA) (e.g., Davis, 1989; Davis, et al., 1989; Venkatesh & Davis, 1996); the Theory of Planned Behavior (TPB) (e.g., Mathieson, 1991; Taylor & Todd, 1995); and Social Cognitive Theory (SCT) (e.g., Compeau & Higgins, 1995a, 1995b; Hill et al, 1986, 1987). It has been acknowledged this body of research has produced some useful insights into the cognitive, affective and behavioral reactions of individuals to technology, and into the factors which influence these reactions (Compeau, Higgins and Huff, 1999).

According to Compeau, Higgins and Huff, (1999), in each of the theories noted above, behavior (e.g., the use of computers) is viewed as the result of a set of beliefs about technology and a set of affective responses to the behavior. The beliefs are represented by the perceived characteristics of innovating in Innovation Diffusion research, by perceived

usefulness and perceived ease of use in TAM, by behavioral beliefs and outcome evaluations in TPB, and by outcome expectations in SCT. Seddon (1997) refers to these as the net benefits (realized or expected) accruing from the use of a system. Affective responses are typically measured by attitudes towards use, that is, an individual's evaluation of the behavior as either positive or negative. These commonalities in the models reflect a belief in the cognitive basis of behavior.

Compeau, Higgins and Huff, (1999) suggest however that, while TAM and the Diffusion of Innovations perspectives focus almost exclusively on beliefs about the technology and the outcomes of using it, SCT and the TPB include other beliefs that might influence behavior, independent of perceived outcomes. The TPB model incorporates the notion of Perceived Behavioral Control (PBC) as an independent influence on behavior, recognizing that there are circumstances in which a behavior might be expected to result in positive consequences (or net benefits), yet not be undertaken due to a perceived lack of ability to control the execution of the behavior. PBC encompasses perceptions of resource and technology facilitating conditions, similar to those measured by Thompson, et al. (1991), as well as perceptions of ability, or self-efficacy (Taylor and Todd, 1995).

However, none of the above theoretical frameworks explicitly addresses: traits of individual personality that trigger intentions within individuals leading to the observable behavior of individual; how environmental factors, such as Culture and Social Situations within which the individual lives impact on the traits of the individual's personality leading to goal directed behaviors; and how the environmental factors such as Facilitating Conditions, Social Situations, Genetic/Biological Factors cumulate into objective consequences of the individual's behavior, the interpretations of the behavior and the reinforcement of that behavior in the individual (see Figure 1). These are some of the potentials Triandis' Theoretical Framework holds in the user behavior testing of IS use and acceptance.

3. Overview of Triandis' Theoretical Framework

Some IS researchers (e.g., Trice and Treacy, 1988; Davis, 1989; Davis, et al., 1989; Venkatesh & Davis, 1996; Kim, 1996; Elkordy, 2000; Venkatesh, 1999; Venkatesh and Morris, 2000; Elkordy and Khalil, 2002) relied on Fishbein and Ajzen's (1975) TRA, in their attempts to explain user behaviors. While TRA is very useful, it is somewhat incomplete, in that it leaves aside factors that could also have influence on behavior intentions and on behavior itself. In an attempt to encompass a larger number of relevant variables, Triandis proposed a theoretical network of interrelated hypotheses around the constructs of attitude and behavior, placing them in the broadest possible context.

With reference to his framework in Figure 1, Triandis (1980) states that *behavior* has "*objective consequences*, (that occur 'out there' in the real world) which are *interpreted* (occur inside the person)" (p.198). He argues that as a result of these interpretations, the person feels *reinforced.* Reinforcement, he states, "affects the *perceived consequences* of the behavior in two ways: it changes the *perceived probabilities* that the behavior will have

particular consequences and it changes the *value of these consequences*" (p.198). These probabilities and values, Triandis argues, in turn constitute one of the determinants of *behavioral intentions* to behave, which are one of the determinants of behavior. Triandis further argues that *habits* and *relevant arousal* are also determinants of behavior. But even when the intentions are high, the habits well established, and the arousal optimal, there may be no behavior if the geography of the situation makes the behavior impossible: thus *facilitating conditions* are seen as important determinants of behavior. The interpretation of the objective consequences, Triandis argues, may differ because of genetic/biological influences or because of the previous situation-behavior-reinforcement sequences that the individual has encountered in his/her history, that is, the individual's *personality*. Personality, Triandis states, internalizes the *culture's* way of perceiving the social environment, called the *subjective culture* of a group.

According to Triandis, *subjective culture* consists of *norms* (self-instructions to do what is perceived to be correct and appropriate by members of a culture in certain situations); *roles* (which are also concerned with behaviors that are considered correct but related to persons holding a particular position in a group, society, or social system); and *values* (the broad tendencies to prefer certain states of affairs over others – what make a group or a category of people to distinguish between, for example, good and evil; clean and dirty; beautiful and ugly; natural and unnatural; normal and abnormal; logical and paradoxical; and rational and irrational). These internalizations, according to Triandis, correspond with, but not identical to, the group's subjective culture, and form the *social factors* that influence the intention to behave. In addition, Triandis argues, previous experiences of the individual with particular behaviors result in *affect* towards the behavior, which in turn are among the determinants of intentions. Triandis adds that, personality is an outcome of *situation-behavior-reinforcement* sequences and the *subjective culture* to which the individual is exposed. This subjective culture, Triandis explains, reflects the human-made part of the environment, which is shaped by *historical* and *ecological* forces. In turn, personality has an impact on the way people will interpret the objective consequences of the behavior.

