

MOBILE INTERNET SERVICES CONTINUANCE: A RATIONAL DECISION MAKING AND AUTOMATIC BEHAVIORAL PERSPECTIVE

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ABSTRACT

No researchers in the IS literature tried to provide and explain an integrated human behavioral processes framework. This paper attempts to fill in this gap by proposing a rational decision making and automatic behavior framework and suggesting rational behaviors to consist of cognitive, affective and judgmental components while automatic behaviors to consist of affective and habitual components. This study also provides implications to practitioners who have been finding it difficult to maintain or increase the continuing usage of mobile Internet services. The findings validate our integrated rational decision making and automatic behavior framework and suggest practitioners to increase the perceived value of the mobile Internet services.

Keywords: Behavior, habit, perceived value, IS continuance, mobile Internet service

INSTRUCTIONS

Human behaviors have been mostly examined in terms of usage and adoption behavior in the IS literature. Most recently, post-adoption behaviors have been attracting interest. To explain IS continuance or post-adoption behavior, [20] developed a continuance model based on the confirmation-disconfirmation paradigm while [61] integrated adoption and post-adoption model was based on both TPB and a subset of Triandis model [90]. However, TPB and TRA are incomplete and focused too much on cognition and paid little attention to affective behavioral components [46] [17] [47]. Going by this argument, Bhattacharjee's model [20] is incomplete too for failing to consider habits. Belk [16] and Holbrook [47] suggested that behavioral models need to integrate all behavioral mechanisms in order to be complete and to be able to predict behaviors in various situations. Therefore, there is the need to identify and explain the various human behavioral processes and explore the possibility of integrating them in one model that will be more comprehensive in explaining human behaviors under various conditions.

In order to develop and explain a comprehensive model, an extensive literature review of human behaviors was conducted. Human behavioral studies have been conducted across various domains such as in marketing e.g. [6] [88], economics e.g. [49] [54], psychology e.g. [40], and information systems e.g. [29]. These studies have evolved in many directions including behavioral models that focused solely on cognition or solely on affect, or integrated both cognition and affect with either the perspective of the behavior being controlled by cognition or by affect, and automatic behaviors [16] [47]. Ouellette and Wood [68] considered human behaviors to consist of a dual-mode processing: the first one being conscious decision making and

the second one automatic behavior. In their model, they explored the dual processes only via intention, past behaviors and future behavior variables. In our quest to develop a comprehensive model, we recognized this dual classification to be our starting point. They are complementary and broad enough to allow the development of a comprehensive model. Conscious decision making or actions refer to behaviors that involve reasoned actions requiring conscious cognitive processing [93]. We, therefore, termed it as rational decision making. Automatic behavior or reactions refer to unconscious behaviors that involve little or no cognitive processing and proceeds rather automatically. For this reason, we kept the terminology automatic behaviors to describe this type of human behavior. In the next step of our research, we explored the breakdowns of these two classifications. We conclude, from an in-depth literature review, rational decision making to be composed of cognition, affect [16] [47] and judgment [2] [5]. Automatic behaviors, on the other hand, consist of habit [68] and affect [24]. The dual nature of affect is due to the fact that it can either be cognitively evaluated [13] [77] [78] or it can unconsciously evoke behavior [47].

While adoption studies in the IS field abound, researchers in IS only recently started to show interest in IS continuance [61]. They realized IS adoption is only the first step towards overall IS success [20] and that IS continuance is important to ensure the overall success of an information system [20] [61]. One area where IS continuance research is required is that of mobile Internet services. Initial promotions have led people to start using mobile Internet services, but majority of them subsequently stopped its usage after the promotion [81]. Understanding IS continuance of mobile Internet services is a must if these services are to take off and achieve their huge potential economic success [21] [26].

Given the weaknesses and lack of comprehensive understanding of human behaviors in the IS literature, as highlighted in the opening paragraph, this study aims to examine and shed light on the processes through which human behavior operates. The paper integrates and tests rational decision making and automatic factors in a behavioral model. Because of its importance, IS continuance in the context of mobile Internet services is being studied. This study addresses the questions: What are the prominent factors that influence the continuance behavior of individual consumers? Through what processes these factors affect consumers' behavior?

This study presents important theoretical and practical contributions. Theoretically, this study addresses the various concerns targeted at previous behavioral researches in the IS research domain by identifying and explaining the processes of human behavior. We integrated these processes to provide a more complete and comprehensive model. Variables for IS continuance in the individual context (mobile Internet services) were also identified. Practically, implications are drawn for managers to generate more revenues from existing customers. By having a better understanding of consumer

behaviors, we are able to suggest how to increase consumers' continuance intention. For example, managers should provide and encourage free trials of their products or services over a sufficiently long time period in order for customers to develop a habit of using these products/services.

CONCEPTUAL BACKGROUND

Mobile Internet Services

Mobile Internet services essentially provide the same services as stationary Internet. The services offered by the mobile Internet can be categorized into 3Cs – Commerce, Communication and Contents. Commerce ranges from mobile banking and e-ticketing to physical product purchases while email and interactive services such as Google Chat are considered as communication services. Contents include downloads, news, traffic/stock updates and other time-sensitive, location-based services [52]. The services are offered on mobile devices such as mobile phone, PDA or smart phone. Mobile Internet services create an opportunity to deliver new services to existing customers and attract new ones. The major characteristics differentiating mobile Internet services from stationary Internet are mobility and reach. Users can consume mobile Internet services wherever they happen to be (mobility) and can be reached at any time (reach). Researchers need to provide practitioners advice on how best to achieve this. Only a few studies [8] have explored how individuals use mobile Internet services. In order for mobile Internet services to exploit its huge economic potential, research on consumer continuance behavior in the mobile Internet services context is sorely needed.

