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BEHAVIOR PARTICIPATION IN VIRTUAL WORLDS: A TRIANDIS MODEL PERSPECTIVE

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Abstract

Emerging virtual technology suggests that we are moving into a new age of technology, Web 3.0, in which social networks and 3D virtual environments are prominent. Many new business opportunities present themselves in this context. However, business success in the new virtual world requires an understanding of how people behave in virtual worlds so that they can be effectively and efficiently managed. This paper examines how people behave in virtual worlds by using a Triandis interpersonal behavior model. The data were collected in Cyworld, and the results were tested by Lisrel 8.70. We examined two types of behaviors, giving information and obtaining information. We show that although behavioral intention plays a role in shaping virtual world behavior, habit plays a major role in determining whether people will give information and obtain information. What is more interesting is that behavior related to obtaining information is a strong antecedent of behavior related to giving information in virtual worlds. The conclusion provides several implications for both researchers and virtual world developers.

Keywords: Triandis, Virtual Worlds, Cyworld, Interpersonal Relationship.

1 INTRODUCTION

The last two decades have witnessed the burgeoning of various Internet applications. One aspect worthy of study with regard to these Internet applications is their diffusion at the societal level. Participation in the unseen worlds behind these connected networks can significantly influence people's lives (Igbaria, 1999). There have been three discernible waves of innovation in Internet applications, Web 1.0 to 3.0. A virtual world is an online space in which users are represented by avatars (Reina Yahya & Karl Reiner, 2008). Some researchers believe that two-dimensional spaces with avatars should not be called virtual worlds and that the term virtual world should be reserved for only three-dimensional computer-generated environments (Briggs et al., 1993; Stuart & Jan, 2008). While this view neglects the fact that avatars can be either text-based or graphical and 3D, we define a virtual world as a computer-based simulated environment intended for its users to inhabit and interact through avatars. Hence, our study is not limited to 3D virtual worlds, such as Second Life, but includes virtual worlds like Cyworld with two-dimensional avatars. Several different virtual world business applications have been implemented to capitalize on these relationships. Virtual world applications hold promise for branding and marketing (Hemp, 2006; Papagiannidis et al., 2008; Stuart & Jan, 2008), business training and education (Briggs et al., 1993), the gaming industry (Jin & Chee, 2008), and virtual commerce (Papagiannidis et al., 2008; Reina Yahya & Karl Reiner, 2008).

Participation from virtual world members is essential to keeping a virtual world viable. A virtual world needs to maintain a certain level of participation to generate revenue (Papagiannidis et al., 2008). In virtual worlds, people participate in various ways, such as browsing, writing blogs, sharing information, and networking, among others. Virtual world participation different from virtual community participation in many ways such as avatar has not been explored. We sought to discover the motivations that drive people to participate in virtual worlds. The Triandis interpersonal behaviour relationship model (Triandis, 1977, , 1980), based on a social psychological perspective, is introduced as the framework for our investigation. Specifically, two main types of involvement behavior, Behavior to Obtain Information (BOI) and Behavior to Give Information (BGI), are investigated. Data were collected from Cyworld and analyzed with SEM and the result shows that both BOI and BGI can be explained effectively by the Triandis Model.

2 LITERATURE REVIEW

Although the notion of virtual worlds has been discussed since 1980, the academic literature about it has emerged only in the last two decades and become especially active only in recent years. The study of virtual worlds is only in its infancy, as is virtual world technology itself. According to Festcherin (2008), virtual world research can be classified into four categories according to two dichotomies, individual / company and game / social interaction. Game- and social interaction-oriented virtual worlds differ in many ways. For instance, there are no "levels," "scores," or "end" in social interaction-oriented virtual worlds. We thus focus on social interaction-oriented virtual worlds at the individual level. This section briefly reviews the literature on virtual world participation studies, and presents the Triandis interpersonal relationship behaviour model.