Triandis argues that any behavior occurs in a particular situation, which influences the facilitating conditions and the relevant arousal of the person while simultaneously activating specific levels of the social factors. For interpersonal behavior the *social situation* includes particular individuals, in a behavior setting, as well the other's previous behavior.

Triandis notes that the arrows in the model show the directions of probable causality. Though he admits there that are several bidirectional relationships that are not shown in order to keep the diagram simple.

Triandis defines *habits* as "situation-behavior sequences that are or have become automatic, so that they occur without self-instruction" (p. 204). According to Triandis, habits are what people usually do and the individual is usually not conscious of the sequences, for example, driving a car. They are closely related to an individual's past experience and ability to perform a given act. His model suggests that the habitual nature of a behavior, in addition to

intentions, will have an influence on the individual's response to a given situation. Triandis argues that habits are more important than intentions for many behaviors. Thompson et al (1991) who ignored habits in their studies acknowledged that habits "are clearly an important determinant of behavior" (p. 130).

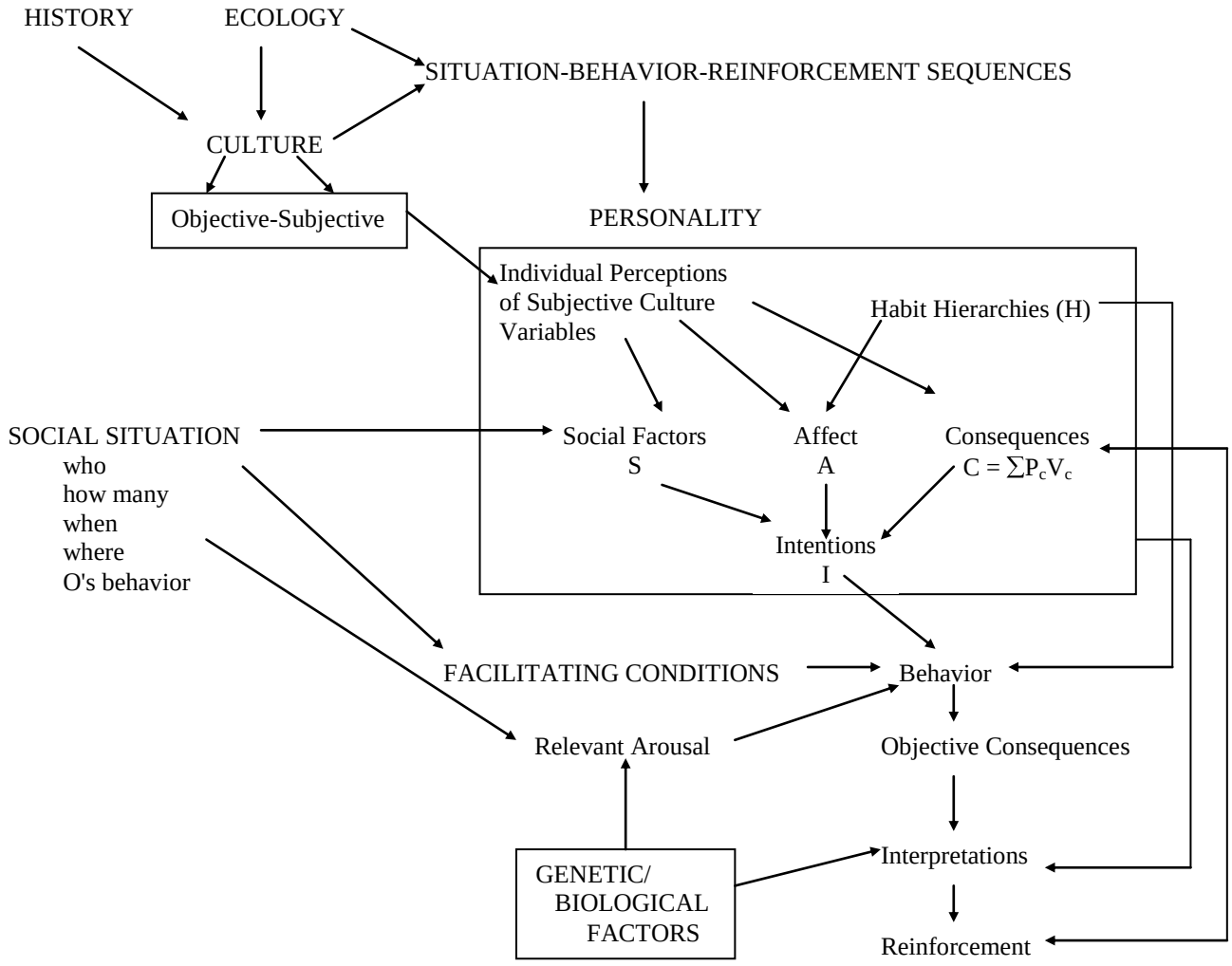

Figure 1. Triandis' Theoretical Framework - showing Relations among the major variables (Source: Triandis, 1980)

