Applying the Perspective of Technology Sensemaking to Plurk User Behaviors: An Exploratory Study

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Abstract
Although microblogging has become a global phenomenon, there has been surprisingly little research on the subject. Thus, this paper aims to serve as an exploratory study that probes into microblogging user behaviors. This study suggests that users' cognitive processes and use of technology can be explained from the perspective of technology sensemaking. Thus, this study treats Plurk as the target, and probes into Plurk's user behaviors from the perspective of technology sensemaking. The analysis is based on grounded theory and content analysis. According to findings based on grounded theory, the content to which users apply technology sensemaking on Plurk was categorized into four types: reality shows, mood bulletins, kiosks, and propaganda vehicles. Content analysis demonstrates that these four types meet users' descriptions of Plurk user behaviors and expands the application of the perspective of technology sensemaking to non-organizational situations. Finally, conclusions and suggestions for future studies are proposed.

1. Introduction
Following the phenomenon of blogging on the Internet, Twitter, an instant microblogging format with a limitation of 140 characters per post, has become popular worldwide, with over 75 million users [1]. However, because the Twitter interface supports only six languages, including English and French, its users are mostly in English- and French-speaking countries. Plurk posts are also limited to 140 characters; however, Plurk supports 35 languages, including Traditional Chinese. Thus, there are more Plurk users than Twitter users in Taiwan. According to statistics on network traffic provided by Alexa Internet, Inc., in February 2010, Plurk users in Taiwan accounted for 34.4% of the total users, and Taiwan has the largest number of Plurk users in the world [2]. Therefore, this study focuses on Plurk, rather than Twitter.

In Taiwan, the influence of Plurk is obvious. For instance, during the Taiwanese flood of August 8, 2009, Internet users around the island voluntarily constructed “Morakot on Plurk,” which provided the latest information on the disaster and integrated disorganized but urgent news about the situations [3]. Thus, Plurk transformed from a communication channel to a functional tool. It is interesting to explore the cognitive processes and resulting behaviors of Plurk users.

In studies of technological user behaviors, the technology acceptance model (TAM) is the most commonly used theory [4-7]. TAM tests causal relations using questionnaire surveys and statistical methods. Although TAM can determine if users accept new technology through perceived usefulness and perceived ease of use, it cannot indicate an individuals’ cognition of technology—the users’ particular uses for technology upon acceptance and the meaning of that technology for users. Because different people treat technology differently, different users will have different behaviors.

To address these problems, this study suggests explaining users’ cognitive processes and uses of technology from the perspective of technology sensemaking, which is usually applied to an organization’s introduction of new technology. Sensemaking comprises individuals’ cognitive processes dealing with external information, as the members in organizations interpret various messages in
their environment. With the construction of sensemaking, individuals can respond to different uncertain situations within an organization and then interact with other members to determine the logical explanations; the final result is a rational and specific individual act or group behavior [8]. In addition, existing research has demonstrated diversity in sensemaking [9]; in other words, it shows that the types of technology sensemaking employed by different users are varied [10-12].

Therefore, this study suggests that technology sensemaking means that, when using technology, users will imbue that technology with in-depth meanings, according to their individual needs and personalities. These meanings will guide each user to arrive at his or her particular manner of using Plurk. From the technology sensemaking perspective, this study focuses on two questions: how do users develop meanings for Plurk use and how do the said meanings influence users’ Plurk use?

In order to answer the above questions, this study includes two phases, grounded theory and content analysis, for three reasons: (1) Currently, there is little research on microblogging, and thus, as an exploratory study, the present research aims to determine how users develop meanings on Plurk, based upon grounded theory. (2) With content analysis, researchers can come up with a specific standard to observe how users use Plurk while avoiding subjective descriptions. In addition, researchers can validate that the analytical results of grounded theory meet users’ descriptions of Plurk use behavior. (3) In the past, a technology sensemaking perspective was applied to organizational situations and was considered in the context of users who were subjected to organizational regulations; however, the use of Plurk is voluntary. Thus, the expansion of the technology sensemaking perspective to a non-organizational situation should be verified by the basis of grounded theory and content analysis.

2. Literature review

2.1 The perspective of technology sensemaking

Sensemaking originates from the field of organization studies and focuses on the relationship between cognition and action in organizations [13]. Sensemaking is defined as the ‘making of sense’, where sense refers to meaning and making refers to the activity of constructing or creating something [9]. When introducing new technology in organizations, an understanding of people’s interpretations of a technology is critical to understanding their interaction with it. For example, Orlikowski and Gash argue that ‘to interact with technology, people have to make sense of it; and in this sensemaking process, they develop particular assumptions, expectations, and knowledge of the technology, which then serve to shape subsequent actions toward it’ [14]. Therefore, sensemaking specifically address cognitive and social mechanisms for dealing with unexpected events, especially for the adoption of new technology.