Human Behaviors

In our literature review, we uncovered various components of human behaviors. They are mainly cognitive, affective and automatic behaviors. Human behaviors have been classified in two categories: one involving conscious deliberation and the other one involving automatic reliance on well-established routines [39] [70] [25] [68] [83] with some researchers calling it a dual-mode processing model [16] [47] [68] [83] [58]. According to Ouellette and Wood [68], past behavior predicts future behavior via two processes: It can either be guided by conscious deliberation or by automatic reliance on well-established routines. In the first process, when behaviors are not well learned or when they are performed in unstable or difficult contexts, conscious decision making is likely to be necessary to initiate and carry out the behavior. In the second process well-practiced behaviors in constant contexts recur because the processing that initiates and controls their performance becomes automatic. Ouellette and Wood [68] considered conscious deliberation as conscious decision making and automatic actions as automatic behaviors. We refer to conscious deliberation as rational decision making and automatic reliance on well established behaviors as automatic behavior. These two classifications are comprehensive and complementary and provided a good approach to develop an encompassing framework representing various components of human behaviors. We proceeded, in a top-down approach, from these two

classifications to make sure that we do not miss out on any behavioral components. The criteria for the classifications and the components of the two categories are further elaborated in the sub-sections below.

Rational Decision Making

Research in IS literature has usually assumed a highly rational model, with theories such as TRA [40], TPB [1] and Technological Adoption Model (TAM) [29], in which users' behavior are based on the basis of reasons, on the beliefs about the outcome of an action. This assumption is based on the premise that behavior is purposive, planned, and conscious [16], that is, the most proximal cause of behavior is the intention that represents the person's motivation in the sense of his or her conscious plan to exert effort to carry out a behavior [37]. Rational decision making involves controlled reasoning processes [68]. Azjen and Fishbein [4] labeled their approach as Theory of reasoned action because they believe human beings are rational and are not controlled by unconscious motives. The goal-directedness of human behaviors are based on expectancy-value models of attitudes and decision making, themselves deeply rooted in theories of rational choice [93]. These studies emphasize the deliberate character of individual choice suggesting that choices are made consciously. Thus, rational decision making assumes the existence of beliefs. These beliefs or thoughts are cognitive in nature [67]. We refer to this component as cognition. Some reasoned action or rational decision making models have been criticized for focusing too much on cognition and ignoring affect [46] [47]. However, affect does form part of rational decision making [55] [43] [96]. From the expectancy-value perspective, humans evaluate the potential outcome of a behavior and form their judgment about the utility of this behavior [11] [14]. Since attitude involves evaluation, that is cognitive processing, it is part of the rational decision making process.

Automatic Behavior

In automatic behavior, behavioral responses are automatic in the sense that the cognitive processing that initiates and controls the response becomes automatic unlike in rational decision making [68].

Automatic behaviors posed difficulties to cognitive theories like TRA and TPB [74] [84]. Research studies have proven that traditional reasoned actions models failed to predict behavior involving automation [16] [68] [93]. This laid rise to the abovementioned criticism of traditional reasoned actions for failing to take automatic behavior into consideration. Therefore, to be complete, behavioral models need to consider both rational decision making and automatic behaviors. The components of automatic behaviors habit and affect. From the discussion of affect as rational decision making and the discussion of affect as automatic, we can understand why affect is involved in both rational decisions making as well as automatic processes.

THEORETICAL FRAMEWORK

In the literature review, we found that behavioral models that

focused on cognition and ignored affect were criticized for being incomplete. Behavioral models that ignored habituation issues were criticized too because they were unable to predict repeated behaviors. Belk [16] and Holbrook [47] each suggested a framework that should be able to explain human behaviors in all different type of situations. In their conceptual framework, they tried to encompass as much different situations as possible. However, they never developed a model from their framework and never conducted empirical testing. From our analysis of past literatures, we categorized behavioral processing mechanisms as rational decision making and automatic behavioral processes which we integrated into one conceptual framework. In the framework, automatic behavior processes consists of the relationship between habit and behavior [68] [95] and the relationship between affect and behavioral intention [12] [58]. The habit-behavior mechanism initiates and controls well-practiced behaviors in constant contexts and proceeds automatically and unconsciously [68]. Affect-behavioral intention is automatic because people's affect automatically influence behavioral intention along this path. People cannot choose their emotions whereas they can choose what to believe in; rather, emotions unconsciously influence their behavioral intention [32] [75]. Rational decision making processes, on the other hand, consist of judgment-behavioral intention [40] [1] [29], cognition-behavioral intention [94] [14], cognition-judgment [40] [29] [13] affect-judgment [77] [13] [76] and, ultimately, behavioral intention-behavior [40] [90] [29] relationships. Thus, this type of human behavior is volitional. The various relationships of the two processes, supported by background theories, are discussed in more details below.

Rational Decision Making Process

Relationship from Cognition to Behavioral Intention

The effect of cognition on behavioral intention was initially brought up by Triandis [89], who viewed cognition as having a direct effect on behavioral intention. According to the self-efficacy theory [14], behavior would be best predicted by considering two outcome decisions: outcome expectancy judgment and self-efficacy judgment. In outcome expectancy, behavioral intention is influenced by beliefs (cognitive factors) that certain behaviors will lead to certain outcomes. In self-efficacy judgment, behavioral intentions are affected by the beliefs of whether one can effectively perform the behaviors necessary to produce the outcome. These two outcome judgments are different because the belief that a certain outcome can be produced by a certain behavior does not imply that a person will think that he can perform that behavior [38]. In the case of mobile Internet services continuance, if a consumer believes that continuing using mobile Internet services will result in useful benefits (outcome judgments), and that he will have no difficulty in continuing the usage of mobile Internet services, then the person will exhibit a continuance behavioral intention towards that service.

Relationship from Judgment to Behavioral Intention

Humans evaluate situations rationally and form intentions [40]. In our theoretical framework, judgment is used as a surrogate for evaluative decision-making processes. Among those included under the umbrella of evaluative judgment are attitudes, overall utility and perceived value constructs. Bagozzi [13] considered attitude to consist of cognitive and evaluative judgments. In TRA, attitudes towards the behavior refer to people's positive or negative evaluation of performing the behavior. In TRA literature, the relationship between attitude and behavioral intention is well documented and empirical supported. These theories emphasize the reason-based antecedents of behavior.

