

IDENTIFICATION OF FACTORS AFFECTING HABITUAL IS USE

Research-in-Progress

Saerom Lee

College of Business Administration
Seoul National University, Seoul, Korea
rose318@gmail.com

Jungjoo Jahng

Graduate School of Business
Seoul National University, Seoul, Korea
jahngj@snu.ac.kr

Abstract

The Information Systems (IS) fields have evolved from identifying factors that lead to initial IS adoption to its continuous use. Recent studies on IS continuous use focus on variables unexplained by reason-based processes, such as automatic use and inertia toward new IS. A habit is an automatic action, which has been frequently repeated following a cue, to achieve a certain goal. This study focuses on the antecedents of habitual IS use and strives to accomplish three primary research objectives. First, we offer a simple research model aimed at identifying characteristics of IS and psychological factors that affect habitual IS use. Second, in developing this research model, we provide rich understandings both of theoretical background of automatic behaviors and previous research on habit in IS fields. Finally, we discuss future research plan and implications for research and practice.

Keywords: IS continuance, user behavior, habit, automaticity, IS characteristics, reward, stress

Introduction

Imagine waking up in the morning and checking your SmartPhone for messages. With half-opened eyes, you turn on the music for a shower. While eating breakfast, you read today's headline in the news application. The age of ubiquitous computing has people using information systems (IS) everywhere, often automatically. Studies have previously focused on the adoption and continuous usage of IS (Agarwal and Karahann 2000; Bhattacharjee 2001; Bhattacharjee and Premkumar 2004; Cheung and Limayem 2005; Straub et al. 1995). However, recent research has begun attempting to explain its automatic usage where reason-based theories have failed (Hong 2010; Jaspersen et al. 2005; Kim et al. 2005; Limayem and Hirt 2003; Limayem et al. 2007; Politis and Karahanna 2012; Wilson et al. 2010). In the field of psychology, automatic behavior refers to habit. Researchers in the field of psychology (e.g., Limayem and Hirt 2003) have used the term "habit" to refer to an automatic, subconscious behavior. (Limayem and Hirt 2003).

A habit is a learned behavior that results in action following a cue (Limayem and Hirt 2003; Triandis 1977; 1980; Verplanken and Aarts 1999). Habitual IS use occurs automatically and with high efficiency due to repetition, where intentionality, awareness, and controllability are lacking (Bargh 1994). However, most research on IS use has been rooted in reason-based processes such as the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Technology Acceptance Model (TAM). Therefore, prior studies cannot sufficiently explain how automatic behavior affects actual IS use (Guinea and Markus 2009).

The present study investigates factors affecting habitual IS use. Habits are formed when actions are repeated and governed by a cue in a stable context (Verplanken and Aarts 1999). This study identifies the IS characteristics that contribute to create a stable context. Based on prior research, psychosocial factors such as stress and reward are also considered foundations of habit formation.

The next section reviews the definition of habitual behavior through learning theory and previous studies of habit in the IS field. In addition, we investigate how technological characteristics, stress, and reward affect habitual IS use. Then, areas for future research are identified, as are the theoretical and practical contributions of the present study.

IS Continuous Use

The IS field has evolved from identifying factors that lead to initial IS adoption to its continuous use (Agarwal and Karahann 2000; Bhattacharjee 2001; Bhattacharjee and Premkumar 2004; Cheung and Limayem 2005; Straub et al. 1995). Previous studies have focused on various factors affecting intention to use, referring to TAM (Limayem et al. 2007). In particular, studies on post-IS adoption behavior and IS continuous use suggest that future behavior is influenced by constructs such as satisfaction and emotional factors from past experience, not rational evaluation of IS (Agarwal and Karahanna 2000; Guinea and Markus 2009). Recent studies on IS continuous use focus on variables unexplained by reason-based processes, such as automatic use and inertia toward new IS.

