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The Effect of Anonymity on Virtual Communities Usage - Facebook versus BBS

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Abstract

Social Network Services (SNS) have developed rapidly in recent years, making many virtual communities become insignificant. The traditional virtual communities of the past almost always allowed members to post their works or articles anonymously. However, SNS works differently, requiring members to register and login using their real names. In order to research the influence of anonymity on the willingness of a virtual community member to publish an article, this study is based on social influence factors. Furthermore, the motivational factor of "desire" is added into the model of goal-directed behavior (MGB) as are the "social influence factor" and the intermediary factor of "on-going willingness to publish an article" incorporated too. This study adopts the articles "Facebook community to represent non-anonymity" and the "PTT community to represent anonymity" as the research samples, to discuss the influence of anonymity on social influence factors, desire and the willingness to publish an article by community members with anonymity as a moderating variable.

The results show that anonymity has an obvious moderating effect on the desire to publish an article. Although the relationship between cause and effect is changed by anonymity, it does not influence the intention to continue posting articles. In other words, anonymity is not the key issue influencing members' decisions to post articles.

Keywords: Anonymity, social influence, desire, virtual community

1. Introduction

1.1 Background and Research Objectives

While innovations in virtual communities on the Internet are occurring regularly, in Taiwan, however, the BBS has been largely unaffected. Looking at Taiwan's largest BBS website "PTT" as an example, thousands of people visit the site at the same time every day. While the biggest feature of PTT is the same as other communities, a big difference is that people can post articles and responses anonymously. Because of this anonymity, the PTT community often has a lot of articles, and since the community is "people" oriented, there are many discussion boards for every pos-

sible interest to be found on PTT. The three most famous features of PTT are anonymity, first-hand information, and the number of articles; these are important factors that have promoted Taiwan's BBS boom.

In addition to BBS, the rapid development of global social network services (SNS) in recent years has also influenced Taiwan's virtual communities. SNS is the most popular Web 2.0 product after blogging and Wikipedia. Community members can conduct real-time interaction, share photos and communicate with each other. These core values of SNS are rapidly developing on the Internet. Facebook is the world's most representative SNS, which itself has a very important feature, the "real-name system", which means that members must apply for the account using their

real names and friends on the web are mutually aware of each other's identities. Since Facebook requires members to use their real names, the more information a member discloses, the more the members see their virtual identity as their real "self", making interaction among members easier.

Although more traditional anonymous settings allow community members to actively express their views and discuss them with others, Facebook's rapid development and its real-name system has left other community sites feeling relatively confused. In order to understand whether anonymity affects virtual community members' posting intentions, this study has adopted two hypothetical situations representing anonymous and not anonymous: "PTT" and "Facebook," respectively, as research objects.

In the past, Perugini and Bagozzi (2001) explained that the behavior of people is not only affected by "intention", but also by "motivation". The present study also used the Model of Goal-directed Behavior (MGB) developed by Perugini and Bagozzi (2001) to determine whether the "posting motivation" of community members is likely to affect their "continuous posting intentions". This study also wanted to understand the influence of social factors on the posting intention of community members within situational changes, with the influence of social factors on posting motivation as the basis, and the different contextual factors (anonymous and non-anonymous) as moderator variables. Therefore, this study used "anonymity" as the operating situation and aims to answer the following questions:

1. Does "anonymity" affect the virtual community members' motives and intentions to publish articles?
2. What are the different social impact types on the community as experienced by members?

2. Literature Review

2.1 MGB Related Research

The Model of Goal-directed Behavior (MGB) proposed by Perugini and Bagozzi in 2001 is based on the Theory of Planned Behavior (TPB) by Ajzen (1985). Thus, a thorough understanding of the concept of TPB is required before furthering our knowledge of MGB. Ajzen officially raised the framework for TPB in 1991 to explain how humans systematically collate information affecting their personality before deciding on their actions and behavior, with their intentions being the best way to predict their behavior. Therefore, one's "behavior" is mainly influenced by "intention", and the said "intention" is influenced by one's "attitude", "subjective norm", and "perceived behavioral control".