Relationship from Cognition to Judgment

Some of the antecedents of judgment can be categorized as a set of cognitive factors. The effect of beliefs on intention (judgment) was initially brought up by Triandis [89]. He viewed cognitive factors as having a direct effect on behavioral intentions. The direct belief-intention link was also supported by Bagozzi [11]. He suggested that this path can be considered as an expectancy-value judgment that works through stored imperatives in memory. A possible explanation is that these beliefs achieve a personal goal, which in turn, influences one's behavioral intention to act. The relationship can be further supported by Mental Accounting [88]. According to the theory, total utility consists of transaction and acquisition utility. Total utility is the overall evaluative judgment in terms of the utility of the outcome of the transaction and acquisition. Evaluation of cognitive factors, such as perceived price, is involved in evaluating the acquisition utility. Therefore, cognitive factors are antecedents to judgment.

Relationship from Affect to Judgment

Affective factors form the other category of judgment antecedents. In fact, attitude has been recently defined as a summary evaluation of an object, more specifically, consisting of affective and cognitive judgments [13]. The affective dimension of attitude, prior to disentanglement, lays the foundation for affect as an antecedent of the more judgmental attitude. The "affect-as-information" model further reinforces the relationship between affect and judgment [77] [78]. In this model, people rely on their feelings to form judgments because they perceive feelings to contain valuable judgmental information. By holding the target's representations in their minds, they will thus ask themselves, "How do I feel about it?" [77]. But first, the feelings or affect must be regarded as representative of the target. Only then will these subtle feelings be incorporated in the individual's evaluations of the target. Therefore, affect predict acquisition utility (acquisition judgment) and, subsequently, total utility (overall judgment).

Relationship from Behavioral Intention to Behavior

According to Triandis [91], behavioral intentions are instructions people give to themselves to behave in certain ways. It is widely accepted that intention is the mediator

between behavior and other factors leading to behavior ([40] [90], [47]). This relationship has been empirically tested. Theories that support this relationship include well-known TRA [40], TPB [1] and Triandis model [90]. In these theories intention to act or not to act is regarded as the immediate determinant of the action itself. According to Belk [16], an individual's behavioral intention may change before he actually carries out the behavior. Therefore, we include the intention-behavior relationship in our theoretical framework instead of using intention as a surrogate.

Automatic Behavioral Process

Relationship from Affect to Behavioral Intention

Human behavior has been described as a hybrid mechanism by Romer [73]: feeling-based and thought-based mechanisms. The feeling-based mechanism embodies the emotion-intention relationship. The consummatory and instrumental motives in the consumption context are based on intrinsic and extrinsic rewards respectively. While consumers with instrumental motive are concerned by the utility of the products/services, those with consummatory motives are more concerned about their affective experience. Thus, they will more likely rate the feelings experienced as very relevant [45]. The theory identifies coping responses as important mechanisms to infer action and goal attainment from feelings. Depending on the emotions generated, behavioral intention emerge to activate plans in order to avoid undesirable outcomes, realize goals, tolerate negative conditions and/or increase or maintain positive outcomes [12]. Some studies have included action tendencies, together with reactions to appraisals of events, in the definition of affect [43]. Yet others even stated that these action tendencies or behavioral intentions are automatic, "pre-wired" responses linked to emotions [56] [13], implying emotions are natural antecedents of behavioral intentions.

Relationship from Habit to Behavior

Behaviors follow the habit-driven route when the behavior is repeatedly and satisfactorily executed and becomes habitual, thus losing its reasoned character. Behaviors which have been performed many times in the past are encoded in memory such that environmental cues serve to automatically elicit the behavior. Behavior may then be more guided by the automaticity of stimulus-response relations, and less by attitudes and intentions [93]. One's intentions to perform a new behavior in a familiar context may simply be forgotten. Ronis [74] pointed out that it may be particularly difficult to remember to perform novel behaviors in familiar settings because behavior in such settings is largely habitual and automatic. Habit is strongly rooted in behaviorist approaches to learning theory [93]. These habits proceed efficiently, effortlessly and unconsciously. When a habit develops, behavior is said to come under the control of stimulus cues [93] [68] [74]. On future occasions, presence in a similar situation is sufficient to trigger the automatic response sequence. A stable context is therefore crucial for habitual behavior to occur. In fact, habit has been defined as the tendency to repeat past behavior in a stable context [68].

Modern habituation perspectives follow Hull's [48] reinforcement theory of learning. According to the theory, learning occurs in terms of automatic habits established through reinforcement. The relationship between habit and behavior is further empirically supported by Triandis' Model [89].

RESEARCH MODEL AND HYPOTHESIS

Research Model

We aim to investigate IS continuance behavior to contribute to the growing interest in IS continuance and given the importance of IS continuance. Due to the need of research into the continuance of mobile Internet services, the latter is the chosen context. Therefore, IS continuance and IS continuance intention are the behavioral and behavioral intention variables of interest. Our model reflects our agreement with Bhattacharjee's [20] argument on the substantive differences between the IS adoption stage and post-adoption stage by proposing variables different from those used in adoption models. We developed our behavioral model based on the theoretical framework proposed in the previous section.

Figure 1 illustrates the rational decision making and automatic behavior integrated model. In identifying the variables influencing user's continuance behavior, we took into consideration the fact that the consumer, in the mobile Internet context, is bearing both the role of buyers and users [57]. Rather than enumerating all possible variables, we identified and selected the most salient cognitive as well as affective factor that captures most of the users' behavior. Usefulness is, therefore, our selected cognitive factor in our continuance usage behavior model. In product-consumption-elicited experience, affect is important [69] [63] [51]. The definition of attitudes, on the other hand, has been more ambiguous with some researchers considering it strictly as an evaluative judgment rather than an affective state [28] and some considering it as both affective and cognitive [15]. However, in this research, we split human behaviors into cognition and affect. Therefore, emotion is the chosen affect construct. From the consumer choice perspective, consumers estimate the value of the choice object by considering all relevant benefit and sacrifice factors [49] [65] [88]. Value represents an overall estimation of the choice object. Given that end users' perceived value is the consumer's overall assessment of the utility of a product [97], perceived value is the chosen judgmental construct. In addition to these constructs, frequent usage of mobile Internet services involves habitual behaviors such as repeatedly typing similar words on the mobile phone keyboard. Habit, the construct in question, predicts IS continuance behavior. The mapping between the theoretical framework and the model is as follows: Affect is mapped onto emotion; cognition onto usefulness; judgment is reflected as perceived value; behavioral intention is mapped onto continuance intention; the behavior is Continuance usage and habit is habit.