Learning Theory

A habit is formed from goal-directed behavior, by repeating the same actions following a cue. Hull (1943) proposed a link between learning and motivation in that learning reduces motivational drives; this is known as the drive-reduction theory of learning. According to Hull's Learning Theory, people take action to reduce motivation (Hull 1943). By repeating the same action in a stable context to reduce motivation, the habit is strengthened. A stable context is a situation in which an event occurs with each instance of an action with similar goals and cues. When a behavior is performed repeatedly in a stable context, features such as time, place, and situation may become strongly linked to the mental image. Specific cues stimulate performance of the behavior without conscious consideration (Ouellette and Wood 1998; Wood et al. 2002). The behavior is performed automatically and efficiently with unintentionality, un-awareness, and lack of controllability (Bargh 1994).

Habit

Definition of Habit

A habit is an automatic action, which has been frequently repeated following a cue, to achieve a certain goal (Hull 1943; Limayem and Hirt 2003; Triandis 1977; 1980; Verplanken and Aarts 1999). In this study, we adopt the definition of a habit proposed by Verplanken et al. (1997). They define habits as “learned sequences of acts that become automatic responses to specific situations, which may be functional in obtaining certain goals or end states.” For specificity, we differentiate between habits and behaviors that are driven by internal mechanisms. Such behaviors are unconscious body reflexes, compulsive behaviors, and addiction (Verplanken and Aarts 1999).

Bargh (1994) considers habits as one type of action with automaticity, categorizing the factors of automaticity as follows: un-intentionality, uncontrollability, lack of awareness, and efficiency. Since habits are repetitive actions to achieve a certain goal, they are intentional behaviors (Verplanken and Aarts 1999). However, the level of intentionality of habitual behavior depends on the importance and complexity of the goal (Lankton et al. 2010). Higher habit levels lead to lower levels of intentionality (Triandis 1977; 1980; Verplanken 2006). Although higher levels of habit contain an intention to achieve a goal, the person might be unconscious of their actions. Therefore, lower levels of awareness imply higher levels of habit (Polites and Karahanna 2012). Automatic actions are difficult to control during its flow, and repetition brings efficiency through learning-by-doing (Bargh 1994).

Habit Formation

Habits are formed in a stable context (Ouellette and Wood 1998; Verplanken and Aarts 1999; Wood et al. 2002). This means that actions can be formed into habits more easily in a stable environment than in a dynamic environment. Verplanken and Aarts (1999) demonstrated that when there are appropriate rewards, actions are formed into habits for functional purposes. Ouellette and Wood (1998) showed that a habit is more easily established in a stable context, where opportunities for habit-forming behaviors arise at intervals of days or weeks, than in an unstable context, in which such opportunities arise only at intervals of six months to a year.

Habit in IS Research

In IS field, initial IS adoption, post-IS adoption, and IS continuous usage is investigated following the logic of reason-based processes (Guinea and Markus 2009). There is relatively little attention given to automatic behavior such as habits. Habit is usually considered an empty construct that predicts future behavior depending on statistical results (Guinea and Markus 2009). There are still ambiguous relationships between habitual behavior and future behavior. Consequently, habit is considered an unknown variable. Existing research does not address what factors influence habit, instead focusing on factors that can predict future behaviors (Ouellette and Wood 1998). Table 1 summarizes prior IS research on Habit.

Reference	Definition of Habit	Research Model	Role of Habit	Methodology
Jasperson et al. (2005)	Past behavior	Individual Cognition Model	<ul style="list-style-type: none"> • Independent variable of Post-adoptive intentions • Use History: Habit becomes the dominant predictor of individual's post-adoptive behavior 	Empirical
Lankton et al. (2010)	Learned actions that have become automatic responses to cues and are intended to obtain one or more goals	Extension Model of Limayem et al. (2007)	<ul style="list-style-type: none"> • Independent variable to Continued IT use • Identify additional antecedents of habit 	Empirical
Limayem and Hirt (2003)	The non-deliberate, automatically inculcated response that individuals	Triandis' Framework (Triandis 1977)	<ul style="list-style-type: none"> • Independent variables to actual usage behavior and affect 	Empirical