Bagozzi and Dholakia (2002) applied social influence theory and personal factors to explore the intentions of people joining a virtual community. Dholakia, Bagozzi and Pearo (2004) further incorporated two key factors of social influence theory into the MGB, namely group norms and social identity, in order to understand the reasons why members participate in a virtual community. Carrus, Passafaro and Bonnes (2008) used the MGB Model to predict the intentions of people using public transportation to commute to work instead of the family car. Lee, Song, Bendle, Kim and Han (2011) used the MGB Model to explain the influence of non-pharmaceutical interventions (NPI) on the travelling intentions of international tourists during the H1N1 flu outbreak. Past studies have pointed out that "social influence theory" has affected the intentions of members to join and continuously participate in virtual communities. A virtual community is different from an information system executed independently by a single individual in that its establishment, development, and maintenance depend on common use by many people (groups) for its continuous existence. Compared to the traditional attitude theory framework that holds the

I-Intention opinion and adopts new skills only by relying on personal factors (attitude or social pressure), engaging in discussion/exploration by accepting and adopting collaborative skills through the method of We-Intention is better. Therefore,

this study has decided to exclude individual factors and only discusses the influence of social influence theory on desire and intention. A schematic representation of MGB is shown in Figure 1.

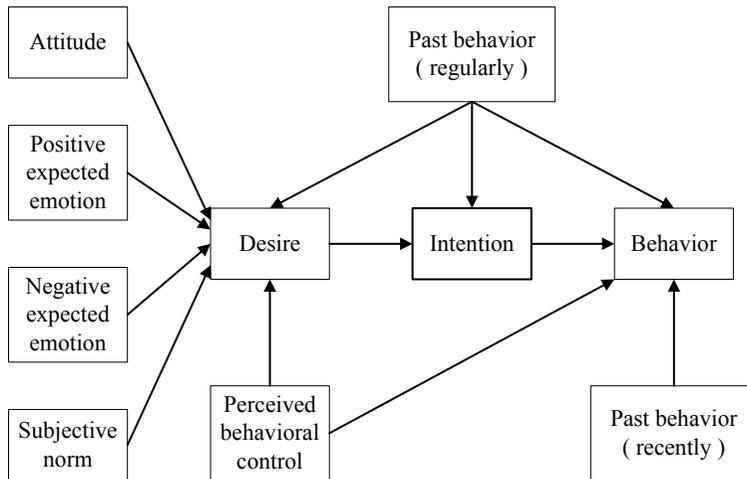


Figure 1: Model of Goal-directed Behavior (MGB)
Data Source: Perugini and Bagozzi (2001)

2.2 Social Influence

Social influence refers to the influence that some external factors have on behavior, with the exception of personal factors; such external factors may include peer pressure, group norms, community cohesion, community classification, etc., and are likely to have a significant influence on an individual's decisions. Furthermore, social influence consists of the degree to which people are influenced by social interactions (Rice et al., 1990). Past researchers of social influence have said that compliance, acknowledgment, and internalization cause the individual behavior models of persuading another or accepting another's opinions (Kelman, 1961). After an individual forms a cognitive critical mass, they will influence the trends of which system is used because the critical masses are simultaneously affected by the social influence factors of both informational and normative influences (Lou et al., 2000).

Venkatesh's (2003) studies have shown that the perspective of social influence has a positive relationship with behavioral intention. The social influence of external factors on individual behavior can be categorized into informational influence and normative influence (Venkatesh, 2003). Informational influence means that a user believes that the information offered by other people or groups is reliable and is willing to accept this information as true. Normative influence means that a user complies with the expectations of other people or groups in order to acquire the acknowledgment of others. In the TPB model, the subjective norms are the social factors used to explain the intention and behavior predictors. Ajzen (1985) believed that certain types of social pressure would cause people to change their intentions and behavior. Furthermore, Wellman & Wortley (1990) explained that strong community ties were a very important factor for knowledge sharing. Some studies have supported the concept finding that social

identity encourages members to make a contribution to and participate in the community to which they belong (Dholakia, Bagozzi, & Pearo, 2004). Therefore, this study used the social influence research of past scholars to understand which factors affect the posting intentions of members in a virtual community.