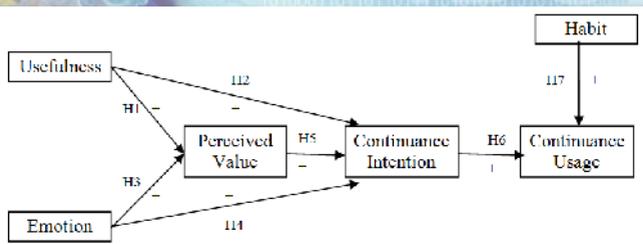


Figure 1: Integrated Rational Decision Making and Automatic Behavior Continuance Model

Hypotheses

Usefulness is defined as the degree to which a person believes that using a particular system would be advantageous in performing his or her task [30] [29]. In our study, a task is an objective or function to be attained or performed using mobile Internet services. These tasks include using m-commerce to purchase movie tickets, checking mails as part of m-communication services and accessing contents off the m-Internet such as checking out the latest stock prices. Perceived value, on the other hand, is defined as the customer's overall assessment of the utility of mobile Internet services based on the perception of what is received and what is given [97].

Karahanna [50] found that usefulness influences attitude (judgment) substantively and consistently. In our model, judgment is conceptualized as perceived value. Thus if a technology performs up to expectation, provides gains over alternative services and helps consumers in difficult situations (i.e. useful), consumers are likely to evaluate the use of the technology favorably. Similarly, as it improves on its ability to deliver convenience, effectiveness and efficiency in performing tasks, mobile Internet services appeals more to consumers, especially if the consumer is traveling. We therefore hypothesize:

H1: The usefulness of mobile Internet services is positively related to its perceived value.

Continuance intention is defined as the actual intention to continue using mobile Internet services in the post-adoption stage [20]. Originating from social psychology, Action Theory e.g. [40] and Work Motivation Theory e.g. [94] are the two main theoretical underpinnings for the usefulness and behavioral intention relationship. Work motivation theory specifies that task specific plans guide behavioral intention by linking instrumental acts to goals. Action identification theory [92] posits that an organized cognitive representation of action which is seen as a basic mechanism by which people cognitively regulate their behavioral intention in furtherance of higher level goals. These two theories share the view that the extrinsic motivation for engaging in specific behaviors stems from a mental representation linking instrumental behavior to higher-level goals or purposes. IS usage can be the means (behavior) to that end (goal). Following this line of thought, if an individual believes that the continued usage of an information system will help in attaining certain goals (i.e. useful), then that individual will intend to continue using it. Similarly, we expect users to intend to continue using mobile

Internet services if they believe that using it will help them achieve certain goals, such as convenience benefits, not attainable in alternative means such as a physically stationary computer. Hence we hypothesize:

H2: The usefulness of mobile Internet services is positively related to the continuance intention

Emotion is defined as a mental state of readiness that arises from cognitive appraisals of events or thoughts, is often expressed physically (e.g. facial features) and may result in specific actions to affirm or cope with the emotion [13]. Sweeney and Soutar [85] defined emotional value, one of the multiple dimensions of value, as the utility derived from feelings or affective states that a product generates. Consistent with the definition of emotional value, individuals experiencing immediate pleasure or joy from using mobile Internet services are more likely to use it more extensively than others [30]. Hence we hypothesize

H3: The emotion generated from the usage of mobile Internet services is positively related to the perceived value

Emotion can have a direct influence on behavioral intention, not summed up by judgments [7]. In fact, if emotions are assumed to represent the target, such emotions need to be regarded as relevant for the decision at hand [71], that is, the continuance decision. Emotion is the intrinsic motivation in Work Motivation Theory [94] that guides behavior. Donovan and Rossiter [35] found that consumers tend to have more favorable shopping-related behavioral intention if they rate the environment as pleasant. Hence, we hypothesize

H4: The emotion generated from the usage of mobile Internet services is positively related to the continuance intention

The definition of perceived value compares benefits with sacrifices [97]. This definition reflects the economic theory of utility whereby customers try to achieve maximum utility given their resource limitations. Perceived value, evaluative in nature, is similar in certain aspects to attitude in Davis' TAM [29] which is used for explaining adoption intention in organizational context. We argue that the similar treatment of perceived value as a trade-off between the "give" and "get" components of a product [33], allows it to be used to explain consumers' continuance intention. Perceived value is the consumer's overall assessment of the choice object [97] from which consumers decide their choice behavior [49] [65] [88] [97] [52] have taken the first step to examine and confirm the relationship between perceived value and behavioral intention. In addition to their empirical studies, there is strong support that perceived value affects behavioral intention [86]. Hence we posit

H5: The perceived value of mobile Internet services is positively related to the continuance intention

Behavioral intentions are instructions people give to themselves to behave in certain ways [91] and continuance intention is defined as the actual intention to continue using

mobile Internet services in the post-adoption stage [20]. Continuance usage, on the other hand, is the continuous usage of a system [61]. The relationship between intention and behavior is well-known in the literature [40] [90] [47]. Theories that support this relationship include TRA [40], TPB [1] and Triandis model [90]. In these theories intention to act or not to act is regarded as the immediate determinant of the action itself [47]. Therefore, we posit that,

H6: The continuance intention of mobile Internet services is positively related to the continuance usage

Habit is defined as the behavioral tendency to repeat responses given a stable supporting context [68]. In a stable context, responses become automatic requiring little or no cognitive processing. The habit-behavior relationship is founded in Hull's reinforcement theory of learning [48]. Numerous researchers have explored and proven the causal link between habit and behavior. e.g. [10] [18] [19] [42] Habitual behaviors unfold in response to environmental events, often without the formulation of any conscious intent to engage in a specific sequence of action. Habitual behaviors may not likely have access to specific intentions and may appear to the actor to be unintentional and non-volitional. In other words, under the presence of habit, behaviors proceed automatically. Therefore, we hypothesize that

H7: The habit of using mobile Internet services is positively related to the continuance usage.