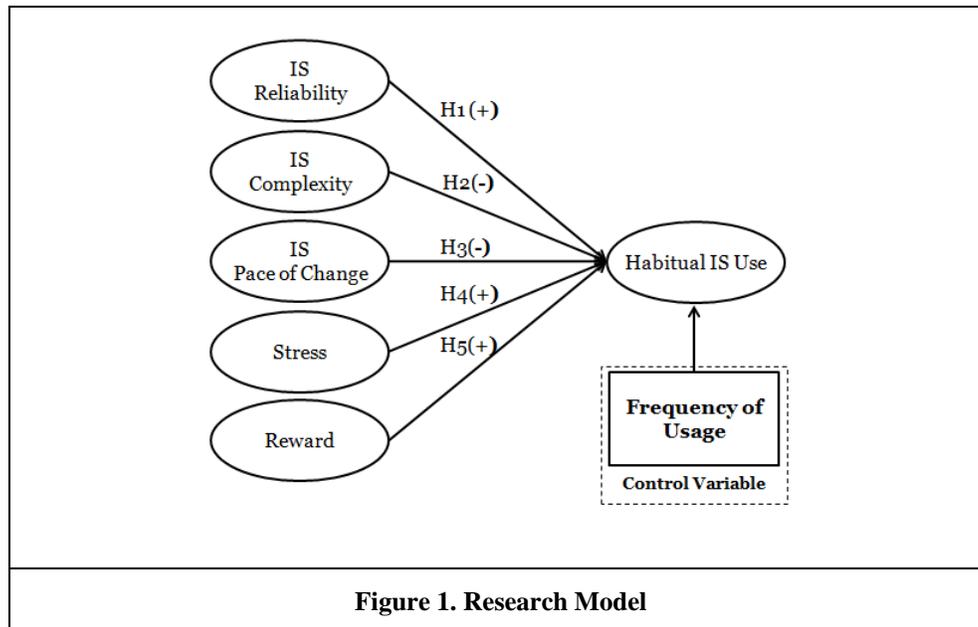
	may bring to IS usage			
Limayem et al. (2007)	Learned sequences of acts that become automatic responses to specific situations, which may be functional in obtaining certain goals or end states	Bhattacharjee's IS Continuance Model (Bhattacharjee 2001)	• Moderating variable between IS continuance intention and IS continuance usage	Empirical
Polites and Karahanna (2012)	Learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states	Technology Acceptance Model (TAM)	• Independent variables of Inertia	Empirical
Wilson et al. (2010)	Learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals	Unified Theory of Acceptance and Use of Technology (UTAUT)	• Independent variables of Intention and continued IT use frequency and performance expectancy, effort expectancy, and social influence which is independent variables of Intention	Empirical

Wilson et al. (2010) confirm that habit heavily affects intention to use and other independent variables such as intention and continued IT use, frequency, performance expectancy, effort expectancy, and social influence. Limayem and Hirt (2003) investigated how habit influences intention to use and actual behavior. They extend Triandis' model to develop objective measures of habit. Kim et al. (2005) found that heavier users of IS tend to not evaluate the system and show less intention. Limayem et al. (2007) contributed greatly to resolving the debates on habit, which is regarded as having a moderating or directing effect on intention to use. Empirical research led them to conclude that habit moderates intention. There is another approach to habit in IS usage studies, as exemplified in the research of Polites and Karahanna (2012), who analyzed the role of habit and switching costs in new-IS adoption. They developed a framework to explain the role played by inertia in the mechanisms underlying new-IS adoption.: inertia results from habitual use of incumbent systems and switching costs, and influences technology adoption. Previous studies attempt to identify error terms in intention to use. The habit construct plays alternative roles of error terms since habit could explain automatic behavior.

Most studies treat habit as empty construct to effect intention to use. However, there is a lack of research on how habits are formed. Lankton et al. (2010) realized that habits can be formed as a result of satisfaction, frequency of usage, or social norms. Although they developed a theory of habit formation on the basis of learning theory, their independent variables were limited to well-known IS continuous variables such as satisfaction, frequency of usage, and social norms. They also fail to explain why some IS usages become successfully established while others are not.