Bagozzi and Dholakia (2002) also based their research on the MGB Model, including three social factors that affect members' participation in the virtual community, that is, "group norms", "subjective norms" and "social identity". Bagozzi and Dholakia (2002) explained that social identity had the greatest influence on the desire to participate. In addition to social identity, the authors concluded that subjective norms as a social factor should have a certain influence on this research purpose. Bock, Zmud, Kim and Lee (2005) considered that subjective norms had a positive effect on knowledge sharing. Although the TPB model used subjective norms as the social influence factor, many previous studies had pointed at a redefinition of the "norms", including the "descriptive norms", to increase the explanatory power of norms. In addition to "social identity", "subjective norms" and "descriptive norms", the study also included a fourth social influence factor, "social interaction ties". The authors believed that the interaction between members of the virtual community increased or the members retained a close relationship with each other, thus enhancing the posting motivation of the community members.

The social interaction tie is a structural dimension developed from the social capital theory, which refers to the personal or social relation network. In addition to being the main resource in the network, it strongly influences the occurrence of knowledge sharing behavior between people (Nahapiet & Ghoshal, 1998). They also defined social capital theory as consisting of the following three dimensions:

1. Structural dimension: the connection of each behavior in one's overall environment
2. Relational dimension: relationships produced by the interaction between people
3. Cognitive dimension: manifestation patterns of acts of resource sharing

The social interaction tie falls within the structural dimensions of the social capital theory and refers to the strength, depth, and width of the connection of each member to their respective environment.

2.3 Anonymity

Anonymity refers to individuals doing something without using their real name or letting others know who they are; in other words, individuals can perform certain tasks without revealing their true identities (Nissenbaum, 1999). This is one of the principal differences between virtual communities and real communities. Most members of a virtual community are nameless and are free to conduct various activities anonymously, such as posting, responding, online trading, playing games, etc. The anonymous features allow members of the virtual community to deal with matters without others knowing their true identities.

Some researchers also believe that if meetings implemented an anonymous system, group members would speak more actively and express their views more freely. Since, in such a situation, the members could not see each other and would not know each others' true identities, the pressure of group consistency would be reduced (Nunamaker, Dennis, Valacich, Vogel, & George, 1991). However, in the virtual community, identities are separate from real world identities. In other words, members are able to create a different role and use this role to do something that they would usually not dare to do or are unable to do if they had to use their real name. Most online forums now use anonymity in order to allow members to discuss each other and speak on a highly free platform.

Because online forums need more members to provide more knowledge on the platform, anonymity may allow members to have more opportunities to discuss topics with each other on the forum itself.

Grijpink and Prins (2001) divided anonymity into three categories: whether the self-imposed pseudonym had, in any way, to create a personal identity; whether the pseudonym was allocated by a third party organization; or whether the personal identity was verified by a third party organization. However, this study focused on the posting intention of members on Facebook and PTT, using Facebook as the same name object and PTT as the different name object. Although Facebook claims to be a real-name platform, the majority of members do not use their real name on the platform. Nevertheless, community friends are familiar with each other. However, in the PTT community, members do not know the true identity of other members. Chesney and Su (2010) conducted an anonymous blog and blogger-related study and found that, anonymous or not, the credibility of the blogs and the bloggers showed no significant differences. Valkenburg, Peter and Schouten (2006) explained that young people in an anonymous network environment are less concerned about their appearance, and the anonymous system helps young people to disclose personal information on the network.

3. Methods

3.1 Research Framework and Hypotheses

This study was in response to Facebook's recent real-name system investigation of whether the anonymous system would have an impact on the posting inten-

tion of community members and aims to understand whether or not the system would change, increase or decrease the posting intentions of community members, with social factors as the moderating variables. In addition to the above factors, the author also references the MGB Model, stating "desire" as the behavioral intention antecedent for understanding the posting motivation of community users. Regarding operational anonymity, this study used the Facebook community to represent non-anonymity and the PTT community to represent anonymity so as to explain the relationships between the social factors, desire and posting intentions in the two different situations.