2.1 Review of Virtual World Involvement

Because virtual worlds emerged only recently and are still in development, only a few studies have been published on factors motivating members' participation. Broadly speaking, behavior in social interaction-oriented virtual worlds can be classified into two types: behavior to obtain information and behavior to post information (Jung et al., 2007), although there are several other peripheral types of behaviors, such as playing games and searching for friends. In the few papers investigating factors motivating participation in virtual worlds, community factors, relationship factors, and social and psychological factors have been found to be significant. Fetscherin et al. (2008) conducted an empirical study in Second Life to investigate members' intentions to participate in the virtual world and found that community factors such as communication, collaboration, and cooperation play a

pivotal role as a means of influencing user intention and the acceptance of Virtual Worlds. In another paper, Jung et al. (2007) investigated members in Korea-based Cyworld and found that entertainment and personal income factors are the main motives for why people maintain a homepage in Cyworld. In contrast, a study by Kim and Yun (2007)found that emotional and social factors are the primary motives for participation in Cyworld.

Since a virtual world is a kind of virtual community (VC), we can refer to the VC literature to gain insight on what influences participation. Generally, virtual community participation behavior has been studied from three perspectives: general participation, lurking, and active participation. General participation behavior, defined either by the time and frequency spent in VCs (Wang & Fesenmaier, 2004) or the intention to participate in VCs (Bagozzi & Dholakia, 2002; Teo et al., 2003), has been investigated in several studies and the results suggest that social-psychological reasons are the major reasons for virtual community participation. "Lurking" is when users view messages in a virtual community but do not post any. People who lurk are called "lurkers." Lurking behavior has been described in a series of studies (Brazelton & Gorry, 2003; Christie & Azzam, 2004; McKee, 2002; Preece et al., 2004) but has not been extensively investigated. The reason is that active virtual community participation contributes to the virtual community's continued success, even though this behavior is spontaneous, unrewarding, and time-consuming, and that lurking does not. In general, three perspectives have been proposed from which to explore and explain this behavior. The first is the gift economy viewpoint, and has been studied by several researchers (Kollock, 1999; Wasko & Faraj, 2000). The second perspective can be attributed to and explained by social identity theory (Dholakia et al., 2004), self-efficacy theory (Wang & Fesenmaier, 2004), and self-presentation theory (Papacharissi, 2002; Schlenker, 1985), which are all sub-theories of self-concept theory. The third perspective of active virtual community participation arises from social-related constructs such as culture (McKee, 2002), trust (Ridings et al., 2002), and centrality in the network and self-related expertise (Wasko & Faraj, 2005), friendship (Carter, 2005).

From explorative studies of both the virtual world literature and virtual community literature, we can conclude that virtual world studies, though still in the early stages, are somewhat similar to virtual community studies. Literature from both sides suggests that relational, social-psychological, and emotional factors are the main reasons that members participate. The current needs for virtual world research are thus 1) to set up a theoretical framework through which to investigate the motivations of virtual world members' involvement; 2) to empirically verify the proposed framework; and 3) to differentiate the two main types of virtual world behavior and identify the factors that influence these two behaviors.

2.2 The Triandis Interpersonal Behavior Model

An interpersonal behavior model was proposed by Triandis in 1977 and developed further in 1980, with the objective of building a synthesized model to include centripetal variables of attitudes, values, and other acquired behavior dispositions that could be used to describe different types of interpersonal behavior.

The core of the Triandis model is the mechanism of motivations for behavior, which can be described by two equations built on intention and habit relationships:

$$P_a = (w_H H + w_I I)\, P.F$$
$$I = w_S S + w_A A + w_C C.$$

The first equation represents the probability of a behavior Pa as a function of the sum of habits (H) plus behavioral intentions (I), multiplied by the organism's physiological arousal (P) and by facilitating conditions (F). The second equation describes behavioral intention as a function of social factors (S), affect (A), and perceived consequences (C). w represents weight, which ranges from 0 to 1. According to the first equation, behavior is determined jointly by habit and intentional motivations, which supplement each other. When an individual is familiar with a certain behavior, his or her ability to perform this behavior will be high and his or her action toward this behavior will become automatic, which lays the ground for this behavior to become habitual. Consequently, the intention of performing behavior is a self-conscious and self-instructional command of the individual. The relationship

between habit and behavior is like a zero-sum game. When an individual's automatic behavior is high, that is, he or she habitually performs this behavior, the individual's intention toward this behavior is low. However, even in the presence of habit and intention, if the external environment does not permit the behavior, the individual cannot perform the behavior.

