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Understanding Twitter's adoption and use continuance: the Synergy between Uses and Gratifications and Diffusion of Innovations

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ABSTRACT

This study explored the explanatory power of Uses and Gratifications (UG) and the Diffusion of Innovation theory (IDT) in describing Twitter phenomenon. Effects of mobile access and perceived outcomes of using Twitter were also examined and comparison of active and inactive users revealed which needs are likely to result in Twitter's discontinuance if unmet. Online survey and data analysis with Partial Least Squares (PLS) revealed that the needs for Entertainment, Relaxation, the service's Visibility and Compatibility were strong predictors of Twitter's usage. ANOVA highlighted that the same dimensions were significantly lower among inactive 'tweeters', suggesting that the same factors may be responsible for both adoption and continuance. Mobile access of Twitter was found to be a catalyst for continued use. There is a need for the combined use of UG and IDT in describing Twitter's adoption, with personal needs and the service's characteristics being the use drivers by different audiences.

Keywords

Twitter, discontinuance, continuance, diffusion of innovation, uses and gratifications, IDT, UG, PLS.

INTRODUCTION

Social network sites (SNS) are becoming a dominant research topic in the area of computer-mediated communication in recent years. According to ComScore, a US marketing research company, Facebook, a leading SNS, has a growing audience that exceeded 500 million users worldwide in October, 2010 (Gonzalez, 2010). Facebook has already experienced huge popularity even in the academic field. In spite of the great volume of related prior research, Hargittai (2008) pointed out that a significant antecedent question has been largely ignored: the difference between who is and who is not a SNS user. She also believed that this research limitation was caused by such a small number of non-users that there was little variance present to explain the difference upon the adoption of the services. One social medium that received tremendous attention in the second half of 2009 is Twitter. Twitter is a new social networking and micro-blogging service that enables its users to send and read

messages. Users can describe their current status in short posts, up to 140 characters, distributed by instant messages, mobile phones, email or the Web (Java, Song, Finin & Tseng, 2007). Twitter, a comparably new service, launched in 2006 and has gained extensive notability and popularity worldwide. As of today, Facebook has over 500 million active users worldwide since its launching in 2004. There are 138 million users on Facebook, while Twitter has 27 million users in the U.S. (Bluff, 2010; Gonzalez, 2010). More importantly, Twitter shows a 3,000 percent user base growth from just one year ago (Rao, 2009; PRWeb, 2009). Contrary to its notable success, Twitter shows an interesting phenomenon. A study by Nielsen Online, a service of delivering measurement and analysis of online and offline information and media, states that more than 60 percent of new U.S.-based Twitter users do not return one month later and are referred to as 'Twitter quitters' (Liedtke, 2009). Twitter also shows less loyalty by its users, including 79.79% with no homepage URL, 75.86% with no biography, 55.50% that are not following anyone and 52.71% with no followers (HubSpot, 2009). From the above critique, Twitter emerges as an ideal subject to investigate; hence, this study: i) compares theoretical frameworks in their relative ability to explain the Twitter adoption phenomenon; ii) explores why registered tweeters discontinue this SNS; and iii) explores whether mobile Twitter access acts as a predictor of its use for real-time, anywhere, information sharing and communication exchanges. There have been only a few related publications, because Twitter is still in its infancy. Consequently, this study will break new ground in a comprehensive study of Twitter users' characteristics and offering insights into what drives its users to tweet or quit based on their expected outcomes and personality types, but more importantly offering a comprehensive theoretical model with high explanatory power describing the Twitter phenomenon that can also be applied in future innovations. Uses and Gratification (herein, UG) as a theoretical framework identifies characteristics of Twitter users and Twitter quitters. Additionally, this study will also look at different users from the perspective of Roger's (2003) Innovation Diffusion theory (herein, IDT), because the IDT constructs have provided influential insight on users and non-users in the adoption of new media.

THEORETICAL FRAMEWORK AND RESEARCH QUESTIONS

Uses and Gratifications Theory (UG)

UG has been widely used in both traditional and new media studies such as the Internet and online games (Chang, Lee & Kim, 2006). UG has explained how social and psychological needs drive relatively active audiences to use different media to satisfy their needs (Rubin & Bantz, 1987). Users purposely select media they consume to achieve their goals, hence UG can be understood from the perspective of individuals' behaviors based on specific motives and socio-psychological characteristics (Trammell, Tarkowski, Hofmokl & Sapp, 2006). The focus of UG is on motives for media use and its determinants and expected outcomes from media-related behavior. In the early stage of Twitter, its brevity and interactivity have attracted a significant user base. Hence, studying Twitter presents an opportunity for significant value in both theory and practice. One of the objectives of this study is to identify the use motivations and needs that are likely to lead to Twitter's registered users' inactivity in the event they are not met.