New technology is equivocal because it is esoteric, subject to misunderstandings, uncertain, complex, and recondite [9]. Weick describes new technology is simultaneously the source of stochastic events, continuous events, and abstract events, and these three classes of events make both limited sense and many different kinds of sense [9]. When users could make multiple senses towards new technology and shape how the technology is exploited, they also act on the basis of their interpretations of the technology, and in doing so enact particular technology artifacts and endow them with meaning [14]. Unless we keep track of how senses are evolved around technology, we are unable to manage technology effectively.

Sensemaking is a social process in which users interpret their environment through interaction with others, construct accounts which allow them to comprehend the world, and respond to events collectively [8]. The lens of technology sensemaking helps us analyze how users may attribute meanings to new technology by examining the symbolic and non-instrumental dimensions of technology adoption [11,15]. In addition, the lens examines the social construction of technology, and considers technology as texts which are written in certain ways by their developers, producers and marketers, and have to be read by their users [16]. From the lens of technology sensemaking, this study investigates how microblogging adoption may be affected by users’ socially-constructed meanings, especially for Plurk in Taiwan.

2.2 Twitter vs. Plurk

Twitter, the most popular microblogging in the world, was launched in 2006. It is a social networking and microblogging service that enables its users to send and read other users’ messages called tweets. Tweets are text-based posts of up to 140 characters displayed on the author's profile page. Tweets are publicly visible by default; however, senders can restrict message delivery to their friends list. Users may subscribe to other author tweets—this is known as following and subscribers are known as followers. All users can send and receive tweets via the Twitter website, compatible external applications (such as, for smart phones), or by Short Message Service (SMS).
Twitter has gained notability and popularity in the world and currently has more than 100 million users worldwide. In February 2010, Twitter users were sending 50 million tweets per day. As of June 2010, about 65 million tweets are posted each day, equaling about 750 tweets sent each second [17].

Plurk was launched on May 2008 and also provides a social networking and microblogging service that allows users to send updates through short messages or links called Plurks, which can be up to 140 characters in length, the same as Twitter. Unlike Twitter, Plurk's interface shows updates in horizontal form through a scrollable timeline which lists all the updates received in chronological order, as shown in Figure 1, and delivered to other users who have signed up to receive them. Users can respond to other users' updates from their timeline through the Plurk.com website, by instant messaging, or by text messaging.

Plurk's users, also called Plurkers, can post new messages with optional qualifiers, which are one-word verbs used to represent a thought (e.g. feels, thinks, loves, etc.). There are also advanced features such as sending updates only to a subset of user's friends, and sharing images, videos, and other media. Plurk also supports group conversations between friends and allows usage of emoticons together with the usual text microblogging. Due to messages being sent between users in near-realtime, many users use Plurk as an alternative to chat.

Plurk is very popular in Taiwan, Philippines, and Indonesia. According to Alexa, as of February 11, 2010, 34.4% of Plurk's traffic comes from Taiwan, and about 30% of Plurk's traffic comes from Southeast Asia. Plurk is also ranked 24th in Taiwan and 1,062nd worldwide [2].

Compared with Twitter, Plurk use Karma to promote users' loyalty. Every Plurker has his/her own Karma value. It is recalculated every day and can be divided into six intervals, as shown in Table 1. Higher Karma value means that Plurker has ability to give title/names to Plurker’s own timeline and has right to use exclusive emoticons when send updates. According to Plurk.com, some tips on getting more Karma includes inviting real friends, quality plurking each day, responses from other plurkers, and updating own profile (picture, location, birthday etc.). However, they will lower Karma include spamming other users, inactivity for a long period, requesting friendship and getting rejected, and getting unfollowed by friends [18].

### Table 1. Karma's intervals and their descriptions

<table>
<thead>
<tr>
<th>Karma</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00~21.00</td>
<td>You are in the state of creation.</td>
</tr>
<tr>
<td>21.00~41.00</td>
<td>You are in the state of maintenance.</td>
</tr>
<tr>
<td>41.00~61.00</td>
<td>You are enlightened.</td>
</tr>
<tr>
<td>61.00~81.00</td>
<td>You are so close to Plurk Nirvana.</td>
</tr>
<tr>
<td>81.00~99.99</td>
<td>You have reached Plurk Nirvana!</td>
</tr>
<tr>
<td>100</td>
<td>You have reached the top!</td>
</tr>
</tbody>
</table>

Source: [18].

