Modelling continued use of information systems from a forward-looking perspective: Antecedents and consequences of hope and anticipated regret

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ABSTRACT

This study focuses on two future-oriented emotions, hope and anticipated regret, to predict continued use of information systems. Empirical results based on two studies show that these emotions can exert independent and additive effects on continued use, controlling for previous use behaviour and satisfaction. Interestingly, the effect of hope on continued use is insignificant during initial use but becomes significant at the later stage. Furthermore, disconfirmation and involvement are identified as antecedents of hope and anticipated regret. These findings suggest that incorporating forward-looking variables into models of continued use is necessary and that their influence can be dynamic in nature.

1. Introduction

Continued use of information systems (IS) is a subject of lasting and extensive investigations in IS research. It is also highly critical to a firm’s sustained success and long-term profitability. The issue of continued use is even more pressing for firms that provide services through mobile applications. Recent research shows that on average a mobile application (app) loses 77% of its daily active users within the first three days after installation, and this loss quickly escalates to 90% within one month [1]. It appears that users become increasingly impatient as too many apps are competing for their attention. This raises an important question regarding the significant gap between initial adoption and long-term use that needs to be addressed urgently.

Many studies on continued IS use are traditionally based on the cognitive paradigm. Recently, the IS community shows increasing support for a more balanced view that considers both cognition and emotions [2,3]. These existing models can effectively explain continued use and are quite robust across different settings. However, the variance accounted for by these models commonly ranges from 40% [4,5] to 60% [6]. The relatively large portion of variance not explained by current models indicates the existence of other potential determinants of continued IS use. The unexplained variance is also corroborated by our real experience that a user may continue to use an information system despite his/her low satisfaction with it. Indeed, in existing models the prediction of future user intent is predominantly based on a hindsight perspective. Thus, users may keep using an information system with occasional glitches because they expect impending improvements. In other situations, users may abandon a seemingly satisfactory information system as better alternatives are anticipated in the future. Therefore, we argue that the incorporation of a forward-looking perspective in the prediction of continued IS use can be insightful, as individual decision-making commonly involves imaginary experiences [7] or future-oriented considerations [8]. In fact, IS researchers generally agree that users continue to discover and try new features after a system has been adopted [9]. Psychological studies also find that affective states can be more intense during anticipation than during retrospection because of the greater uncertainty involved [10].

The forward-looking perspective is particularly relevant to products and services available in rapidly evolving technologies, e.g. services delivered by mobile apps. Some app reviews reflect this future-oriented mindset, as the following examples quoted from the iTunes App Store demonstrate:

‘Seriously?! Can we not just get the app to open and display everything quickly?? I’ve about had it waiting update after update to see if the next one is better…’

‘I regret to inform you that your services and or online website are not up to par. I feel as though ever since I created my account years ago I have never had an experience with your services that has been considered satisfactory… I see an update that says bug fixes major improvements, etc. etc. and I download it hoping changes are actually made that will increase my experiences with your services…’

As shown by these examples, user reviews are not uncommon in the app market. Both reviewers appear to be active and long-term users, thereby highlighting the relevance and importance of the app, yet neither of them is fully satisfied with it. The gap between their desired

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experience and the current performance of the app gives rise to hope for an improved version in the future. This is consistent with the argument that one fundamental condition of hope is that the current situation is unsatisfactory [11]. However, the review content also reveals that users still believe that a better version is possible in the future. Intrigued by this example, we propose hope as the first future-oriented emotion in this study. We argue that being hopeful about an information system can be essential to its sustained use. The other future-oriented emotion we examine is anticipated regret. In the technology domain, anticipated regret is extensively studied in relation to consumers’ product upgrade decisions [12], but rarely in relation to continued IS use. Furthermore, longitudinal surveys were used to capture the potential dynamic relationships between future-oriented emotions and continued use.

This study uses appraisal theory to understand these two emotions. As one of the most influential current psychological approaches to emotions, it specifies the conditions for the rise of a particular emotion, usually known as appraisals, and predicts the differentiated consequences of distinct emotions. Goal congruence and importance are two appraisals common to most emotions. Based on their definitions, goal congruence and importance can be linked to existing concepts in IS literature, i.e. disconfirmation and involvement, and are posited as two important determinants of hope and anticipated regret.