Perceived Motivation (perceived needs)

Since the Internet has been popularized in everyday life, there has been extensive research employing UG in the context of the Computer-Mediated Communication (CMC). The UG approach has focused on the understanding of users' motivations and associated behaviors. In a related study on Cyworld, a Korean-based SNS (Jung, Youn, and McClung, 2007), users were described as "active gratification seekers". Twitter's users may also be classified as "active gratification seekers", but the motives, needs, desires, and/or outcomes pursued are to this day unknown. Hence, this study attempts to answer the following research question:

RQ1: How do motivations (perceived needs) influence Twitter active and inactive users respectively, and are there particular needs that are more likely to lead to inactive users if they go unmet?

Diffusion of Innovations Theory (Innovation Diffusion Theory: IDT)

IDT explains how an innovation or new idea propagates in a social system over time. The foci of the theory are on the knowledge, attitude change, and decision making process that affects the adoption of innovation. However, IDT is limited in that it focuses on the initial adoption of an innovation while overlooking its potential rejection, discontinuance, or reinvention (Rogers, 2003). This is in line with Hargittai's argument (2008) that the differences between who is and who is not a SNS user have been ignored, and consequently presents an opportunity for an important research stream. In applying IDT to Twitter, this study will adopt the above three constructs and will also include demographic variables and items regarding new media adoption.

Personal innovativeness

Rogers (2003) defined innovativeness as 'the degree to which an individual or other unit of adoption is relatively earlier in adopting an innovation than other members of a social system' (p. 22). Also, highly innovative individuals are active information seekers and can handle high levels of uncertainty and are expected to develop more positive beliefs about the target technology. Hurt, Joseph & Cook (1977) also understand the innovativeness as an individual's willingness to change.

Perceived characteristics of an innovation

Rogers (2003) proposed a number of factors as important in determining the rate of adoption of an innovation. Five of these are selected as the independent variables in this study, as prior research has found them to be the most reliable and overall strongest predictors of an innovation's adoption rate (Rogers, 2003); they are: relative advantage, compatibility, complexity, triability, and observability.

Relative Advantage

Relative Advantage is the degree to which an innovation is perceived as better than the idea it supersedes (Rogers, 2003). According to Pontin (2007), the relative ease of being connected through the use of a one-to-many application, an inherent characteristic of Twitter, is a key strength of this communication platform. Twitter users can send status updates to "Friends" and "Followers." Users can send a message to people they know well or even to others they may not be familiar with (Pontin, 2007).

Compatibility

Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 2003). According to Rogers (2003), the more compatible an innovation is, the more uncertainty is decreased. Twitter on both a web- and mobile-based platform, makes it possible to connect people anytime and anywhere, and enables them to interchange their status and opinions. The use of this communication technology is as varied as the people, who rely on it to stay 'connected.' Essentially, Twitter enables its users to use a free SMS service delivered on the web, through Instant Messenger applications, or via a mobile application on the handset (e.g. Tweetdeck, Tweetie). Hence, it can be argued that Twitter is compatible with its users' existing values, beliefs, and their daily life.

Complexity

Complexity is the degree to which an innovation is perceived as difficult to understand and use (Rogers, 2003). Twitter's attraction appears to be its simple and clear user interface and its message length with limitation up to 140-characters to instantly communicate brief messages. The simple user interface and low complexity of use may positively relate to the adoption of Twitter.

Trialability

Trialability is the degree to which an innovation may be experimented on a limited basis (Rogers, 2003). When an innovation is designed to be easily tried by the potential adopters, they can find out the innovation's value proposition and how it may work for them. Also, the personal process of trying of an innovation can dismiss uncertainty (Rogers, 2003).

Observability

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2003). When an adopter can see the result of an innovation easily, that experience is positively related with the innovation's adoption. Twitter has received extensive media coverage as a result of its adoption by many celebrities, politicians. Through media promotions and coverage, many potential adopters have already been exposed to Twitter.

Perceived popularity of an innovation

Rogers (2003) has suggested that perceived social norms and adoption may be caused not only by actual needs, but also by pressure. Also, perceived popularity may also be referred to as the motives of users to adopt an innovation known as network externalities (Dickinger, Arami & Meyer, 2008). Network externalities are understood as the increased utility of a communication medium as a result of an increasing user base. These considerations set up a second research question for this study:

RQ2: How and to what extent do the various innovation constructs influence active/inactive Twitter users?

Having described two well established theories that could be used to explain the Twitter adoption phenomenon, this study will also explore their respective strength in explaining actual usage by registered tweeters. Hence:

RQ3: Which of the two theories, UGs and IDT, offers greater explanatory power in the adoption of Twitter?