![Figure 1. Example of the Plurk's horizontal scrollable timeline in chronological order](source)

Source: [3].
3. Methods

3.1. Participants

This study treated Plurk users with Karma greater than 60 as potential participants. On Plurk, Karma indicates frequent usage, and higher Karma values indicate users that are more experienced [19]. Thus, they can share in-depth and valuable information when describing their experiences on Plurk.

In October 2009, this study posted a message on Plurk to recruit participants, and selected eight participants with Karma over 60, as participants for the grounded theory analysis. The participants were 22-to-25-year-olds (M = 23.88, SD = 1.25) and included four males and four females. Two were students, five were office employees, and one was a blogger. According to statistics on network traffic provide by Alex, 18 to 24 year olds are a majority of Plurk users [2]. When the researchers interviewed the seventh participant, they observed theoretical saturation [20]—in other words, that user’s description completely overlapped that provided by the previous six participants. Thus, this research interviewed only eight participants.

For content analysis, ten Plurk accounts were selected, including five of those whose creators accepted interviews and agreed to provide related data (the other three participants declined to participate for privacy reasons), one new student (who initially agreed to accept the interview and later rejected the offer), and four public accounts (three Plurk celebrities and one company user were selected by purposive sampling from the top 100 Plurk users [21]). Five additional participants were selected to expand the scope of the study beyond those already interviewed.

3.2. Materials

The users’ development of meaning on Plurk originates from their inner thoughts, which cannot be directly observed. Thus, the first research tool of this study is an in-depth interview. By a semi-structured questionnaire, this research probed into users’ thoughts regarding Plurk in order to collect data for a grounded theory analysis. The semi-structured questionnaire includes four sections: (1) Background of and needs concerning Plurk use, which aims to understand the participants’ background, reasons, and situations when using Plurk. (2) Use of Plurk, which aims to determine how participants use Plurk, including posting, responses, reading, usage frequency, and so on. (3) Participants’ views toward Plurk, including their feelings regarding Karma. (4) The usage effects of Plurk, which aims to determine if participants reduce their use of other such tools after using Plurk.

Content analysis is the second research tool used in this study; it focuses on using the above users’ public messages and responses on Plurk rather than using their private message, in order to protect their privacy [22,23]. Since there are a large number of previous messages on Plurk, only the data posted by 10 Plurk users over the course of September 2009 was considered. We recruited participants in October; thus, the collected data were naturally generated without external intervention. The research participants did not change their user behaviors after learning that their information was collected. This study treated one topic on Plurk as one analytical unit, and there were 884 topics in all. When a certain topic was associated with two or more types of sensemaking, the users’ main purpose for sending the message was presumed according to the users’ situation. Some meaningless messages, or those that do not reveal the users’ intentions, such as “oh” and “test,” are not included in the analysis.

3.3. Procedure

Prior to their analysis based on grounded theory, the interviews were recorded and transcribed. The data were input into Atlas.ti, a software package for qualitative data analysis. Two of this study’s authors coded the interview data according to the principles of grounded theory [20], which does not aim to prove an existing theory, but to develop inductively a theory from the data. Thus, in the research process, the data were repeatedly compared and analyzed upon the three stages of grounded theory—open coding, axial coding, and selective coding [24].

Upon completing the grounded theory analysis, this study gained a preliminary understanding of the types of users’ technology sensemaking regarding Plurk. In content analysis in the second stage, in order to avoid a single researcher’s subjective classification, two researchers conducted coding and reached an advanced consensus on the classification; these two encoders worked independently during the coding processes in order to avoid mutual influence. This study randomly selected 50 messages on Plurk for comparisons. Two researchers individually judged the types of technology sensemaking according to the data, and then compared them, resulting in a Cohen’s kappa of 0.82; this implies a good level of inter-rater agreement. One researcher then completed the coding of the content analysis.
4. Results

Regarding users whose data was the subject of the grounded theory analysis in the first stage, the eight participants’ Karma range from 67.65 to 97.62 (M = 81.60, SD = 10.71), the number of messages published on Plurk is between 74 and 6,958 (M = 1270.00, SD = 2311.17), the number of responses obtained is between 493 and 13,501 (M = 3362.13, SD = 4271.40), and the number of friends is between 16 and 824 (M = 173.88, SD = 265.75) as taken from statistics between registration to the end of September 2009. According to the above data, the variance of the eight participants’ numbers of messages published on Plurk, the number of responses obtained, and the number of friends, is significant, which shows that the eight participants’ Plurk use is considerably different.