Research Model for Habitual IS Use

We have identified factors to enhance habitual IS use through learning theory. Psychological studies have theorized that habit is formed in a stable context by repeating the same behavior. Owing to the lack of clarity on what a stable context in IS use is, we suggest five factors that affect habitual IS use, on the basis of learning theory. First, we focus on the primary factor in a use context: the IS itself (Wilson et al. 2010). We also provide three characteristics of IS that influence the context of IS use. Based on prior studies, we suggest that stress and reward facilitate the formation of habits. Finally, we consider frequency of use as a control variable in order to reduce ambiguous relationships between past and future behavior. It is difficult to verify the cause and effect of habitual IS use because frequency of usage indicates habitual behavior. Here, the control variable addresses problems by reducing correlations between past and future behaviors. Figure 1 shows our research model of habitual IS use.



Research Hypotheses

Prior habit studies merely concentrated on how a stable context is an important prerequisite for habit formation (Ouellette and Wood 1998; Wood et al. 2002). Extending previous research, the present study attempts to identify the prerequisites for a context to be stable. The most important factor in the formation of habitual use is IS itself. This study addresses the characteristics of IS as factors (reliability, complexity, and pace of change) that affect the formation of habit. Previous studies find that stress and reward promote habitual behavior (Danner et al. 2007; Schwabe and Wolf 2009). Therefore, we adopt stress and reward as independent variables in our model explaining the formation of habitual IS use.

IS Reliability

IS Reliability is defined as the degree of trust users feel toward IS (DeLone and McLean 1992). For example, habitual IS use is strengthened if IS does not report technical errors. Technology should be designed for stable use, since the reliability of an IS is a key determinant of its market success (DeLone and McLean 1992).

Hypothesis 1: IS reliability positively influences habitual IS use

IS Complexity

IS Complexity is defined as the degree in which its use is free of effort (Moore and Benybasat 1991). Task complexity has a negative impact on habitual IS use (Lankton et al. 2010). In this paper, we assume that a complex IS loses the attention of its user. Advanced technology becomes more complex and difficult to use. However end users prefer relatively simple and easy to user technology. Consequently, less complexity speeds up technology use, and cues allow the user to engage in IS with less awareness and confusion.

Hypothesis 2: IS complexity negatively influences habitual IS use

IS Pace of Change

IS Pace of Change is defined as the degree of the progress of technology (Heide and Weiss 1995). Rapid changes in technology that arise as technology progresses hinder the formation of habits. For example, when a new version of a software product is released every year, people need to learn the changes in how the product should be used. Thus,

developers should pay attention to the relationship between habitual IS use and pace of change, so as to determine a degree of pace that optimizes formation of habits, which could lead to market success.

Hypothesis 3: IS pace of change negatively influences habitual IS use

Stress

Stress is defined as the subjective feeling that work demands exceed one's perceived capacity to cope (Cropanzano et al. 1997). Stress favors habit performance and reduces explicit knowledge of action (Schwabe and Wolf 2009). Habitual behavior is better formed when people learn goal-directed action under stress. Therefore, stress of IS use could reduce awareness of action, which is a crucial characteristic of habit.

Hypothesis 4: Stress positively influences habitual IS use

Reward

Reward is defined appropriate feedback (Hull 1943). Habits are well-learned stimulus-response combinations that are reinforced by positive rewards (Danner et al. 2007). Verplanken and Aarts (1999) also state that "habits are developed by the systematic experience of rewarding consequences of behavior." The link between goals and related actions become stronger in cognitive systems when there is appropriate feedback (Verplanken and Aarts 1999). Thus, rewards facilitate habit formation. Therefore, the existence of a reward system provides a better environment for habits to be formed. This study considers what type of reward will positively affect the formation of habits.

Hypothesis 5: Reward positively influences habitual IS use

Frequency of Usage as Control Variable

Prior research stresses that the most important variable affecting habit is frequency of usage (Aarts and Dijksterhuis 2000). However, there are still ambiguous relationships between habitual behavior and future behavior (Verplanken and Aarts 1999). Mittal argues that "repetition of prior behaviors is necessary for the formation of habit, but not habit itself" (1988). Since there are correlations between past usage and habit, we consider a frequency of usage as a control variable. Although most studies regard frequency of usage as an independent variable of habitual behavior, some habits are formed with relatively little repetition. Therefore, considering frequency of usage as a moderating variable might reduce uncertain results. Controlling frequency of usage may also allow us to discover other factors that can establish habits with a small number of repetitions.