Triandis on the other hand defines *behavior* as "a broad class of reactions by an organism to any stimuli (internal or external to the organism) [which] includes *acts*" (p. 201). *Acts* he defines as "socially defined pattern of muscle movements" (p.201). He gave an example of specific acts of hitting someone. Such acts he said have no meaning in themselves but acquire meaning from the social context, particularly the perceived causes of the acts. "For instance, 'to hit' is very different if it is done accidentally, as a joke, to 'correct' a naughty child, or with the intention to hurt" (p. 201). According to the framework, behavior consists of the frequency, duration and/or intensity of the reactions by an organism to stimuli. *Behavioral intentions* which trigger behavior, is defined as "instructions that people give to themselves to behave in certain ways" (p. 203). They involve ideas such as "I must do X", "I

will do X", and "I am going to do X" and are influenced by social factors, affect, and the behavior's consequences (p. 203).

The clear distinction that can be drawn between *habits* and *behaviors* from Triandis' Framework is that, whereas habits are automatic and occurring in the individual without self-instruction and with the individual usually not conscious of the reactions, behaviors are not. It can be deduced from the Framework that *habits* are *behaviors* that have become automatic and acquired through the individual's past experience and ability to perform an act.

Relevant arousal is a physiological factor. Triandis states: "the physiological arousal of the organism that is relevant to the act facilitates the act, and increases its probability" (p. 205). The model suggests that relevant arousal directly influence behavior and is influenced by genetic and biological factors, as well as by the social situation, that is, the behavior setting.

According to Triandis, it may happen that an individual has the intention to do something, but is unable to do it because the environment prevents the act to be performed. Consequently, the level of *facilitating conditions* is an important factor in explaining an individual's behavior, and must be taken into account. In turn, facilitating conditions are dependent on the social situation.

Triandis (1971) argued that behavior is influenced by social norms, which depend on messages received from others and reflect what individuals think they should do. In his later work, Triandis (1980) expanded this term and called it s*ocial factors* which he describes as "the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (p.210). Thus, in addition to influencing intentions, social factors are themselves dependent on the social situation, and on the individual's perception of subjective culture variables.

Affect relates to the individual's feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate towards a given behavior. Positive feelings will increase the intention toward a given behavior, while negative feelings will decrease them. Affect is influenced by the individual's habits and by his/her perceptions of subjective culture variables.

Consequences factor is considered as a function of the *perceived consequence* of the behavior and the *value of each consequence*. Perceived consequences, what Davis (1989) called perceived usefulness in TAM, refers to the probability that a given consequence will follow from performing a behavior. The value of the consequence is the "affect attached to the consequence" (Triandis, 1980, p. 203). The model hypothesizes that the higher the expected value of the behavior, the more likely the person will intend to perform it. Consequences are influenced by an individual's perception of subjective culture variables as they do to social factors and affect variables. According to the model, consequences, in addition to influencing behavior through intentions, they are influenced by behavior. That is, the

objective consequences of a behavior is interpreted by the individual, and "as a result of these interpretations, the person feels reinforced" (p.198).

4 Application of Triandis' Theoretical Framework in User Behavior Testing in an IS Research

4.1 The Research Model

Bergeron et al. (1995) who based their research model on Triandis' Framework suggested in their conclusion that "future investigations should aim for a cumulative tradition by continuing to employ Triandis' Framework as a theoretical foundation to further understand the phenomenon of IS use" (p. 142). In line with this suggestion, the research model for this study is based on Triandis' Framework, as shown in Figure 2. The model is in line with that used by Bergeron et al. (1995) in a similar study. While, however, Bergeron et al. ignored culture and social situation factors in their model, subjective-objective culture and social situation factors are considered in the operationalization of the social factors construct in this study.

The affect construct consists of satisfaction with information similar to that of Bergeron et al. This model however takes into account satisfaction with the IS system and support instead of satisfaction with access and assistance respectively as in Bergeron et al.'s model. In addition, satisfaction with the IS system plan is included in the constructs for this study. The facilitating conditions construct consists of the IS development processes, the IS management processes, and the organizational environment. In line with the Triandis' Framework, the consequences construct consists of perceived usefulness (consequences) of IS use. The behavior construct consists of the frequency of IS use and the internalization of IS use, similar to that of Bergeron et al. (1995).