RESEARCH METHODOLOGY

In this section, we will present how we developed the scales for our constructs and how we conducted the survey. The items used to measure the constructs are adopted and adapted from existing validated scales. All measurements have been further checked for reliability and validity, as we will report later.

Instrument development

To measure usefulness, we adapted the scale of usefulness from Davis [30]. Emotion items were adopted from Cheung [27] and Cohen and Areni [28]. We adopted the scales for perceived value from Sirdeshmukh, Singh and Sabol [82]. Since perceived value means the comparison between cost and benefit, our scales compares fee and value, effort and benefit, and, time spent being worthwhile and overall good value. Continuance intention scales were adopted from [20]. To measure continuance usage, [60] first measured continuance intention and one month later measured usage for the same subjects. However, due to time constraint, we were only able to measure usage at the same time when continuance intention was measured. We used the seven-point Likert scale (1 = strongly disagree, 7 = strongly agree) in developing our questionnaire.

Two information systems researchers and five scholars reviewed the instrument and checked the face validity of the items. As a pre-test, the questionnaires were discussed during the interviews of 10 people (some of them had used mobile Internet services before and others had not). We obtained

feedback about the content of the instrument, question ambiguity, the format of the scales, and its length and overall format and design of the questionnaire. The respondents were also asked to identify factors not in the questionnaire that they considered important and to describe their judgment related to the use of mobile Internet services. The final list of items, shown in Appendix A, for each construct reflects the feedback received.

Data collection

Empirical data for this study was collected via an Internet survey after which further data was collected by quota sampling, to recruit respondents above 25 years old, through face-to-face and mail questionnaire surveys. Emails were sent out via the University emailing list to the undergraduates and graduates of a major university in Singapore inviting them to take the survey if they have previously used mobile Internet services. The email recipients were encouraged to spread the word about the survey. To improve the response rate, \$50 was offered to 20 respondents who were randomly selected for the prize. Confidentiality of responses was assured, and, prior to starting the survey, respondents were reminded only to take the survey if they have experiences using mobile Internet services. The first page of the questionnaire stated clearly who can be considered as having mobile Internet services experiences.

A total of 376 responses were collected. Out of the 376 responses, 4 were duplicates and 5 were found to have no previous mobile Internet services experiences. These were removed from the data set. Responses from respondents who overlooked the reverse order of items (intention item), for example, by saying they strongly agree to both continue using mobile internet services as well as discontinue its use, were discarded. To reduce cases of misuse or abuse of the survey, data from respondents who provided similar values to all or most of the questions were also removed. After cleaning the data, 324 responses were left.

Demographic Profile

The respondents' detailed descriptive statistics of their characteristics are shown in Table 2. 64.5% of the respondents are male while 76.5% of the respondents are aged 20-29 years old. Previous studies found technology users in Singapore are predominantly male [87] and that most mobile Internet users are in their 20s and early 30s [53]. Therefore, the fact that 64.5% of the respondents were male and 76.5% were in their 20s was acceptable. Due to the fact that a university mailing list was used, 66.3% were university respondents. The high penetration rate of mobile phones in Singapore was reflected in the percentage of users, 88.9%, using mobile phones to access mobile Internet services.

DATA ANALYSIS AND RESULTS

Reliability and Validity of Instruments

We carried out factor analysis to further assess construct validity. Principal components analysis with Varimax rotation was conducted. A total of 5 factors with eigenvalue greater

than 1.0 have been identified. The factors explain 73.6 % of the total variance. All the items have loadings greater than 0.5, with .662 the lowest loading, and are loaded on a distinct factor. When compared across factors, the items are found to load highest on their own factors. We note that items of habit and usage load onto one factor. This is due to the fact that habit represents frequently repeated past behaviors [68] and is thus inherently associated with usage behavior. Furthermore, most of the loadings on the target factors (18 out of 22) were in the excellent range (i.e. loadings more than 0.71).

We conducted confirmatory factor analysis (CFA) by creating a LISREL path diagram. To assess the model fit, the following indices and standards are applied: goodness-of-fit index (GFI) and normed fit index (NFI) greater than 0.90, adjusted goodness-of-fit index (AGFI) greater than 0.80 [44], comparative fit index (CFI) greater than 0.90 and root mean square error of approximation (RMSEA) lower than 0.08 for a good fit and lower than 0.05 for an excellent fit [22] [64].

Following recommended methodological procedures [44] [9], the measurement model in the CFA has been revised by dropping, one at a time, items sharing a high degree of residual variance with other items. This is to purge items that violate unidimensionality. We dropped three items: The second (HAB2) and fourth (HAB4) item of habit and the second (USE2) item of usefulness. HAB2 shares a high degree of residual variance with HAB3, HAB4 and HAB5. HAB4 shares a high degree of variance with HAB1 AND HAB5. USE2 shares a high degree of variance with USE1. In order to be consistent, these three items were dropped from further analysis. After these items were dropped, the CFA showed a very good model-fit: GFI = 0.90, NFI = 0.97, CFI = 0.99, AGFI = .88, RMSEA = 0.052.

Convergent validity is the degree to which the items of a given construct are measuring the same underlying latent construct. There are three criteria to assess convergent validity. First, standardized path loadings, which indicate the degree of association between the underlying variable factor and each item, should be greater than 0.7 and statistically significant (t-value above 1.96 for alpha of 0.05 and above 2.56 for alpha of 0.01) [44]. Second, composite reliabilities, as well as Cronbach's alphas, should be higher than 0.7 [66]. Third, the average variance extracted (AVE) for each factor should exceed 50 percent [41]. The figures in table 4 show all path loadings to be greater than 0.7 except for EMO4 and HAB1 and all of them are statistically significant. All the reliability measures are above 0.7 and all the AVE values are above 0.5. Thus, convergent validity of all the items is established.

Discriminant validity means the degree to which the measures of two constructs are empirically distinct. As suggested by Anderson and Gerbing [9], we used Constrained Confirmatory Factor analysis to assess discriminant validity. Ordinary CFA is conducted for every pair of factors, after which the correlation is set to unity (1.0) and the model is tested again. We use χ^2 difference test to compare the results between the constrained model and the original model. Discriminant validity is established if the χ^2 difference is significant. In our pair-wise constrained tests, the χ^2 differences are all significant. Hence, discriminant validity is established.