Research Method

We plan to conduct a questionnaire survey to investigate impacts of antecedents of habitual IS use. The questionnaire will employ a five-point Likert scale and cover IS characteristics, including reliability, complexity, pace of change, stress, and rewards. We will also interview respondents to explore additional factors that could influence habit formation. In-depth interviews may help us identify directions for future research.

The target population is not limited to particular IS users. Understanding automatic behavior requires that the population should primarily consist of individuals who frequently use IS. Therefore, the population selected for this study is businessmen using IS at work. Since there are various IS in working environments, we will not restrict our research to users of specific IS.

Partial least squares structural equation modeling (PLS-SEM) is an appropriate approach to analyze our data because it does not involve assumptions about the population or scale of the measurement (Lankton et al. 2010). We will run the research model in PLS to generate factor scores for each of our constructs. Loadings of measures of each construct can be interpreted as loadings in a principal components analysis.

Expected Contributions and Conclusion

This research identifies factors that affect habitual IS use. Habits could provide evidence of a lock-in effect wherein people use certain IS without intention. This approach has various theoretical and practical contributions. First, from

theoretical perspective, this study investigates subconscious behavior, which lies beyond the reason-based process. We also provide a unified view of habit, combining not only IS perspectives but also a psychological perspective. Habit formation is an important issue from a practical perspective since users are locked in to certain systems (Arthur 1989). Our findings can inform practitioners on how to effectively establish habits in order to gain a network effect. Further improvements of this study will gain validity via conducting empirical research for appropriate results.

References

- Aarts, H. and Dijsterhuis, A. 2000. "Habits as Knowledge Structures: Automaticity in Goal-directed Behavior," *Journal of Personality and Social Psychology* (78:1), pp. 53-63.
- Agarwal, R. and Karahanna, E. 2000. "Time Files When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage," *MIS Quarterly* (24:4), pp. 665-694.
- Arthur, B. 1989. "Competing Technologies, Increasing Returns, and Lock-in by Historical Events," *The Economic Journal* (99:394), pp. 116-131.
- Bargh, J. A. 1994. "The Four Horsemen of Automaticity: Awareness, Efficiency, Intention, and Control in Social Cognition," In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 1-40). Hillsdale, NJ: Erlbaum.
- Bhattacharjee, A. 2001. "Understanding Information System Continuance: An Expectation-Disconfirmation Model," *MIS Quarterly* (25:3), pp. 351-370.
- Bhattacharjee, A. and Premkumar, G. 2004. "Understanding Changes in Belief and Attitude Toward Information Technology Usage: A Theoretical Model and Longitudinal Test," *MIS Quarterly* (28:2), pp. 229-254.
- Cheung, C. M. K., and Limayem, M. 2005. "The Role of Habit in Information Systems Continuance: Examining the Evolving Relationship Between Intention and Usage," in *Proceedings of the 26th International Conference on Information Systems*, D. Avison, D. Galletta, and J. I. DeGross (eds.), Las Vegas, NV, December 11-14, pp. 471-482.
- Cropanzano, R. Howes, J. Grandey, A. and Toth, P. 1997. "The Relationship of Organizational Politics and Support to Work Behaviors, Attitudes, and Stress," *Journal of Organizational Behavior*, (18:2), pp. 159-180.
- Danner, U. Aarts, H. and Vries, N. 2007. "Habit formation and Multiple Means to Goal Attainment: Repeated Retrieval of Target Means Causes Inhibited Access to Competitors," *Personality and Social Psychology Bulletin*, (33:10), pp. 1367-1379.
- Delone, W. H. and McLean, E. R. 1992. "Information Systems Success: The Quest for the Dependent Variable," *Information Systems Research* (3:1), pp. 60-95.
- Guinea, A. and Markus, M. 2009. "Why Break the Habit of a Lifetime? Rethinking the Roles of Intention, Habit, and Emotion in Continuing Information Technology Use," *MIS Quarterly* (33: 3), pp. 433-444.
- Heide, J. B. and Weiss, A. M. 1995. "Vendor Consideration and Switching Behavior for Buyers in High-technology Market," *Journal of Marketing* (59:3), pp. 30-43.
- Hong, S. 2010. "Internal and External Beliefs as the Determinants of Use Continuance for an Internet Search Site," *The e-Business Studies* (11:5), pp.185-208.
- Hull, C. 1943. "Principles of Behavior: An Introduction to Behavior Theory," New York: Appleton-Century Crofts.
- Jaspersen, J. Carter, P. E. and Zmud, R. W. 2005. "A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enable Work Systems," *MIS Quarterly* (29:3), pp. 525-557.
- Kim, S. S. Malhotra, N. K. and Narasimhan, S. 2005. "Two Competing Perspectives on Automatic Use: A Theoretical and Empirical comparison," *Information Systems Research* (16:4), PP. 418-432.
- Lankton, N. K. Wilson, E. V. and Mao, E. 2010. "Antecedents and Determinants of Information Technology Habit," *Information & Management* (47:5-6), pp. 300-307.
- Limayem, M. and Hirt, S. G. 2003. "Force of Habit and Information Systems Usage: Theory and Initial Validation," *Journal of Association for Information Systems*, (4:1), pp.65-97.
- Limayem, M. Hirt, S. Cheung, C. 2007. "How Habit Limits The Predictive Power of Intention: the Case of Information Systems Continuance," *MIS Quarterly* (31:4), pp. 705-737.
- Mittal, B. 1988. "Achieving Higher Seat Belt Use: The Role of Habit in Bridging the Attitude Behavior Gap," *Journal of Applied Social Psychology* (18:12), pp. 993-1016.
- Moore, G. C. and Benbasat, I. 1991. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research* (2:3), pp. 192-222.