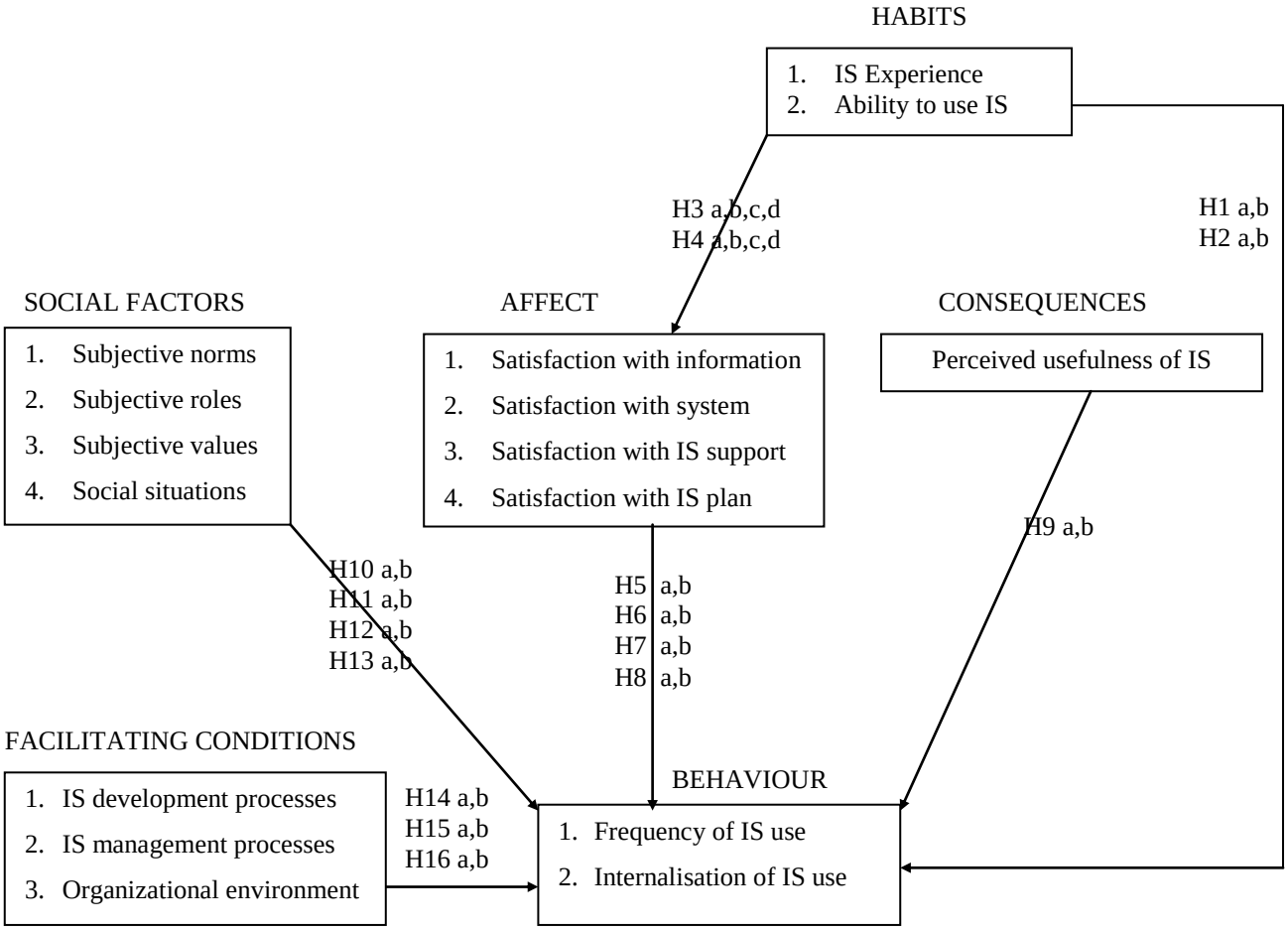

Figure 2. Research Model for IS Use and Acceptance

Similar to Bergeron et al (1995) and Thompson et al (1991)'s studies, genetic/biological factors are not included in this research model. Similarly, behavioral intentions are not included in line with the suggestions by Bergeron et al, Thompson et al, Moore and Benbasat (1991), and Ajzen and Fishbein (1980). This study seeks to explain behavior towards the use of IS but not to predict it, as did by Bergeron et al (1995), and therefore a longitudinal study is not also necessary.

The measurement of the variables this research model is based on Triandis' (1980) suggested operationalization of constructs defined in his framework in addition to other relevant studies (e.g. Bergeron et al., 1995; Thompson et al., 1991).

Habits are operationalized by assessing the number of years of a user's experience in using IS and his/her ability to use the systems. Consequences are operationalized by assessing user's perceived consequences (usefulness) of using IS in his/her work and assessing the impact of using IS on his/her performance. Social factors are operationalized by measuring the subjective norms, roles and values and the social situations in which the user uses the IS. Affect is operationalized by measuring the user's satisfaction with the information provided

by the IS, with the IS itself, with the support provided in using the system, and with the system plan now and into the future. Facilitating conditions are operationalized by measuring what the IS development processes, the IS management processes and the organizational environment have on the user's behavior in using the IS. Finally, behavior is operationalized by measuring the frequency and the internalization of the IS use. (Detail operationalization of the constructs is available on request).

4.2 Research Hypotheses

The hypotheses to be tested based on the research model are as follows.
According to Triandis' Framework, habits have a major contribution to the explanation of behavior. This is supported by a previous study (Sugar, 1967, cited in Thompson, et al., 1991) which shows that habits are a strong predictor of behavior. Sugar (1967) measured the attitudes, norms, and habits of college students concerning cigarette smoking. On a separate occasion, the same students were offered a cigarette. The strongest single predictor of behavior was found to be habit, followed by norms and attitudes being the least. According to Triandis, habits are closely related to an individual's past experience and ability to perform a given act and in his earlier work in 1972 (in association with Vassiliou, Vassiliou, Tanaka, and Shanmugam and with the assistance of Davis, Kilty, McGuire, Saral and Yang) he also acknowledged experiences as habits. Previous IS studies also identified computer experience as determinants of user attitude towards information systems.