Table 1: Results of converging validity testing

Item	Usage model				
	Std Loading	T-value	AVE	Composite Factor Reliability	Alpha
USE1	0.78	16.12	0.93	0.98	.88
USE3	0.88	19.55			
USE4	0.85	19.10			
EMO1	0.88	18.78	0.92	0.98	.92
EMO2	0.9	19.82			
EMO3	0.84	20.69			
EMO4	0.68	18.41			
EMO5	0.79	13.53			
HAB1	0.67	15.86	0.87	0.95	.79
HAB3	0.77	12.79			
HAB5	0.75	15.38			
VAL1	0.79	15.46	0.92	0.98	.90
VAL2	0.89	16.76			
VAL3	0.90	19.99			
VAL4	0.88	20.47			
IUL1*	0.7	19.76	0.91	0.98	.90
IUL2	0.88	14.18			
IUL3	0.93	19.73			
IUL4	0.93	21.73			
INT1	0.91	21.98	0.92	0.98	.92
INT2	0.93	21.13			
INT3	0.73	21.70			
INT4 (reverse)	0.78	14.92			

* IUL = Internet Usage Level (usage item)

Prior to testing the hypotheses, we also conducted a Pearson correlation analysis. The simple correlations among the research variables are show in Appendix B (a).

Hypotheses Testing

After the measurement instruments had been tested for validity and reliability, the Hypotheses were tested using LISREL. The fit indexes were satisfactory: normed $\chi^2 = 2.51$, GFI = 0.90, NFI = 0.97, CFI = 0.99, AGFI = .88, RMSEA = 0.052. We examined the path significance of each hypothesis. The results are shown in Figure 2.

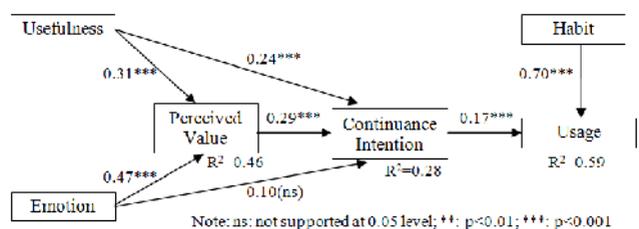


Figure 2 Hypothesis testing results

The testing results show that the two hypothesized path are significantly related to perceived value: usefulness (=0.31, p<.001) and emotion (=0.47, p<.001). Thus hypothesis H1 and H3 are supported. Usefulness (=0.24,

$p < .001$) and perceived value ($\beta = 0.29, p < .001$) are also found to significantly affect continuance intention. Therefore, H2 and H5 are all supported. The path from intention to usage ($\beta = 0.17, p < .001$) and, hence, H6 is also supported. Habit is significantly related to usage ($\beta = 0.70, p < .001$). Therefore, H7 is supported. However, the path from emotion to intention is not supported.

DISCUSSION AND IMPLICATIONS

Discussion of Findings

The relationship between emotion and behavioral intention has been previously tested and is empirically supported by past studies e.g. [52] [58]. So the insignificance of the emotion-intention relationship is not due to its inexistence or inappropriateness, rather, it has to be due to the context of the research. The reason why the relationship between emotion and intention in this study is not supported may be due to gender bias [36]. Only 35.5% of the respondents are female. Females are found to score highest on feelings and emotions and they are more likely to respond spontaneously to their feelings unlike males [62]. From our results, the respondents are not prone to react unconsciously to emotions but will rather evaluate their emotions via the perceived value construct. Given that the majority of the respondents in our study are males, this result is in line with Majee's and Hojat's [62] findings. This research aimed to achieve two main objectives. First, in order to answer to critics of behavioral models and to develop a complete model that will predict behaviors under various types of situations [47], this study aimed to develop a comprehensive model of rational decision making and automatic behaviors. Second, this study aimed to research into mobile Internet services continuance to provide much needed insights to practitioners [23] [81]. We further discuss our findings in relation to these two objectives.

Rational Decision Making and Automatic Behaviors

Our results proved that it is feasible to integrate both rational decision making and automatic behaviors in one model. Although, the measurement of continued usage at the same point in time as the measurement of continuance intention prevented the precise capture of continued usage itself, it did not prevent testing the integration of rational decision making and automatic behaviors. Measurement of continued usage at the same point in time as continuance intention implies that current usage was the actual measured construct. However, going by the definition of continuance intention [20], if an individual had the intention to continue using a system, he will also have the intention of currently using the system. Continuance intention is a superset of intention. Therefore, we argue that the relationship between intention and usage will be stronger than the relationship between continuance intention and usage. Since the relationship between continuance intention and usage was supported, the relationship between intention and usage will be even more so. Therefore, we managed to fully test the rational decision making and automatic components of our integrated model.

Repeated behaviors have been found to pose difficulties for the theories of reasoned action and planned behavior [80].

Without habit, that is automated behaviors, the R² of usage would have been only 0.21. R² of usage is 0.59 when predicted by both intention and habit. That is, an integrated model of rational decision making and automatic behaviors help to increase the explanatory power of the model. This explains why reasoned-based only models fail to predict frequently practiced behaviors in stable contexts. Habit is a strong predictor of human behavior [60]. In situations where individuals do not rationally form an intention to act due to their actions being performed automatically, reasoned based models fail to predict behaviors. A behavioral model that leaves out habits will thus be ignoring an important aspect of human behaviors. On the other hand, TRA [40] and TPB [1] have successfully proven the existence of rational behaviors. Leaving out the rational element, that is evaluative judgment and planned intention, will likewise be ignoring an important aspect of human behaviors. The significant relationship between intention and usage from our results proves that intention still predicts behaviors through the rational decision making process. Furthermore, from the support of H1, H3 and H5, the judgmental evaluation of cognitive and affective factors and subsequent formation of intention from the judgment shows the indirect involvement of these factors on human behaviors occurring through the rational decision making process. The supported H2 shows the possibility of the direct effect of cognition on behavioral intention that proceeds consciously. Although our results were not able to prove the direct relationship between emotion and behavioral intention, it does not imply that this relationship does not exist. Another data collection with balanced number of males and females is required to test the existence of this relationship. Responding to Holbrook [47], this study has been able to develop and test a comprehensive model consisting of rational decision making and automatic behaviors. Human behaviors are affected by cognitive and affective factors that can be evaluated to form judgments and they are affected by habits too. Therefore, our study has been able to identify and integrate the processes of human behaviors as well as identifying the components of these processes.