The second equation shows how behavioral intention is jointly determined by affect, perceived consequences, and social factors. Affect refers to an individual's cognitive feelings toward the behavior; social factors refer to the internalization of the individual's subjective culture, determined by the group of people with whom he or she interacts most often; and consequences refer to the values the behavior may bring to the individual after he or she performs the behavior.

In addition to these two core equations, the Triandis model suggests there are other relationships among the variables. For example, habit has a positive influence on affect, which suggests that the previous automatic experience of a habit will strengthen an individual's emotional feelings.

The Triandis model has proved useful for explaining attitude-behavior relationships. It can be used across disciplines and therefore is regarded as even more useful than models such as Fishbein's model (1975) of attitudes (Sheth, 1982). The relationship most often used is the attitude-behavior relationship. A tradeoff is made, however, between an attitude-behavior relationship and a habit-behavior relationship. If the attitude-behavior relationship is strong, then the habit-behavior relationship is weak (Verplanken et al., 1994).

3 CONCEPTUAL MODEL

Although the Triandis interpersonal relationship model has long been regarded as an adoption theory or behavior-choice model in the IS and marketing fields, it is in fact an interpersonal relationship theory that attempts to explain people's behaviors toward others in a complicated social environment.Because of the interpersonal relationship orientation of virtual worlds, the Triandis interpersonal relationship model is appropriate for explaining virtual world involvement. Furthermore, because virtual world software is easy to use, the Triandis model can focus on participation issues rather than on technical acceptance issues.

The Triandis interpersonal relationship model depicted in Figure 1 proposes that virtual world involvement behaviors (BOI and BGI) can be explained by the participation habits and behavioral intentions (BI) of virtual world members. BI is, in turn, determined by the affect, perceived consequences, and social factors of virtual worlds, and habit has an effect on affect. Based on these two interpersonal relationship models, nine hypotheses are proposed.

H1: Member attempts to obtain information will positively influence propensity to give information.

H2: Habitual activities in virtual worlds will have positive effects on virtual world member attempts to obtain information.

H3: Habitual activities in virtual worlds will have positive effects on virtual world member propensity to give information.

H4: Behavioral intention will have positive effects on virtual world member attempts to obtain information.

H5: Behavioral intention will have positive effects on virtual world member propensities to give information.

H6: Habitual activities in virtual worlds will have positive effects on virtual world member affect towards participating in virtual worlds.

H7: The affect of virtual world members will have positive effects on their behavioral intentions to participate in virtual worlds.

H8: The consequences perceived by virtual world members will have positive effects on their behavioral intentions to participate in virtual worlds.

H9: The social factors affecting virtual world members will have positive effects on their behavioral intentions to participate in virtual worlds.