According to the framework, habits lead to the derivation of some satisfaction or dissatisfaction (affect) which in turn explains behavior while habits themselves directly explain behavior. The framework asserts that the frequency of doing or using something constitutes a behavior, and the internalization of the probabilities and values of an act constitutes one of the determinants of behavioral intentions to behave, which are one of the determinants of behavior. Accordingly, it was hypothesized that:

H1a: IS experience positively correlates with the frequency of IS use.
H1b: IS experience positively correlates with the internalization of IS use.

H2a: Ability to use IS positively correlates with the frequency of IS use.
H2b: Ability to use IS positively correlates with the internalization of IS use.

Previous research studies indicate that users who had been using computer systems for a greater length of time were seen to have better attitudes in terms of user comprehension and participation (Raymond, 1988). Similarly, Sanders and Courtney (1985) found the length of DSS use to be positively related to user satisfaction.

Swanson (1974) defines user satisfaction as a set of user beliefs about the relative value of an information system in terms of providing timely, accurate and easy-to-understand information to support his/her decision making. This definition, however, focuses on only one component of user satisfaction – information satisfaction. Previous studies have shown that users' satisfaction with the quality of information provided by a system, with the features of the system, and with the support provided by the support group or information centre are

correlated with user satisfaction of information systems. Tafti (1992) synthesised the research in this area into information satisfaction, system satisfaction, and support group satisfaction, each of which consists of unique attributes, which correlate with user satisfaction of information systems. Previous studies (Amoako-Gyampah and White, 1993) also show that system plan correlates with user satisfaction of information systems. Accordingly, it was hypothesised that:

H3a: The longer the experience with IS, the higher the satisfaction with IS information attributes
H3b: The longer the experience with IS, the higher the satisfaction with IS features
H3c: The longer the experience with the IS, the higher the satisfaction with IS support group
H3d: The longer the experience with the IS, the higher the satisfaction with IS plan

H4a: The more the ability to use IS, the higher the satisfaction with IS information attributes
H4b: The more the ability to use IS, the higher the satisfaction with IS features
H4c: The more the ability to use IS, the higher the satisfaction with IS support group
H4d: The more the ability to use IS, the higher the satisfaction with IS plan

H5a: Satisfaction with IS attributes positively correlates with the frequency of IS use
H5b: Satisfaction with IS attributes positively correlates with the internalization of IS use

H6a: Satisfaction with IS features positively correlates with the frequency of IS use
H6b: Satisfaction with IS features positively correlates with internalization of IS use

H7a: Satisfaction with IS support positively correlates with the frequency of IS use
H7b: Satisfaction with IS support positively correlates with the internalization of IS use

H8a: Satisfaction with IS system plan positively correlates with the frequency of IS use
H8b: Satisfaction with IS system plan positively correlates with the internalization of IS use

The perceived consequences construct is consistent with the expectancy theory of motivation proposed by Vroom (1964). The basic premises of expectancy theory is that individuals evaluate the consequences of their behavior in terms of potential rewards and base their choice of behavior on the desirability of the rewards. Perceived consequences are also what Davis (1989) refers to as perceived usefulness in the technology acceptance model. Davis (1989) defines *perceived usefulness* as the extent to which a person believes that using a particular technology will enhance his/her job performance. Perceived usefulness, which reflects perceptions of the performance-use contingency, has been closely linked to outcome expectations, instrumentality, and extrinsic motivation (Davis, 1989; Davis et al., 1989, 1992). A significant body of TAM research has shown that perceived usefulness is a strong determinant of user acceptance, adoption, and usage behavior (e.g., Davis, 1989; Davis et al., 1989; Mathieson, 1991; Taylor and Todd, 1995; Venkatesh and Davis, 1996; Venkatesh, 1999; Venkatesh and Morris, 2000; Elkordy, 2000; Elkordy and Khalil, 2002). Accordingly, it was hypothesized that:

H9a: Perceived usefulness positively correlates with the frequency of IS use
H9b: Perceived usefulness positively correlates with the internalization of IS use

As described earlier, subjective culture consists of norms, roles, and values. Subjective norms is defined by Fishbein and Ajzen (1975) as the degree to which an individual believes that people who are important to him/her think he/she should perform a behavior in question. Superior, peer, and subordinate influences in the workplace have been shown to be strong determinants of subjective norms in the technology domain (Mathieson, 1991; Taylor and Todd, 1995; Venkatesh and Davis, 1996; Venkatesh, 1999; Venkatesh and Morris, 2000; Elkordy, 2000; Elkordy and Khalil, 2002). It follows that subjective roles and values which are also social factors will as well have superior, peers, and subordinate as determinants. Subjective culture constitutes the work group influences on the individual at the workplace. Bergeron et al (1995)'s studies show that social factors determine IS users behavior. And according to Triandis (1980), subjective culture is the subjective aspect of the social environment.