This study's hypothesis considers the entire virtual community as the research mainline and anonymity as the moderator variable in order to compare the two representative communities of Facebook and PTT and to understand the influence of anonymity on the posting motivation and intention of community members.

This study utilized four social factors as the desire antecedents: social interaction ties, subjective norms, descriptive norms and social identity, to boost the personal potential motives, and included "anonymity" as the control variable in order to analyze the posting intention of users. Therefore, the purpose of this study was to explore, in different situations (anonymous and non-anonymous), whether these social influence factors would change members' posting motivations and intentions, that is, whether anonymity and non-anonymity are important influencing factors for members in the current virtual communities. This study, therefore proposed the following framework, as shown in Figure 2:

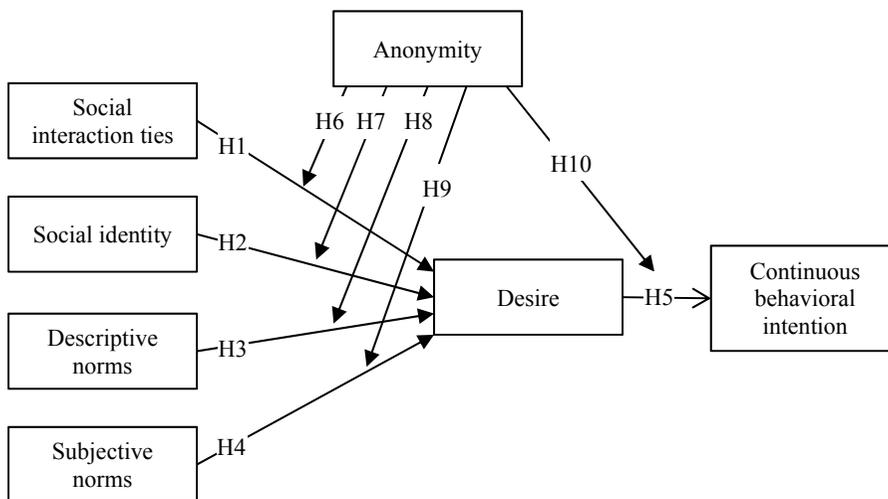


Figure 2: Framework of the Study

3.1.1 Social influence factors and desire

3.1.1.1 Social interaction ties

Nahapiet and Ghoshal (1998) suggested that social interaction ties linked two points through constant interaction, so the higher the social interaction ties, the higher the degree of information-sharing. Granovetter (1973) suggested that the strength of this relationship could be used to display the members' time spent, emotional consistency, closeness and reciprocal services during the social interaction. By referring to Chiu's (2006) and other scholars' definitions of social interaction ties and the above results, this study defined social interaction ties in the community as, "the strength of a relationship between community members, the time spent on communication with each other, and the number of communications." Tsai and Ghoshal (1998) also believe that stronger social interaction ties between members could promote the exchange and combination of resources. Other studies have also agreed that the high degree of the social interaction environment could encourage community members to acquire better knowledge-exchange behavior (Chiu, et al., 2006; Wellman & Wortley, 1990). Although the present study has taken "posting motivation and intention" as its research theme, the authors believe

that emotional communication also belongs among information-sharing and knowledge-exchange. The research conclusions thus reference previous literature regarding information-sharing and knowledge-exchange. Therefore, this study suggests that stronger social interaction ties provide members with a greater desire to post.

H1: The stronger the social interaction ties, the higher the posting desire motivation of community members.

3.1.1.2 Social identity

Social identity allows members to maintain a positive identity in the community and to have more motivation to participate in community activities. Based on past research, social identity was broadly categorized into members who have a sense of belonging to the community and community members who associate "social characteristics" with "self-concept". Nahapiet and Ghoshal (1998) also mentioned that social identity involved a process through which individuals identified themselves and other members or groups as belonging to the same group. Based on the historical definition of social identity, the author of this study defined social identity as "individuals with a sense of belonging to virtual communities and a positive feeling