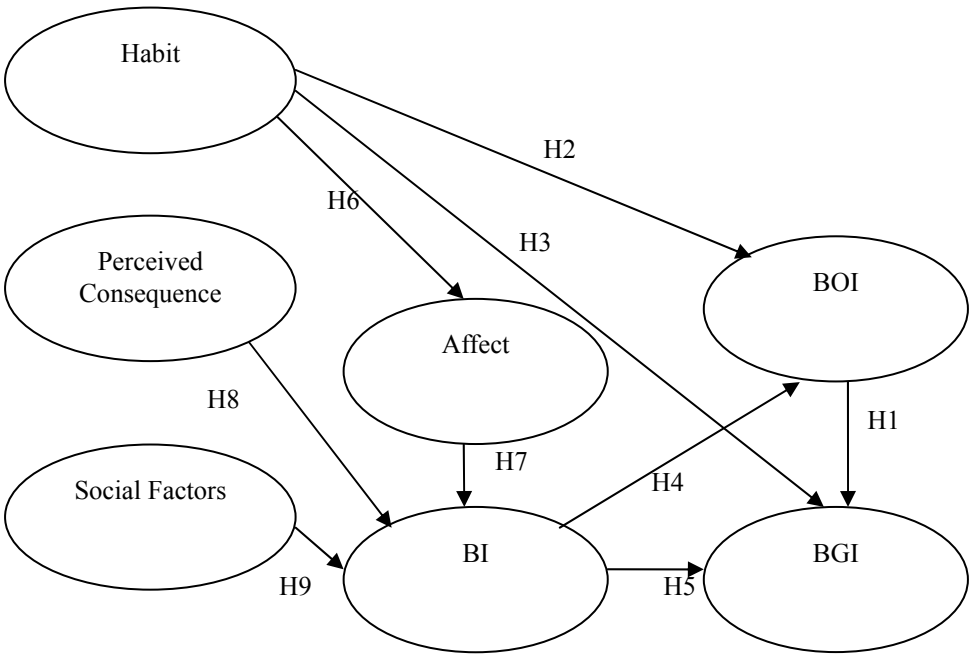

Figure 1. Research Model and Hypotheses

4 RESEARCH METHODOLOGY

We adopted an online cross-sectional survey to investigate participation in virtual worlds. The data were collected in Cyworld, a site that combines elements of Second Life and MySpace. Cyworld was chosen not only because it is a typical virtual world website meant to encourage networking, but because it is a Korean e-community with 18 million members; 90 percent of all Koreans in their 20s have Cyworld accounts. The Cyworld business model earns its owners $7.78 per member per year.

4.1 Data Collection

An online questionnaire was developed to collect data from Cyworld. To facilitate management, the online questionnaire was hosted on a service provider's site (http://www.my3q.com) that provides free questionnaire creation services. The use of a service provider also allowed us to address access control, authentication, and multiple responses associated with the Web-based data collection approach (Stanton & Rogelberg, 2001).

Participants in the survey were college students who took one or two of the five undergraduate electronic commerce courses offered by the School of Business Administration at a Korean university. To ensure that the experiments were rigorous, the participants were tested for two weeks to determine whether they were qualified to answer the survey. First, one of the authors announced that all participants would be awarded one bonus point to their final course grade after submitting their Cyworld homepage address for evaluation. Second, five MIS doctoral candidates evaluated the quality of each participant's Cyworld homepage on a five-point Likert scale in terms of content quality, content volume, and number of online friends. Among the students who expressed a desire to participate in the survey, 31 had Cyworld homepages that were evaluated as below average (4.1) and were therefore excluded from the survey.

All participants had previous experience using Cyworld for various purposes such as uploading information and exchanging information with online friends. A chi-square test revealed no significant differences between groups delineated in terms of gender, area of study, or previous experience with Cyworld.

4.2 Variable Operationalization

The dependent variables of this study were BOI and BGI. BGI measured how eagerly one "talks," or posts messages in a virtual world; BOI measured how often one retrieves information from a virtual world. BOI and BGI were operationalized using a Likert scale (1 to 7) with measures developed from the actual usage behavior in information systems (Davis, 1989; M. Limayem & Hirt, 2003; Ridings et al., 2002; Straub et al., 1995; Wang & Fesenmaier, 2004). Most of these measures, which were derived from information technology adoption studies, were based on the total time spent and the frequency of participation in the virtual world.