According to Triandis' framework, any behavior occurs in a particular social situation which triggers specific levels of social factors. Adamopoulos (1976, cited in Triandis 1980)'s study of the perception of social situations, using an adaptation of the role differential, reveals two dimensions: formality-informality (reflecting the public-private character of the situation) and constraining-unconstraining (reflecting the number of different behaviors that can appropriately occur in the situation). According to Triandis, social situations include behavior settings. A behavior setting has place-time coordinates, it consists of physical entities and process, and it evokes particular behaviors. Triandis cites a classroom as a behavior setting which has a particular location and a particular time when a class meets; it also has physical entities such as chairs and tables, black/whiteboards, and in it people act in certain ways, e.g., talk, listen, take notes, and so on.
Following the above, it was hypothesised that:

H10a: Subjective norms positively correlate with the frequency of IS use
H10b: Subjective norms positively correlate with the internalization of IS use

H11a: Subjective roles positively correlate with the frequency of IS use
H11b: Subjective roles positively correlate with the internalization of IS use

H12a: Subjective values positively correlate with the frequency of IS use
H12b: Subjective values positively correlate with the internalization of IS use

H13a: Social situations positively correlate with the frequency of IS use
H13b: Social situations positively correlate with the internalization of IS use

IS development, as revealed by the literature review, attracts much of the IS research effort. Much of the effort in this area is directed at creating or suggesting the right conditions for deriving the maximum benefits from the systems. Critical factors for successful IS development have been linked to user sponsorship, user involvement and participation, technical and other resources, plan for development and spread, management of data problems and resistance. One of the main reasons for user involvement and participation, for example, is to facilitate implementation, that is, to ensure follow-up; overcome resistance; ensure acceptance; avoid conflicts and ensure continuous resources/support (Nandhakumar

and Jones, 1997). Nandhakumar (1996)'s in-depth case study of IS in an organization suggests that, in addition to these development success factors, developers need to have some understanding of the social and organizational contexts in which the systems are used. He mentioned contextual elements such as assumptions, beliefs, shared norms, and perspectives.

Systems development processes are ongoing and therefore create facilitating conditions for the use of the systems. As well, management processes, such as company policies and rules, with regard to information systems use in organizations will create facilitating conditions for their use. Policies regarding IS can be, say, making the systems accessible to users anywhere, anytime. This may require the provision of laptops and connectivity facilities that will allow users to dial into the systems from home, on business trips, even if they are overseas. McBride (1997)'s nine years case study of the rise and fall of an IS in a UK manufacturing company also suggests the importance of the interactions between the business environment, the organizational environment and the perceptions and interpretations of events and facts by stakeholders on the success or failure of an information system.

From the above analysis, it will therefore be appropriate to investigate how these facilitating conditions explain users' behavior to use the systems. Accordingly, it was hypothesized that:

H14a: IS development processes positively correlate with the frequency of IS use
H14b: IS development processes positively correlate with the internalization of IS use

H15a: IS management processes positively correlate with the frequency of IS use
H15b: IS management processes positively correlate with the internalization of IS use

H16a: Organizational environment positively correlate with the frequency of IS use
H16b: Organizational environment positively correlate with the internalization of IS use

5 Research Methodology

Four methodologies have been identified for empirical IS research studies, namely: *case studies*, *field studies*, *field tests (quasi-experimental)*, and *laboratory studies (experimental)* (Kim, 1996). This study employed the field study approach because of the nature of the variables involved. That is, given the individual and organizational variables in the research model, a field study in a real setting appears more appropriate. By using a field study, data can be gathered on number of ongoing, uncontrolled situations. In addition, field study is usually deemed to be the most feasible and economical method to examine a complex phenomenon as in this study. Furthermore, field study produces relatively strong effects of independent variables on dependent variables, and thus enhances the statistical conclusion of the results (Cook and Campbell, 1979; Kim, 1996).

5.1 Data Collection Method

The data collection method employed for this study is mail survey due to financial resources and the circumstances of the research (Kerlinger, 1986; Kim, 1996). The questionnaire for the survey was pre-tested on six colleagues, refined with feedback received and pre-tested again. Each time a consultation was made with the Statistical Consulting Service in the University, where the researchers work, to verify the statistical validity of the questionnaire

as well. The questionnaire was designed following Wiersma (1986, 2000), Robson (1996) and Bergeron et al (1995). The cover letter to the questionnaire has a statement guaranteeing the confidentiality of respondents and a statement of how the research has been reviewed by the Human Research Ethics Committee (HREC) as required. Data for the pilot study were collected from targeted users in three large organizations using IS. The questionnaire was refined with the feedback received from the pilot study to arrive at the final questionnaire for the main survey.

Seven hundred (700) questionnaires were mailed out for the main survey to targeted users in 200 organizations using IS. One hundred and forty five (145) responses were received. Follow-up questionnaires were sent to non-respondents and 115 responses were received: giving the overall response rate of 37.14% with 20.57% good for analysis. The organizations surveyed were identified through a database purchased from the Fairfax Business Media purposely for this study. The organizations range from small to very large ones employing a minimum of 1,010 to a maximum of 750,000 people. The number of IT staff range from 0 to 4000 people in the organizations surveyed and turnover ranging from 0 to greater than US$1000.