regarding the virtual community.” By using the MGB Model to explore the factors affecting community members involved in the community, Bagozzi and Dholakia (2002) also believed that social identity was an important factor. Nahapiet and Ghoshal (1998) stated that social identity was a motive for promoting the exchange of knowledge among members. Chiu et al. (2006) suggested that the stronger the community identity was, the more knowledge-sharing behavior occurred. This study’s aim was to explore whether social factors affect the continuous posting intention of community members, and, because the virtual community has different kinds of members, the authors concluded that community members could find like-minded companions or interested community groups within this community. Therefore, they would post more, thus creating a sense of belonging, as well as positive feelings toward the community. Moreover, posting was also a way to participate in community activities and share information among members. Therefore, this study concluded that the greater the social identity, the higher the posting motivation of community members.

H2: The higher the social identity, the higher the posting desire motivation of community members.

3.1.1.3 Subjective norms and descriptive norms

Descriptive norms refer to individuals observing whether the people around them participate in a particular behavior and how these people or groups do it. Ravis and Sheeran (2003) also believe that the TPB model can include descriptive norms as social factors. Although the MGB Model does not include descriptive norms as an antecedent, Fishbein and Yzer (2003) indicated that the model should have included both imperative norms and descriptive norms in order to increase the explanatory power of the norms. However, imperative norms do not exist in the community. Therefore, this study defined the descriptive norm as when people observe others in

the community who are important to them, and these people are doing something, they will think that they ought to do the same. Therefore, according to past studies on descriptive norms, the study included them to increase the power of norms to explain community members’ posting habits.

Based on the above discussion, this study deduced the following hypothesis:

H3: The higher the descriptive norms, the higher the posting desire motivation of community members.

Subjective norms refer to the perceived social pressure of individuals developing certain behavioral intentions. The higher the social pressure support or agreement, the higher the behavioral intention (Ajzen, 1985). According to the antecedents of the MGB Model, Perugini and Bagozzi (2001) suggested that the agreement or support of the people close to us was another factor affecting motivation. This study used the motivation factor of the MGB Model to better understand the antecedents of the posting intention of community members and concluded that, when the community members adapted certain behavior, the higher the perceived social pressure, the higher the posting motivation.

Based on the above discussion, this study deduced the following hypothesis:

H4: The higher the subjective norms, the higher the posting desire motivation of community members.

3.1.2 Desire and continuous behavioral intention

Based on the MGB Model of Perugini and Bagozzi (2001), desire provided the most direct motivation for behavioral intentions and was an important motivational factor in the decision-making process. Bagozzi and Dholakia (2002) also used desire as the mediator of the social influence factor and intention to explain why people joined virtual communities. Dholakia, Bagozzi and Pearo (2004) also explored why virtual community members initially join a community and suggested that desire was

the important mediating factor affecting members and compelling them to join.

Studies in the past have suggested that intention and desire were two different levels of feeling. Desire involved personal motivational factors, that is, people had a strong desire to do something, but did not have any plans or planned actions; Intention involves a strong personal purpose, that is, people already had the planned intention or at least the definite idea to want to do something.

To better distinguish between intention and desire, the present study defined intention as planned or continuous, that is, the continuous posting intention of a community member; desire was defined as when members want to do something due to a certain motivation.

Therefore, community members were assumed to already have some motivational factors before having continuous posting intention, that is, people wanted other community members to have a better understanding of them through their posted articles and then had a continuous posting intention. Therefore, this study suggests that a higher motivation would have a higher influence on continuous posting intention.

Based on the above discussion, this study developed the following hypothesis:

H5: The higher the posting desire motivation of community members, the higher the continuous posting intention will be

3.1.3 Anonymity and social influence factors

The authors of this study used the anonymity definition of Jane Hanson (1998) to distinguish the virtual community. Whether anonymous or not, in this study it was defined as “different name” and “real name”. The different name refers to community members who use another identity in the virtual world, so that other community members do not know their true identities. The real name refers to a community member who will use their real identity in the virtual world, but only their community

of friends will know it. The study considered the entire virtual community as its research subject and anonymity as the moderating variable to compare the two representative communities of “Facebook” (real-name) and “PTT” (different name) in order to understand the influence of anonymity on the posting motivation and intention of community members.