The variables in the Triandis model were operationalized according to the initial suggestions of Triandis and the suggestions of previous studies using a Likert scale (1 to 7). We adapted the habit construct that Limayem and Hirt (2003) developed for virtual world participation. The measure of behavior intention was adapted from a model developed by Davis (1989) and Moon and Kim (2001). The measure of affect was adapted from a model developed by Triandis (1980), who suggested the use of four pairs of semantic differential items: pleasant-unpleasant, enjoyable-disgusting, exciting-depressing, and joyful-hateful. Perceived consequence was measured by the construct developed by Limayem and Hirt (2003) in their study of WebBoard for supporting Internet communication. Social factors were measured using two approaches. First, we adapted some of the items from previous studies (e.g., (Baumann et al., 1993; M. Limayem & Hirt, 2003)). Second, we used open questions to solicit additional information about the social factors. This method has been used with great success by Limayem and Hirt (2003) to examine environment-specific factors.

4.3 Instrument Validation

Four-stage survey validation was conducted to ensure the validity and reliability of the questionnaire. First, whenever possible, previously validated questions were used, and generally accepted online instrument construction guidelines (Ridings et al., 2002; Stanton & Rogelberg, 2001; Wang & Fesenmaier, 2003) were observed as much as possible. Second, the questionnaire was pretested by an MIS professor, seven business doctoral students, and two experienced virtual world webmasters. Third, the pilot test for the questionnaire was conducted for the questionnaire in Cyworld before real data were collected. The reliability of the measurement as measured by Cronbach's alpha is shown in Table 1. As shown, the reliability of all the constructs exceeds 0.70, except affect, which is slightly lower than 0.70 but acceptable for the exploratory study (Nunnally & Bernstein, 1994).

Construct	Cronbach's Alpha	Construct	Cronbach's Alpha
BOI	0.87	HAT	0.90
BGI	0.93	FC	0.79
ITO	0.87	PC	0.74
AFF	0.66	SF	0.87

Table 1. Cronbach's Alpha of the pilot test

5 RESULTS OF DATA ANALYSIS

A total of 563 responses were collected from Cyworld. After checking for data integrity, multiple responses resulted in the elimination of four responses, thus yielding a total of 559 effective responses. According to the respondent profile, most respondents were male (63%), and single (97%). Their occupations varied from unemployed to professionals, and most of them were graduate/college students. The ages of respondents were predominantly (94%) between 19 and 28. Most (96%) were college graduates. Their incomes were relatively low, probably because most were students; for instance, 74% had an income less than $500 per month. Lisrel 8.70 was used to analyze the Triandis model in this study. A two-step approach, incorporating a measurement model and structural model analysis, was employed on the recommendation of Anderson and Gerbing (1988). A CFA using LISREL 8.70 was conducted to test our measurement model.

5.1 Analysis of Measurement Model

Scale reliability and validity were assessed with Confirmative Factor Analysis (CFA) and Cronbach's alpha. Since there is not a perfect fit index, it is recommended that researchers report their research result using a combination of the fit indices. This study thus chose the goodness of fit index (GFI) as its combination of fit indices, the adjusted goodness of fit index (AGFI), and root mean square residual (RMSR) from the absolute fit indices, the non-normalized fit index (NNFI) and IFI from the relative fit indices, and the comparative fit index (CFI) and root mean square error of approximation (RMSEA) from the noncentrality fit indices. The cutoff criteria for the fit indices are based on those of Hu and Bentler (1999).

The goodness of fit indices for both the measurement model and the structural model is reported in Table 2. Overall, the measurement model suggests that the model has a good fit. Although the GFI and AGFI indices failed to meet the recommended minimum values, GFI's value discrepancies (0.01 for the measurement model and 0.02 for the structural model) and AGFI's value discrepancies (0.05 for the measurement model and 0.06 for the structural model) led us to believe that the model fit was reasonably adequate for assessing the results for the structural model.