Mobile Internet Services Continuance

The measurement of continued usage at the same point in time as continuance intention results in the actual measurement of usage. This is not appropriate for studying mobile Internet services continuance. To this end, we have developed an alternative model using the same constructs. This alternative model thus ensures the presence of both rational decision making and automatic behavioral processes. Although intention should not be used as surrogates for behavior, because of the inability to measure continued usage, we had to limit the prediction of continuance behavior to continuance intention in this alternative model. We replaced the relationship between behavioral intention and behavior by the relationship between behavior and behavioral intention (inverse). We explained our reasoning for hypothesizing this new relationship in the next paragraph.

Research in psychology indicates a reputed success of past behavior as predictor of future acts [10] [18] [42]. Triandis [90], in his model, found that frequency of past behavior is the best predictor of future behavior. Here, usage

is the past behavior and continuance intention represents the future behavioral intention. Usage grants users with direct experience that shape their feelings towards the IS [20]. Belk [16] argued that the effects of our prior choice behavior appear to be able to be incorporated into our behavioral intentions part of the time. Any value generated from usage provides immediate reinforcement of reasons that drives intention via direct learning and habit formation [47]. Thus, users' experience from usage is crucial towards their continuance intention. Recently, Limayem [61] predicted and confirmed a positive relationship between initial usages and IS continuance. The more a user likes or finds mobile Internet services useful while using the services, the more the user will use the services. And the greater his usage, the greater is his intention to continue using mobile Internet services in the future. Therefore we posit that: "The usage of mobile Internet services is positively related to the continuance intention".

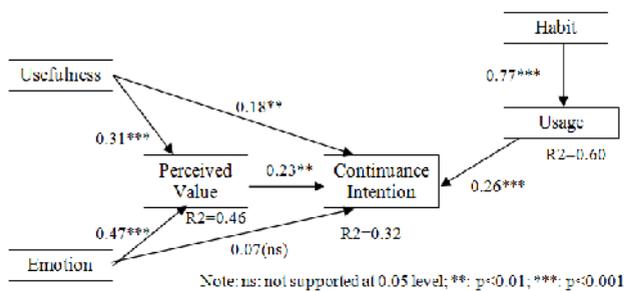


Figure 3: Results of alternative continuance model

Figure 3 shows the results of the test of the alternative model. Our findings indicate that adopters' intention to continue using mobile Internet services is influenced mainly by their habitual usage, by their overall evaluation towards the use of mobile Internet services and by the perception of how useful the services are. The results show that the continuance intention of predominantly male population is not directly influenced by their emotion.

Current usage, which is strongly affected by habits ($R^2 = 0.60$; $\beta = 0.77$), is found to be an important factor for continuance intention. Behavior, in the presence of habit, is dominated by automaticity [68]. The loop habit-usage-continuance intention and, subsequently, future usage is a self-reinforcing vicious loop. Habit, which is developed as a result of frequently repeated usage of mobile Internet services, will result in the unconscious and automatic usage of the service [68]. This increases the frequency of the usage and the usage itself increases the continuance intention [42] [3]. Subsequently, this intention results in further usage [40].

Our results show that (continuance) intention is significantly predicted by perceived value, our evaluative judgmental construct. This relationship can be further explained by the theory of utility whereby consumers strive to achieve maximum utility, that is, consumers behave such as to maximize the value they obtained from their act. Although perceived value is not attitude, these two constructs share the same judgmental nature. Attitude has been used as the judgmental construct to predict usage behavior at the organizational context and during the adoption stage [29]. Our findings show that, at the individual context, perceived value is an equally successful judgmental construct in the prediction

of continuance intention. Attitude has served well at the organizational level, but because of the difference between an individual and an organizational context [59], it will be interesting if future research can test which judgmental construct, perceived value or attitude, can better predict intention at the individual level. It is worth mentioning that consumer behavior (individual context) has been deeply examined in terms of perceived value rather than attitude in the marketing literature e.g. [34].

The influence of usefulness on continuance intention can be further understood via the perspective of extrinsic motivation [72] [79]. Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcome [31]. Usefulness is an example of extrinsic motivation. From the motivation perspective, usefulness influences continuance intention through the reinforcement of the valued outcome. Since using mobile Internet services fulfils their needs, it tends to heighten users' interest in continuing its usage so as to reinforce the utilitarian benefits. Although, for the survey responses in this study, the emotion-intention link is not supported, this relationship is expected to hold for a more gender balanced survey sample. It can then be similarly understood via the intrinsic motivation perspective [72] [79]. The hedonic benefits derived such as fun and enjoyment from using mobile Internet services generate positive feelings of emotion and the adopter hopes to re-experience these emotions by continuing the usage.

Implications for researchers and practitioners

Our findings have contributed to the research domain in many ways and have several implications to researchers. According to Belk [16] and Holbrook [47], behavioral models should be comprehensive and complete in order to be able to better predict behaviors in various situations. There have been IS studies that included both rational and automatic components in their models, although not explicitly stated. However, to date, there have been no existing studies in the IS literature that attempted to classify into, explain and to break-down the components of rational decision making and automatic behaviors. This study provides evidence that continuance behavior can be explained by rational decision making and automatic behavioral processes. The results indicate that human behavior researchers need to consider both rational decision making components as well as automatic behavioral components in their models. Not only did this study develop a rational decision making and automatic behavioral framework, it developed and tested a continuance model based on the framework for mobile Internet services. Distinct from prior research on IS continuance e.g. [20] [60] our study suggests that perceived value can be used to predict continuance intention. Besides perceived value, the results have also shown that there are cognitive and affective factors that can help us better understand continuance intention. Our findings also show that attention need to be paid to habitual usage in order to better understand IS continuance. This suggests that all these components need to be explored in IS continuance studies. Furthermore, specific cognitive and affective variables that are most salient in mobile Internet services continuance have been identified. Hence, we have proposed

usefulness to be the cognitive variable and emotion to be the affective variable.