5.2 Data Analysis

Preliminary evaluation of the research model and the associated hypotheses for this study involves simple analysis such as calculating the product-moment correlation coefficients (Pearson's r). A further analysis is conducted by using stepwise regression to determine the relative importance of the independent variables in explaining IS use. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The descriptive statistics for the sampled data collected are presented in Table 1 and the reliability coefficients of scales (Cronbach's Alpha) for scaled variables used in this study are shown in Table 2. SPSS for Windows was used in this process.

6. Results and Discussions

6.1 Bivariate Analysis – Pearson's Product-moment Correlation Coefficients

The results of testing the hypotheses associated with the research model, as shown in Figure 2, are presented in Tables 3 and 4. Table 3 shows that the results do not support the hypothesized relationship between IS experience and internalization of IS use (H1b) and the relationship between satisfaction with IS support and frequency of IS use (H7a). Table 4 shows that the results also do not support the hypothesized relationship between IS satisfaction and IS experience (H3); relationship between satisfaction with IS support and the ability to use IS (H4c); and the relationship between satisfaction with IS development plans and ability to use IS (H4d).

Table 3 shows a good explanation of the overall user behavior to use IS as measured by frequency of IS use and internalization of IS use. Except for the hypothesised relationship between IS experience and internalization of IS use (H1b) and the relationship between satisfaction with IS support and frequency of IS use (H7a), all the rest are significant. Table

3 shows that, overall, the results indicate there is positive correlations between the independent variables and the dependent variables as hypothesized. Table 4 however shows that, overall, the results do not indicate there is positive correlations between habits and affect (H3, H4).

Table 1: Descriptive Statistics for variables in the Research Model
(N = 144)

Variable	Mean	Std. Deviation
IS Experience	2.06	1.09
Ability to use IS	2.67	1.03
Satisfaction with IS information	3.40	0.74
Satisfaction with IS System	3.50	0.71
Satisfaction with IS Support Services	3.47	0.85
Satisfaction with IS Development Plans	3.02	0.70
Perceived Usefulness of IS	3.20	2.21
Subjective Norms in relation to IS use	2.38	1.82
Subjective Roles in relation to IS use	3.99	0.60
Subjective Values of IS	3.71	0.73
Social Situations in relation to IS use	3.54	0.70
IS Development processes	3.44	0.67
IS Management processes	3.59	0.67
Organizational Environment	3.64	0.68
Frequency of IS use	3.64	1.18
IS Internalization	3.94	0.73

Table 2: Reliability Coefficients of Scales (Cronbach's Alpha) for scaled Variables used in this Study (N = 144 Scale = 5-point Likert scale).

Variable	No. of Items	Cronbach's Alpha
Perceived Usefulness	6	0.85
Satisfaction with IS System	7	0.88
Satisfaction with IS Information	8	0.90
Satisfaction with IS Support Services	5	0.92
Satisfaction with IS Development Plans	7	0.92
Subjective Norms	4	0.81
Subjective Roles	4	0.82
Subjective Values	4	0.91
Social Situations	4	0.86
Organizational Environment	5	0.76
IS Development Processes	5	0.74
IS Management Processes	4	0.70
IS Internalization	4	0.81

Table 3: Pearson's Product-moment Correlation between the Independent variables, Frequency of use and Internalization of use (N = 144)

Independent variable (Hypothesis)	Frequency of IS use		Internalization of IS use	
	r	*p*	*r*	*p*
IS Experience (H1a, b)	0.231**	0.006	0.119	ns
Ability to use IS (H2a, b)	0.400**	0.000	0.413**	0.000
Satisfaction with IS Information (H5a, b)	0.329**	0.000	0.311**	0.000
Satisfaction with IS system (H6a, b)	0.312**	0.000	0.389**	0.000
Satisfaction with IS Support (H7a, b)	0.160	ns	0.205*	0.016
Satisfaction with IS Development Plan (H8a, b)	0.208*	0.014	0.250**	0.003
Perceived Usefulness of IS (H9a, b)	0.259**	0.002	0.600**	0.000
Subjective Norms in relation to IS use (H10a, b)	0.373**	0.000	0.383**	0.000
Subjective Roles relation to IS use (H11a, b)	0.413**	0.000	0.569**	0.000
Subjective Values of IS (H12a, b)	0.283**	0.001	0.497**	0.000
Social Situations relation to IS use (H13a, b)	0.176*	0.036	0.377**	0.000
IS Development processes (H14a, b)	0.249**	0.003	0.298**	0.000
IS Management processes (H15a, b)	0.285**	0.001	0.388**	0.000
Organizational environment (H16a, b)	0.281**	0.001	0.573**	0.000

Note: Significant at $**p < 0.01$, $*p < 0.05$

Table 4: Pearson's Product-moment Correlation between the Independent variables, IS Experience and Ability to use IS

Independent variable (Hypothesis)	IS Experience		Ability to use IS	
	r	*p*	*r*	*p*
Satisfaction with IS Information (H3a, H4a)	-0.001	ns	0.166*	0.048
Satisfaction with IS system (H3b, H4b)	0.033	ns	0.232**	0.005
Satisfaction with IS Support (H3c, H4c)	-0.010	ns	-0.005	ns
Satisfaction with Development plan (H3d, H4d)	0.029	ns	0.017	ns

Note: Significant at $**p < 0.01$, $*p < 0.05$

6.2 Regression Analysis

The bivariate analysis presented above establishes the support or otherwise of the hypotheses tested in this study. To identify the variables which are most important in explaining the variance in behavior towards using IS, stepwise regression analysis was further performed to measure the relative importance of the impact of changes in each explanatory variable. Preliminary analyses were first performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results of the stepwise regression analysis are shown in Tables 5 and 6 for Frequency of IS use and Internalization of IS use respectively.