With the use of grounded theory, this study can now answer the first research question: how do users develop meanings for Plurk use? From the technology sensemaking perspective, we categorized users’ technology sensemaking toward Plurk into four: reality shows, mood bulletins, kiosks, and propaganda vehicles (Table 2). Reality shows refer to users treating Plurk as a tool to describe their current situations and sending instant messages to friends in order to remain in touch with them. Mood bulletins refer to users treating Plurk as a tool to express their feelings and thoughts, and expecting to receive friends’ support and responses. Kiosks refer to users treating Plurk as a tool to pose questions, to ask for others’ opinions, or to acquire information needed by reading others’ messages. Propaganda vehicles refer to users regarding Plurk as a tool to send information or messages to friends, or the public, and firms and celebrities promoting their products or ideas on Plurk.

In analysis of the second stage, this study validates the results of the grounded theory analysis by content analysis and treats four types of technology sensemaking on Plurk as classification criteria for content analysis, with the results shown in Table 3. There are 430 messages in the reality shows category (48.64%), 105 messages in the mood bulletins category (11.88%), 105 messages in the kiosks category (11.88%), and 244 messages in the propaganda vehicles category (27.60%). Since the numbers of different types of messages are related to the subjects selected in this study, the classification results can only serve as a reference. However, content analysis validates that the four types of technology sensemaking for Plurk meet users’ descriptions of Plurk user behaviors, and expands the applications of technology sensemaking perspectives to non-organizational situations. The findings answer the second question of this study: how do the said meanings influence users’ Plurk use?

Table 2. Types and categories of technology sensemaking upon interview data

<table>
<thead>
<tr>
<th>Types of technology sensemaking</th>
<th>Categories</th>
<th>Users’ descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reality shows</td>
<td>➢ Emphasizing the immediacy of an incident ✓ Describing what happens in daily life ✓ Informing friends of current situations ✓ Keeping in touch with friends</td>
<td>I can know my friends’ situations. Although we cannot meet everyday, at least I can learn what happened to them today.</td>
</tr>
<tr>
<td>Mood bulletins</td>
<td>➢ Expressing feelings and thoughts ✓ Expecting support and responses from others ✓ Free space for self-expression</td>
<td>It is about our personal affairs and feelings.</td>
</tr>
<tr>
<td>Kiosks</td>
<td>➢ Active display of personal problems ✓ Asking for others’ opinions ✓ Expecting others’ specific feedback ✓ Personalized and immediate information sources ✓ Information receivers</td>
<td>When we want to ask some questions and do not know who has informative or helpful answers, we pose the question on Plurk and people respond after reading it.</td>
</tr>
<tr>
<td>Propaganda vehicles</td>
<td>➢ Providing information and sharing information ✓ Promoting personal ideas or beliefs ✓ Promoting products ✓ Expecting word-of-mouth effects ✓ Information senders</td>
<td>I can publish an article (by mobile phone) on Plurk and people will read it.</td>
</tr>
</tbody>
</table>
Table 3. Content analysis result of types of technology sensemaking

<table>
<thead>
<tr>
<th>Types of technology sensemaking</th>
<th>Number of messages (%)</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Reality shows                   | 430 (48.64%)           | • I suddenly feel hungry... didn’t I just finish eating?  
|                                 |                        | • I’ll study traffic regulations this weekend... |
| Mood bulletins                  | 105 (11.88%)           | • I’m always impatient without reasons =3=  
|                                 |                        | • People are fragile, even though it was simply a careless word. |
| Kiosks                          | 105 (11.88%)           | • Can I get the ticket for the Taiwan High Speed Rail for September 3rd at Taipei Main Station tomorrow?  
|                                 |                        | • I cannot figure out gift apps on Facebook. Why does each app provide different numbers of gifts? |
| Propaganda vehicles             | 244 (27.60%)           | • [Good news] Do you want to be the main character in a Win7 activity? Join **Big 7** Group Creation, you will have the chance to win **small notebooks**, and **plenty of great gifts of Win7** just for the users of Plurk ~  
|                                 |                        | • [Test] competition of Nokia N97 GPS: Google & Garmin & PaPaGO |

5. Discussion

Java et al. propose that the main user-intentions for using Twitter can be categorized by four types: (1) Daily chatter: most poets on Twitter talk about daily routine or what people are currently doing; (2) Conversations: no direct way for people to comment or reply to their friend’s post, allowed by the addition of @ to one’s post; (3) Sharing information: sharing URLs to relevant resources enhanced by short comments; and (4) Reporting news: providing information on recent events [25]. Java et al. also report that the minority of participants can be distinguished between information seeker (only reading and lurking, without accounts of any active participation) and information source (only bringing information in, without reading) [25]. Compared with the research results of Java and his associates, our study—the types of reality shows, kiosks, and propaganda vehicles—contains their four categories. In addition, the type of mood bulletins cannot be found on previous researches. Plurk’s four types of technology sensemaking may not generalize to Twitter; however, the results of our study can make contributions for user behaviors on microblogging.