	$\chi 2$	df	NNFI	CFI	IFI	GFI	AGFI	SRMR	RMSEA
Recommended Value			≥0.90	≥0.90	≥0.90	≥0.80	≥0.80	≤0.11	≤0.10
Measurement Model	1856.65	413	0.96	0.96	0.96	0.79	0.75	0.065	0.091
Structural Model	1966.42	393	0.96	0.96	0.96	0.78	0.74	0.077	0.094

Table 2. Overall Goodness of Fit Indices

The measurement model was further assessed for construct reliability and construct validity. Construct reliability was assessed at three levels: Cronbach's alpha, item reliability, and composite reliability. The descriptive statistics and Cronbach's alpha are reported in table 3. As indicated in Table 3, the Cronbach's alpha values of all our variables are above the 0.70 level that is suggested for exploratory research (Nunnally & Bernstein, 1994), thus supporting the reliability of our measurements for model testing. As shown in Table 3, all item reliabilities exceeded 0.50 and showed an acceptable level of item reliability, although several items are slightly below 0.50, namely, HAT4 (0.49), AFF3 (0.38) and AFF4 (0.44), and PC1 (0.40) and PC4 (0.38). We think, however, that these levels are still acceptable. The composite reliabilities shown in table 3 demonstrate acceptable values above the threshold of 0.70 as suggested by Fornell and Larcker (1981), though affect is slightly below 0.70 (0.63). We still believe, however, that it is acceptable.

Construct	Mean	S.D.	Cronbach's Alpha	Factor Loading	Item Reliability	Composite Reliability	Average Variance Extracted
Behaviour to Obtain Information (BOI)							
BOI1	3.30	1.52		0.75	0.56		
BOI2	3.13	1.44		0.75	0.56		
BOI3	3.25	1.48	0.89	0.78	0.61	0.84	0.62
BOI4	3.56	1.71		0.83	0.69		
BOI5	3.37	1.61		0.84	0.71		
Behaviour to Give Information (BGI)							
BGI1	3.49	1.52		0.79	0.62		
BGI2	3.52	1.59	0.91	0.79	0.62	0.88	0.72
BGI3	3.44	1.59		0.91	0.83		

BGI4	3.43	1.61		0.89	0.79		
Habit (HAT)							
HAT1	4.42	1.75		0.81	0.66		
HAT2	3.98	1.80		0.86	0.74		
HAT3	3.73	1.79	0.90	0.84	0.71	0.86	0.65
HAT4	3.92	1.69		0.70	0.49		
HAT5	4.42	1.67		0.81	0.66		
Behavioral Intention (BI)							
BI1	4.09	1.54		0.89	0.79		
BI2	4.17	1.57	0.87	0.90	0.81	0.83	0.70
BI3	3.92	1.55		0.72	0.52		
Affect (AFF)							
AFF1	3.83	1.41		0.75	0.56		
AFF2	4.53	1.48	0.78	0.71	0.50		
AFF3	4.84	1.60		0.62	0.38	0.63	0.47
AFF4	3.83	1.49		0.66	0.44		
Perceived Consequences (PC)							
PC1	4.15	1.25		0.63	0.40		
PC2	4.64	1.10		0.80	0.64		
PC3	4.72	1.08	0.88	0.73	0.53	0.76	0.51
PC4	4.13	1.17		0.62	0.38		
PC5	4.52	1.07		0.75	0.56		
PC6	4.33	1.07		0.74	0.55		
Social Factors (SF)							
SF1	4.74	1.52		0.87	0.76		
SF2	4.54	1.51	0.92	0.81	0.66	0.90	0.74
SF3	4.52	1.50		0.89	0.79		
	4.73	1.60		0.88	0.77		

Table 3. Summary of Measurement Scales

Construct validity was assessed by convergent validity and discrimant validity. As shown in Table 3, all factor loadings are greater than 0.70, except for AFF3 (0.62), AFF4 (0.66), PC1 (0.63), and PC4 (0.62). Moreover, the AVE of all the constructs is greater than 0.50 except for affect (0.47). We continue to believe, however, that these constructs showed acceptable convergent validity.