RESEARCH DESIGN

The literature review and the emerging hypotheses give rise to our proposed research model shown in Figure 1.

The eleven most commonly applied constructs related to perceived needs were derived from two studies: first, Papacharissi's study (Papacharissi, 2002; Papacharissi & Mendelson, 2008) of personal homepages and Facebook included scales for: information, passing time, entertainment, self-expression, professional advancement and companionship, interpersonal (social interaction), newer media (New and cool trend), professional advancement, habit, escape and relaxation. In our study, items were adapted to fit the context of Twitter. In addition to perceived needs, questionnaire items for personal innovativeness, perceived characteristics and perceived popularity from previous studies in IDT were adapted to fit the context of this study. In addition, Reagan (1987) found that the use of other similar

technologies and corresponding user attitudes were important predictors for the adoption of new technologies. Studies have shown that inherent innovativeness and media ownership were significant predictors for an adoption of innovation, especially in the adoption of telecommunication technologies (e.g., Dutton, Rogers & Jun, 1987). Therefore, this study included the measurement of new media ownership and online application account holders, such as social network sites and YouTube, too.
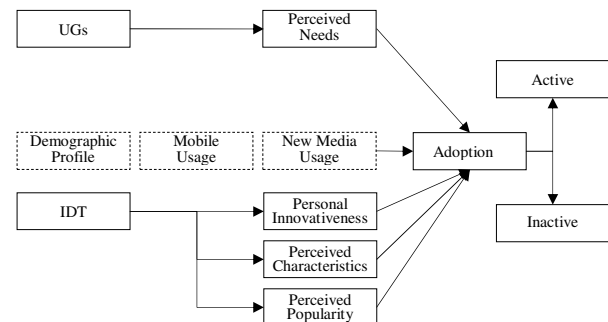

Figure1. A research model

METHOD

An online survey of a college's population was conducted at a US-based large mid-western university to gather data on Twitter user's motivations, innovation constructs and Twitter usage. The data collection period lasted one week in August 2010. To ensure the privacy of respondents, a separate survey was used upon completion of the study to collect e-mail addressed for one of four $25 gift cards. Data were analyzed using SPSS statistical software package (SPSS 18) and Smart PLS (version 2.0.M3).

Subjects

A random sample of 500 students and 500 faculty and staff was contacted by email requesting their participation in this study. A total of 135 responses were received, however 69 (51.1%) of them do not have a Twitter account. Therefore, our usable sample for analysis is 66. The sample consisted of 28 (42.4%) females and 38 (57.6%) males. The average age is 25, ranging from 18 to 63 (SD=9.224). Most respondents are Caucasian/White (63.6%) and African American (27.3%). Responses consisted of undergraduate students (75.8%), graduate students (9.1%), staff (10.6%), and faculty (4.5%). Slightly more than half (58.5%) of respondents were male, 40% were female, and 1.5% did not report gender. However, there was no significant difference in the gender split between active and inactive Twitter groups.

RESULTS

Reliability estimates of the sub-scales

All perceived needs (Uses and Gratifications or UG) and the Innovation Diffusion Theory (IDT) constructs were examined for reliability, shown in Table 2. All items exhibited good reliabilities with Cronbach's alpha values above .80, except for habit (α=.653) in UG which we excluded, and one item in each of demonstrability and visibility measures were deleted. Constructs and items have already been elaborated and tested in previous adoption studies, and simple wording modifications were done to tailor items into the Twitter use context and pre-tested with two graduate students.
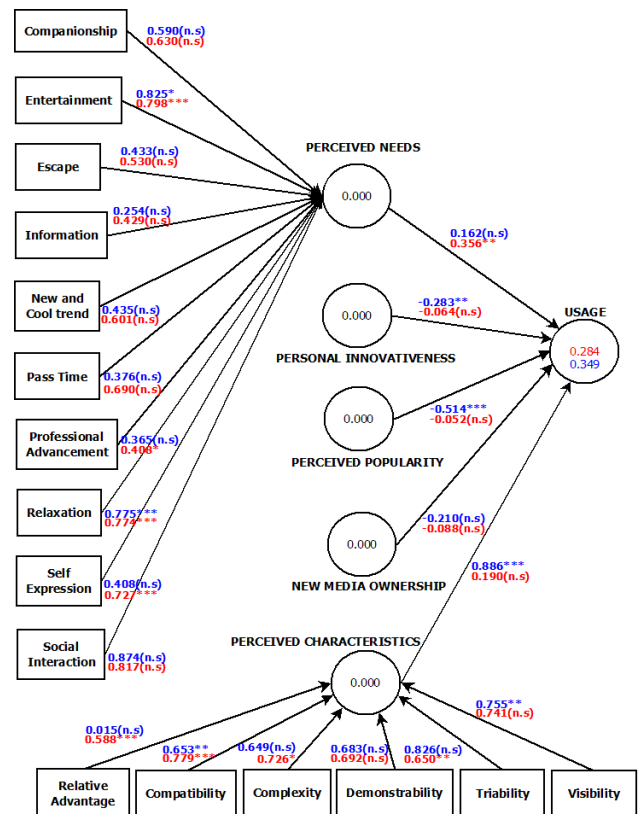
Data analysis