On the basis of the grounded theory and content analysis of Plurk user data, this study finds that users add reality show and mood bulletin updates on Plurk for personal needs, and these updates resulted from the characteristics of Plurk: posts are non-simultaneous, have multiple subjects, consist of messages comprising few words, and are public. In contrast with instant messaging (IM), Plurk updates are not instantaneous, and are based upon one-to-many communications, which reduces the receivers’ pressure to respond. With the character limitation, message sending becomes easier, and public posting allows the simultaneous interactions of many people. These are the critical factors enhancing interpersonal relationships, thus, most participants positively treat Plurk as a tool to enhance such relationships.

In addition, with an increasing number of users, an effect of network externality is manifesting gradually. Users can select personalized messages from numerous information posts (this is the kiosk form of sensemaking). Since users can subscribe to Plurk, they can select and include the information they personally receive, from public affairs (e.g., news) to private matters (e.g., friends’ situations). Moreover, when users think that their messages could influence others (this is the propaganda vehicle form of sensemaking), they could choose to deliver information on Plurk in a manner that would result in a word-of-mouth effect. For instance, during the August 8 floods, “Morakot on Plurk” saw its messages spreading through Plurk at an amazing speed.

One person can exhibit various and simultaneous types of sensemaking, and Plurk offers a new platform for integration. As the example data from this study shows, users can discuss private affairs and public issues with friends on Plurk, which integrates public and private information. Users can also send messages as well as learn information from other messages. Users can abandon older Internet tools and turn to new instruments. We found that some users reduce their use
of IM and blogs, since microblogging integrates the privacy of the former and publicity of the latter; however, Plurk does not generate “formal, structural, and worthy” information. When users consider an article worthy to retain, they will still publish the article in a blog. Therefore, although integration can change users’ behaviors, users still decide on their preferred use of technology, in accordance with their own personal technology sensemaking.

This study has some limitations. First, the study is limited to the types of user technology sensemaking regarding Plurk, and generalizes four types of technology sensemaking on the basis of grounded theory; however, according to technology sensemaking theory, overall technological adaptation processes include three stages: an initial adoption stage, a transitional adoption stage, and a post-adoption stage [12]. Users in the transitional adoption stage are more sensitive to different technological capabilities to develop various applications. Therefore, the four types of technology sensemaking indicated by this study can only represent sensemaking in the present stage, and it is uncertain if users in one stage would have new sensemaking responses that generate innovative user behaviors.

Can the four types of technology sensemaking on Plurk be expanded to other kinds of microblogging platforms such as Twitter? This is the second limitation of this study, as there are different functions in different kinds of microblogging. Because the different functions result in users’ different technology sensemaking endeavors, users would have different usage behaviors. Thus, whether the findings of this study can be expanded to other kinds of microblogging is worthy of further discussion.

6. Conclusions and future research

“Technology originates from humanity” is a well-known advertising slogan. However, it implies the essence of technology sensemaking. When technology design meets human needs and users generate sensemaking efforts toward that technology, users will construct their personal use behaviors on the basis of that sensemaking. Once users are senseless to technology, technology will no longer be valuable. Through the perspective of technology sensemaking, this study demonstrates how users develop meanings for Plurk use and how these meanings influence users’ Plurk usage.

This study suggests two directions for future research. First, this study does not probe into user functions or interfaces of Plurk. Why is Plurk so popular in Taiwan? Is it because Plurk’s functions and interface design are well adapted to the user behaviors of the Taiwanese? Are there other factors? Future researchers can investigate these aspects.

Second, this is a cross-section study (participants are those with Karma greater than 60, and content analysis is based on September 2009). Future studies could probe into users’ changes in technology sensemaking, within the three stages of technology adoption processes—the initial adoption stage, the transitional adoption stage, and the post-adoption stage—through long-term tracking and observation.

7. References


[19] Lin, J.-Y., A research of user behavior of Plurk, a Microblogging service, with technology sensemaking perspective, unpublished master thesis, Department of Information Management, National Taiwan University, Taipei, 2009.