Discriminant validity can be assessed by comparing the shared variance among constructs with the average variance extracted. Our test results not shown here because of text limit, show that all average variances extracted exceed 0.50, except for affect, which is slightly below 0.50 (0.47), but nonetheless surpasses the minimum recommended value. In addition, the shared variance among variables of all entries is consistently lower than the square root of the diagonal average variance extracted. Although the values of some shared variances exceed the average variance extracted, these exceptions are few. The findings suggest that the measures are distinct and unidimensional, thereby ensuring discriminate validity at the construct level.

5.2 Analysis of Structural Model

As with the measurement model, As shown in Table 2, all the fit indices are within the acceptable levels, which indicates that the model has a good fit, except that GFI is 0.02 and AGFI is 0.06, both of which are lower than the 0.80 cut-off point, though this is still acceptable. The model testing results are summarized in Figure 2.

The explanatory power of the structural model was assessed in terms of the portion of variance it explains. As shown in Figure 4, 34% of the variance of behavior to obtain information and 64% of the variance of behavior to give information can be explained by the research model. Furthermore, 75% of the variance of behavioral intention and 78% of the variance of affect can be explained by the research model.

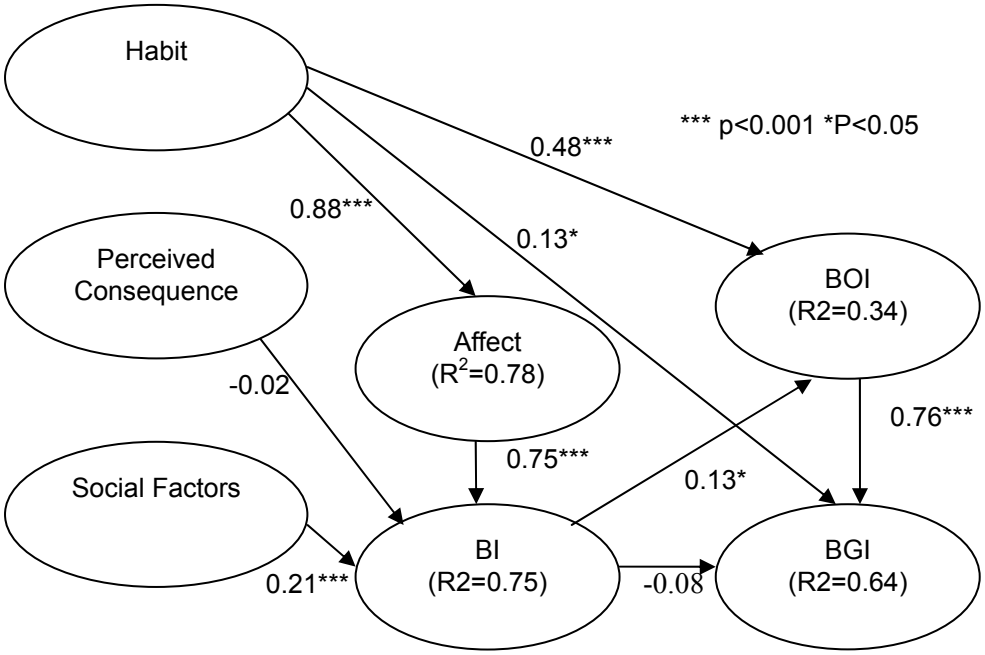

Figure 2. Triandis Model Testing Resuts

The significance of the hypotheses and the relative strength of the individual path are reported in Figure 2. Table 4 summarizes both the direct and indirect effects of the respective factors. Compared to other factors, habit exhibited the strongest direct (0.48) and total effect (0.57) on BOI. Habit also exhibited the second strongest direct (0.13) and the strongest indirect (0.38) and total effect (0.51) on BOI. BOI had the strongest effect (0.76) on BGI. Compared to habit, behavioral intention had a relatively weak effect on BOI (0.13) and a significantly weak effect on behavior to give information (0.02), which caused affect, perceived consequences, and social factors to have weak indirect effects on both BOI and BGI.