- Ouellette, J. and Wood, Q. 1998. "Habit and Intention in Everyday Life: the Multiple Processes by which Past Behavior Predicts Future Behavior," *Psychological Bulletin* (124:1), pp. 54-74.
- Polites, G. and Karahanna, E. 2012. "Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance," *MIS Quarterly* (36:1), pp. 21-42.
- Schwabe, L. and Wolf, O. 2009. "Stress Prompts Habit Behavior in Humans," *The Journal of Neuroscience* (29:22), pp. 7198-7191.
- Straub, D. Limayem, M. and Karahanna-Evaristo, E. 1995. "Measuring System Usage: Implications for IS Theory Testing," *Management Science* (41:8), pp. 1328-1342.
- Triandis, H. 1977. "Interpersonal Behavior," Monterey, CA: Brooks/Cole.
- Triandis, H. 1980. "Values, Attitudes, and Interpersonal Behavior," In H.E.Howe Jr & M.M.Page (Eds.), *Nebraska Symposium on Motivation*, 1979. Lincoln, NE: University of Nebraska Press.
- Verplanken, B. 2006. "Beyond Frequency: Habit as Mental Construct," *British Journal of Social Psychology* (45:3), pp. 639-656.
- Verplanken, B., and Aarts, H. 1999. "Habit, Attitude, and Planned Behaviour: Is Habit an Empty Construct or an Interesting Case of Goal-directed Automaticity?," *European Review of Social Psychology* (10:1), pp. 101-134.
- Verplanken, B. Aarts, H. and van Knippenberg, A. 1997. "Habit, Information Acquisition, and the Process of Making Travel Mode Choices," *European Journal of Social Psychology* (27:5), pp. 539-560.
- Verplanken, B. Aarts, H. and Knippenberg, A. Moonen, A. 1998. "Habit versus Planned Behavior: A Field Experiment," *British Journal of Social Psychology* (37:1), pp. 111-128.
- Verplanken, B. and Faess, S. 1999. "Good Intentions, Bad Habits, and Effects of Forming Implementation Intentions on Healthy Eating," *European Journal of Social Psychology*, (29:5-6), 591-604.
- Wilson, E. V. Mao, E. and Lankton, N. 2010. "The Distinct Roles of Prior IT Use and Habit Strength in Predicting Continued Sporadic Use of IT," *Communications of the Association for Information Systems* (27:1), pp. 185-206.
- Wood, W. Quinn, J. and Kashy, D. 2002. "Habits in Everyday Life: Thought, Emotion, and Action," *Journal of Personality and Social Psychology* (83:6), pp. 1281-1297.