Table 5 shows that nearly 45 percent of the variance in frequency of IS use is explained by seven (7) variables – ability to use IS *(habits)*, subject norms relating to the IS director *(social factor)*, the reliability of the IS system *(Affect)*, interaction among business units *(facilitating conditions)*, position in the organization *(social factor – role)*, IS experience *(habits)*, and CBIS experience *(habits)*. Overall, the results tend to indicate that habits are most important in explaining frequency of IS use: with IS experience, CBIS experience and ability to use IS variables uniquely contributing to this explanation. This is followed by the unique contributions of the variables for the social, facilitating conditions and affect factors, as mentioned above.

It is interesting to note that *position* and *CBIS experience* have not been included in the research model but in the survey questionnaire to check respondents' position and CBIS experience prior to using IS. As the results indicate, they turned out to be important variables in explaining frequency of IS use.

Table 6 shows that a little over 64 percent of the variance in internalization of IS use is explained by five (5) variables – pace of change of business environment *(facilitating conditions)*, perceived usefulness *(consequences)*, ability to use IS *(habits)*, subjective productive values of IS *(social factor)*, and subject norms relating to colleagues *(social factor)*. Overall, the results tend to indicate that facilitating conditions are most important in explaining internalization of IS use, with the pace of change of business environment variable uniquely contributing to this explanation. This is followed by the unique contributions of the variables for the social, consequences and habits factors, as mentioned above.

In summary, the results tend to indicate that internalization of IS use is a more appropriate measure of user behavior than frequency of IS use. However, the contributions of both variables in explaining user behavior towards IS use are quite significant and worth taking into consideration, in deciding on the development, implementation and use of IS in organizations.

Table 5: Stepwise Regression Analysis – *Frequency of IS use*

R = 0.668
R^2 = 0.447
F = 14.649 : *Sig.* F = 0.000

Variables Entered	From Construct	Beta	Sig.
Ability to use IS	Habits	0.244	0.001
Because of my role, IS director thinks I should use IS	Social Factors – Subjective norms	0.215	0.003
IS system always reliable	Affect – IS features	0.229	0.001
Interaction among business units encourages IS use	Facilitating conditions	0.264	0.000
Position	Social Factor – Subjective roles	-0.166	0.024
IS Experience	Habits	0.379	0.000
CBIS Experience	Habits	-0.301	0.001

Table 6: Stepwise Regression Analysis – *Internalization of IS use*

$R = 0.801$ $R^2 = 0.642$ $F = 38.317$: *Sig.* $F = 0.000$			
Variables Entered	From Construct	Beta	Sig.
Pace of change of business environment encourages IS use	Facilitating conditions	0.362	0.000
Perceived usefulness of IS	Consequences	0.264	0.000
Ability to use IS	Habits	0.214	0.000
Productive value of IS	Social Factor – Subjective values	0.161	0.009
Because of my role, Colleagues think I should use	Social Factor – Subjective norms	0.152	0.020

7. Contributions and Limitations of This Study

The contributions of this study are threefold, namely, theoretical, methodological and practical. Primarily and theoretically, IS use as a behavior has been established and confirmed by this study using Triandis' Framework. Methodologically, the approach for studying IS as a behavior using Triandis' Framework has been established. The Framework and the methodology could also be applied in information systems to investigate factors explaining user behavior towards an IS.

Practically, the findings of this study have some implications for IS development, implementation and use in organizations. IS developers and implementers need to be award of the social, affect, consequences, and facilitating conditions factors that contribute the behavior of IS users towards using the systems. Proper education and training might be necessary for experience and ability to use IS for habits to use IS to be entrenched.

8. Problems and Limitations of Triandis' Theoretical Framework

Triandis' Theoretical Framework appears to be complex. Triandis notes that the arrows in the model in Figure 1 show the directions of probable causalities, although he admits that there are several bi-directional relationships that are not shown in order to keep the diagram simple. There also limitations in system characteristics or variables that may impact on user behavior.

9. Conclusion

Triandis' Theoretical Framework, a theoretical model from social psychology and organizational behavior, explicitly addressed the net beliefs as well as the social, cultural and organizational factors that influence/explain behavior. The Framework was applied to provide answers to the following research questions:

1. What are the major social, cultural, and organizational factors that explain the behavior of users towards using IS in organizational settings?
2. What is the relative importance of these factors in determining IS use by users in organizational settings?

The Framework satisfactorily produced results which indicate that, theoretically, both internalization of IS use and frequency of IS use variables significantly contribute to behavior towards using IS. However, relatively, the results of this study indicate that internalization of IS use is a more appropriate measure of user behavior than frequency of IS use. Triandis' Theoretical Framework has therefore proved to be a good theoretical foundation alternative for User Behavior Testing in Information Systems Use and acceptance Research.

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