Effects on BOI		Effects on BGI	
Direct effect	Effect Size	Direct effect	Effect Size
		BOI	0.76
Habit	0.48	Habit	0.13
BI	0.13	BI	-0.08
Indirect effect		Indirect effect	
Habit	0.09	Habit	0.38
		BI	0.10
Affect	0.10	Affect	0.02
PC	0.00	PC	0.00
SF	0.03	SF	0.00
Total Effect		Total Effect	
		BOI	0.76
Habit	0.57	Habit	0.51
BI	0.13	BI	0.02
Affect	0.10	Affect	0.02
PC	0.00	PC	0.00
SF	0.03	SF	0.00

Table 4. Strengths of Individual Factors

6 DISCUSSION, IMPLICATIONS, AND LIMITATIONS

We conducted an empirical study of virtual world participation with the Triandis interpersonal relationship model. The findings suggest that the Triandis model is applicable as a theoretical foundation for evaluating the participation behavior of virtual world members. Seven out of nine hypotheses were supported, which suggests that the Triandis model can be applied theoretically to explain virtual world involvement. Overall, the variables from the Triandis model explain 34% of the variance of behavior to obtain information and 64% of the variance of behavior to give information.

6.1 Theoretical Implications

First, this paper developed a theoretical model for virtual world studies by proposing that the interpersonal relationship perspective of the Triandis model is effective in explaining virtual world involvement. In particular, the paper classified virtual world behaviors into two types—BOI and BGI, and empirically tested the results by finding that habit is a strong predict to both BOI and BGI, and BI is a strong predictor for BOI.

The habit's effects on both BOI and BGI have a strong theoretical implication here. In the virtual environment, more and more research reported the automatic behaviour tendency played the important role in the virtual environment participation (de Guinea & Markus, 2009; M. Limayem & Hirt, 2003; Moez Limayem et al., 2007). Triandis hypothesized, on the basis of the social psychological perspective, that people participate in virtual worlds because of an automatic psychological tendency—the habit to participate in virtual worlds, and the findings of this paper strongly support this hypothesis.

Second, it's very interesting to find that BOI has a positive effective on BGI. This is consistent with what has been observed in the virtual community studies (Preece et al., 2004). The finding implied that members' lurking behaviour, i.e., BOI can nurture active participation, BGI. Furthermore, affect's effect on BGI and affect's effect on BOI; provides researchers starting points from which to explore virtual worlds.

6.2 Managerial Implications

The results presented in this paper have important managerial implications for virtual world organizers, and especially for those aiming to develop profitable virtual worlds.

The general conclusion that members participate in virtual worlds because they want to establish interpersonal relationships with other virtual world members has strategic implications for virtual world developers. A virtual world may have a mission other than relationship-building, but for the community to be sustained, relationship-building among members must be taken into consideration. Thus, virtual world developers should incorporate the interpersonal relationship perspective into their strategic plan for virtual world operation so that the needs of members are fulfilled and they continue to participate. The strategic plan should consider two levels: the design and development level and the activity level. A portion of funds from the overall operation of virtual worlds should be allotted to relationship-building at these two levels. Design-level factors are functions that can be built into the overall framework of the virtual world software. Activity-level factors refer to the management issues associated with the activities in virtual worlds. To facilitate relationship-building, virtual world organizers can initiate theme activities periodically to foster interactions among members so that relationships can be established.

6.3 Limitations

The first limitation of this paper is the nature of the data collection, a cross-sectional survey, which makes it difficult to observe the process by which virtual world involvement develops. Because the BOI and BGI are factors that change over time and the trade-off relationship between the habit of virtual world involvement and behavioral intention varies over time, the dynamic interactions between these relationships can be better examined in a longer period of study.

The second limitation of this paper lies in the sample. A virtual world has thousands of members, but only a fraction of them are online at a given time; thus, the response rate is hard to estimate. Moreover, the sample was self-selecting, which means that only members who were interested in the content of the study responded, and this may have weakened the randomness of the sample.

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