In order to classify active and inactive users into the two groups, data were split at the reported mean daily usage in minutes, which ranged from zero to 240 minutes. (*M*=23.11, *SD*=42.256). One respondent did not report usage, therefore 65 responses were used for analysis of group difference. The split yielded two groups; Inactive (N=44) and Active (N=21) group. The average time spent was 4.02 minutes per day and the number of Twitter friends (for the purpose of this study, average of the number of followings and follows) was 40 in the inactive group, whereas for the active group the average daily usage was 63.10 minutes, each with 123 friends. As a result, a one-way ANOVA showed a significant difference between the two groups' Twitter usage, F (1, 63) =48.332, *p*<.001.

Partial least squares (PLS) was used to test our hypotheses from UG and IDT, followed by use of SPSS and ANOVA to explore for differences between active and inactive users. We began our analysis by contrasting the two theories leveraged in terms of their respective explanatory power. The result shows that UG offers the greatest explanatory power for Twitter usage (33.5%) when used alone, compared to IDT (21.8%), and even combining both theories (28.4%). However, upon further exploration of the model using both theories but for each usage group separately, it becomes evident that each theory offers more insight into the usage of either one of the two groups. Hence, even though the model that combines both theories offers a slightly lower variance explained for usage, it will be used for the remaining analyses as it holds true for both groups.

Perceived Needs (PN; β=0.36, p<.01), Perceived Characteristics (PC; β=-0.09, p<.05), and Perceived Innovativeness (PI; β=-0.06, p<.05) showed significant association with Twitter usage. From the 10 Perceived Needs, only Entertainment (β=2.02, p<.05) and Relaxation (β=2.73, p<.01) were strong predictors. From the six IDT constructs only Compatibility (β=3.61, p<.01) and Visibility (β=2.98, p<.01) received support. Table 3 shows all path coefficients tested in the model.

Next we sought to identify any differences between active and inactive users among all measures of perceived needs by means of ANOVA. Results supported that there were significant differences between the two groups in all but two factors: New and Cool Trend and Escapism were (marginally) not supported. This may be due to sampling, i.e. most respondents were undergraduate students, who are likely to be much more familiar with new media, so they might not consider Twitter as a new or cool media any longer. A similar analysis was done for the IDT constructs. ANOVA confirmed differences between the two users groups for one measurement; Compatibility, F (1, 63) =7.897, *p*<.01; Visibility F (1, 63) = 8.053, *p*<.001; and Demonstrability F (1, 63) = 3.200, *p*<.001.

In a nutshell, active users may turn into inactive users if Twitter is no longer found to be entertaining or relaxing, or if the Twitter service is no longer visible or compatible with other media and services used. All results are shown in the Figure 2.

* significant at 0.05 level; ** significant at 0.01 level; *** significant at 0.001 level, Red: inactive users, Blue: active users

Figure2. Smart PLS result

Lastly, an interesting group difference exists in terms of access. Active users accessed Twitter far more by mobile phone, F (1, 63) =15.264, *p*<.001, and also more through mobile apps, F (1, 63) =31.594, *p*<.001m than inactive Twitter users. Therefore, mobile access emerges as a catalyst in Twitter's use.

DISCUSSION & LIMITATION

This study extends theories of adoption and usage behavior in Computer-Mediated Communication. It was interesting to observe the complementarities of the Uses and Gratifications and the Diffusion of Innovation theory in describing the Twitter adoption and continuance and discontinuance phenomena. The two theories combined performed better at capturing dimensions relevant to the adoption of the Twitter innovation. Results also showed that predictors of Twitter's adoption including the personal needs of enjoyment and relaxation and the service's compatibility and visibility, are also strong predictors of its continued use. An interesting finding emerged in this study in that mobile access was an important factor associated with the continued use of Twitters. Even though most respondents were relatively young college students, there is a distinct difference between active and inactive users in terms of Twitter's access platforms and devices. Active users access Twitter significantly more via mobile phones and mobile apps than inactive tweeters. This might be because of the natural fit between the service's real time update feed with mobile devices' inherent anytime, anywhere reachability and connectivity. No gender differences were observed in terms of Twitter access modes. As with all research, this study comes with limitations. College sampling and low response rates from staff and faculty may have affected the generizability of findings. Future studies could be applied to the general population with a wider age range and geographic coverage.

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