To the best of our knowledge, this study is among the first attempts to incorporate future-oriented emotions in models of continued IS use. It not only confirms the hypothesised effects of hope and anticipated regret on continued use of information systems but also identifies the time-variant feature of the relationship between hope and continued use through two studies. Among the three models tested, at least 50% of the variance in continued use is explained, which is comparable to most current studies. When hope is a significant determinant of continued IS use, the variance explained can exceed 70%, which is higher than most models in the literature and thus justifies the inclusion of forward-looking factors. The findings of this study have important practical implications. For example, the recognition of future-oriented emotions can present new opportunities for market communications that enhance user engagement. Therefore, firms working on understanding system users based on relatively static indicators and historical patterns should consider not only past and present satisfaction but also customers’ future considerations.

In the following sections, first we conduct a literature review of the two main streams of research on continued IS use. Then, we develop the theoretical model with six hypotheses. After that, we present our research methods including the design of survey instrument and the process of data collection. Next, we explain the data analysis procedures and results. Finally, the paper concludes with a discussion of the findings, theoretical and managerial implications, limitations and directions for future research.

2. Literature review

Many studies demonstrate the importance of continued use for the ‘long-term viability and eventual success’ ([13, pp. 351–352]) of information systems. Therefore, it is essential to better understand factors contributing to continued use to make more informed decisions and implement more effective measures. To this end, we first synthesise the literature on continued IS use from two perspectives, i.e., cognition-based models and emotion-based models. Then, we discuss a third perspective that considers future-oriented factors.

2.1. Cognition-based models

Early works on continued IS use maintain theoretical continuity with the body of knowledge on IT adoption and acceptance. Many models come from technology adoption studies, such as the technology acceptance model (TAM). Of the many antecedents examined, only the results for perceived usefulness are consistently found to affect continued use across various settings [14], whereas the results for perceived ease of use are ambiguous. Although some studies find it significant [15,16], the prevailing view is that the effect of perceived ease of use subsides as a user gains more experience [13,17]. One critique of the use of adoption models for continued IS use is that they fail to account for important factors emerging from post-adoption experiences. As a result, alternative theories have been proposed, among which the most widely cited is the expectancy-disconfirmation theory (EDT). In this theory, continued IS use is a result of expectation and satisfaction, the latter being a stronger predictor [13].

Generally, the EDT model has a greater theoretical appeal than those extended from traditional adoption models, such as TAM. EDT is widely used in the field of information systems for diverse areas, such as disruptive technologies [18], ubiquitous media systems [19], electronic medical records [6] and word-processing programmes [20]. EDT accounts for the experience accumulated through repeated use after initial adoption and, consequently, for the potential psychological and behavioural changes that distinguish continued use from adoption.

Bhattachjee and Premkumar [21] demonstrate this process using a temporal model based on the EDT and find that users adapt their beliefs and attitudes from their prior reference levels. However, such adaptation tends to stabilise after initial fluctuations as users develop a more accurate and complete understanding of the information system over time.

2.2. Emotion-based models

Emotions are integral to the use of information technologies because they are critical to human motivation, judgement and behaviour [2]. Increasing emotional commitment can lead to higher customer retention [22], and its influence can be more significant than cognition-based factors in some circumstances [23]. Inspired by these findings, a growing number of studies address the role of emotions in user experiences with information systems.

These studies approach emotional experience mainly from two perspectives. The valence-based view regards emotions as either positive or negative; thus, valence becomes the most influential aspect of emotions on judgement and decision-making. This perspective has been productive [24], but recent studies suggest that valence is only one dimension of emotions, as emotions with the same valence can lead to distinct reactions [25]. Such valence-based approaches may sacrifice specificity for parsimony [26]. The alternative perspective argues for discrete emotions. IS researchers thus consider the complexity of emotions during user interactions with information systems. For example, Beaudry and Pinsonneault [27] examine four discrete emotions (i.e., happiness, excitement, anger and anxiety) and identify differentiated effects on IT use, even though some emotions exhibit the same valence. Yin et al. [28] compare two negative emotions, anger and anxiety and find distinct effects on the perceived helpfulness of online reviews. Both studies demonstrate that a more detailed approach that goes beyond valence can account for more specific influences of emotions on judgement and behaviour.

In summary, a review of the two major perspectives on continued IS use prompts two observations. First, research on continued IS use shows a gradual shift from an exclusively cognitive enterprise to a more balanced view that considers both emotions and cognition. Moreover, IS scholars have recognised that a valence-based approach is theoretically sterile; it is thus necessary to examine complex emotions in detail [29,30]. The second observation is that current studies are mostly retrospective in nature, regardless of the perspective they adopt, cognitive or emotional. Nevertheless, as stated by Helkkula et al. [7], users construct their value perception not only based on previous or current experiences but also based on future experiences. Today the standard release cycle across the entire software industry is moving at a much faster pace, and for mobile apps, this cycle can take one week only. With frequent updates, users are more likely to take into account their
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