Our findings have profound practical implications for mobile Internet services providers. Since usefulness is found to influence the perceived value of mobile Internet services and the continuance intention, service providers can gather feedback to find out what are the services that consumers value more and find more useful. This will enable new and useful services to be updated constantly, keeping customers in a loop of services. In addition, this will enable service providers to focus on the most revenue generating services. Other than improving instrumental consumption experience, service providers should also improve emotional experience of consumers. Since adopters are found to evaluate their emotions contributing towards a higher perceived value of mobile Internet services, service providers may have to offer services that elicit positive emotions such as pleasure so that these feelings are used for their information value [71]. Therefore, service providers should either try to generate positive emotions in their services or provide more of these types of services. Our findings show that habitual usage contributes towards continuance intention. Encouraging frequent usage of mobile Internet services to the point that this usage becomes habitual [68] is thus essential for customers to continue using the services. One possible way is to provide free or cheap trials over a period of time long enough to induce habits. However, our literature review on mobile Internet services showed that those who tried the services during promotions discontinue their usage after the promotions [81]. From the light of our findings, we argue the main reason for their discontinuation is that the length of the promotion was not long enough and the conditions not appropriate enough to induce automatic usage of the services. Therefore, service providers should develop promotions over an appropriate length of time and such promotions should encourage frequent usage of the services so that consumers will develop the habit of using these services.

Limitations and Recommendations for Future Research

We acknowledge that a number of limitations exist in this study. First, since “emotional responses are not always recallable” [35], answering emotions-related questions via a survey questionnaire may not yield accurate results. Furthermore, due to time constraint we were unable to conduct further quota sampling to make sure that our sample was not gender bias [36]. Second, although we followed the

age group distribution of mobile Internet users from other countries, the sample may be biased because most of the respondents are undergraduate students. Still, we cannot claim that the age group distribution from other countries resembles that of Singapore. This may restrict the generalizability of the findings. Third, respondents were motivated by monetary rewards to encourage response rate. Although we cleansed the data prior to data analysis, the data records may still contain careless responses from individuals who have no concern about research integrity. Fourth, due to time constraints, we were unable to measure continued usage. We were only able to measure usage at the same point in time as continuance intention was measured.

We have several recommendations for future research. First, to increase the generalizability of the results, the study needs to be replicated across diverse contexts, such as various countries. Second, we suggest using an experimental study to capture subjects’ emotions towards mobile Internet services as soon as they are experienced. This will minimize distortion posed by time on emotions recapitulation. Also, future research should strive for a balance in the gender of respondents. Such study would then be able to test the emotion-intention relationship. Third, a longitudinal study should be conducted in order to be able to measure continued usage. Fourth, research should be conducted to identify which behavioral mechanisms prevail in which conditions. Future research can also be conducted to identify any potential antecedents of habit and any relationship between habit and other variables.

CONCLUSION

One of the goals of this paper is to develop a rational decision making and automatic behavioral framework that will be comprehensive and complete. Existing theories and findings were identified and used towards that end. We showed that such integrated model has more explanatory power than just a rational decision making model. The second goal was to use this framework to develop a model for IS continuance of mobile Internet services. We tested our model and framework and provided recommendations to researchers and practitioners. By identifying ways practitioners can encourage the continuance of mobile Internet services, this study can help towards the success of this rising industry.

APPENDIX A. Measurement Instrument

Variable	Item	Description	References
Continuance intention	INT1	I intend to continue using mobile Internet services in the next six months	Bhattacharjee 2001
	INT2	I expect my use of mobile Internet services to continue in the future	
	INT3	During the next six months, I plan to continue using mobile Internet services	
	INT4	If I could, I would like to discontinue my use of mobile Internet services	
Emotion	How do you feel about the use of mobile Internet services?		Cohen and Areni 1991, Cheung et al. 2000
	EMO1	Unsatisfied - Satisfied	
	EMO2	Annoyed – Pleased	

	EMO3	Frustrated – Contented	
	EMO4	Unhappy – Happy	
	EMO5	Bored - Excited	
Habit	HAB1	The use of mobile Internet services has become a habit for me	Limayem & Hirt 2003
	HAB2	I am addicted to using mobile Internet services	
	HAB3	I must use mobile Internet services	
	HAB4	I don't even think twice before using mobile Internet services	
	HAB5	Using mobile Internet services has become natural to me	
Perceived value	VAL1	Considering the fee I pay, the use of mobile Internet services offers value for money	Sirdeshmukh et al. 2002
	VAL2	Considering the time and effort I spend, the use of mobile Internet services is worthwhile to me	
	VAL3	Considering all monetary and non-monetary costs, the use of mobile Internet services is of good value	
	VAL4	Overall, the use of mobile Internet services delivers me good value	
Usefulness	USE1	Using mobile Internet services enables me to accomplish tasks more quickly.	Davis 1989
	USE2	Using mobile Internet services makes it easier for me to do my task.	
	USE3	Using mobile Internet services saves me time and effort in performing tasks	
	USE4	Mobile Internet services are useful to me in performing my task.	
Usage	IUL1	I use mobile Internet services very frequently (many times per month)	Cheung et al. 2000
	IUL2	I use mobile Internet services for a variety of tasks	
	IUL3	I use mobile Internet services very intensively (many minutes per month)	
	IUL4	Overall, I use mobile Internet services a lot	

Note: used Likert-type scale with 5 levels (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5= strongly agree)

APPENDIX B. Correlation Table

	EMO	USE*	VAL	HAB**	INT	IUL
EMO	.95					
USE*	.41	.96				
VAL	.55	.46	.95			
HAB**	.43	.36	.45	.93		
INT	.36	.40	.46	.36	.95	
IUL	.32	.35	.38	.66	.41	.95

Note: Leading diagonal shows the squared root of the AVE of each construct

* USE2 has been dropped

** HAB2 and HAB4 have been dropped

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