Nissenbaum (1999) defined anonymity as “people being able to do something without disclosing their personal identity”. Many experimental studies have shown that anonymity changes the intention of “social influence” (Postmes, Spears, Sakhel, & De Groot, 2001; Postmes, Spears, Lee, & Novak, 2005). Nunamaker et al. (1991) suggested that anonymity reduces the pressure caused by group consistency, so members would be able to speak more freely. Zhang Xiuhua, Zeng Hualien and Zhouhui Wen (2007) also indicated that, whether introverted or extroverted members, anonymity would make it easier for all users to express their opinions. In other words, anonymity enhanced posting intention. Therefore, based on the conclusions of previous research, anonymity would mediate social influence and posting intention would be changed by whether an anonymous system was adopted or not. Therefore, this study determined the following hypothesis:

H6: Anonymity will affect the overall research model of causality.

3.2 Operationalization of Research Variables

3.2.1 Social identity

This study used social identity as defined by Chen (2008) and the social identity scale modified by Chiu et al. (2006). Chiu et al. (2006) suggested that social identity referred to a sense of belonging and the subsequent positive feeling of the individuals towards the virtual community. Chen (2008) explored the knowledge-sharing behavior of the Fashion Guide virtual community, while Chiu et al. (2006) explored the knowledge-sharing

behavior of the BlueShop virtual community. This study references the questionnaire scales developed by the two aforementioned studies and adapted the scales based on the two different situations of this study.

3.2.2 Subjective norms

This study references the definition of subjective norms by Ajzen (2002) and Yang (2006); Yang (2006) defined subjective norms as “Members felt that some people within the group were important to themselves, and that these people thought that they should share knowledge.” Therefore, this study referenced the questionnaire scale developed by Yang (2006) and adapted the scales to the situations of this study.

3.2.3 Descriptive norms

Descriptive norms refer to individuals observing whether the people around them participate in a particular behavior and how these people or groups do so. This study references the questions of the descriptive norms developed by Yang (2006) and adapts them to meet the situations of this study.

3.2.4 Social interaction ties

In this study, social interaction ties are defined as the interactive relationship between community members and its intensity. This item further used social interaction ties as defined by Chiu et al. (2006) and Chen (2008), as “the relationship strength between virtual community members, the time spent communicating with each other and the communication frequency.” Therefore, the operationalization was based on Chen (2008) for the design of the questions related to social interaction ties.

3.2.5 Desire

Perugini and Bagozzi (2001) defined desire as individuals’ motivation before creating a behavioral intention, and determined that this was the key condition influencing policymakers’ behavioral intentions. This study defines desire as the fol-

lowing: “the posting motivation of the virtual community members to let other members have a better understanding of themselves”. Therefore, the operationalization was based on the desire questionnaire of Perugini and Bagozzi (2001).

3.2.6 Continuous posting intention

According to Perugini and Bagozzi (2001), intention meant that the individuals had a planned idea before doing something, and would have a series of continuous behavior during the predetermined period. Meanwhile, desire meant that the individuals had strong motivation without any planned ideas before doing something. This study defines “continuous behavioral intentions” as the intention of members to continue to post articles.

Therefore, the operationalization was based on the scales of Chen (2007) and Zhang, Fang, Wei, and Chen (2010). Zhang et al. (2010) explored the knowledge-sharing intention of the virtual community with an objective similar to that of this study.

3.3 Questionnaire Design and Sample

This study’s questionnaire used questions from past research with good reliability and validity and determined the most appropriate questions based on the virtual communities’ (Facebook and PTT) situations and operationalization constructs. Every item has been discussed and adapted by a group consisting of one professor from an information technology institute, five doctoral students from an information technology institute, and three postgraduates. All these questions were measured using a seven-point Likert scale. This study’s aim was to explore whether anonymity would have a moderating effect on the influence of social factors regarding the posting intention of community members, with the virtual community as the study object and anonymity as the moderating variable. Therefore, this study chose Facebook as the non-anonymous (real name) virtual community object and Taiwan’s largest BBS website, PTT, as the anony-

mous (different name) virtual community object.

4. Data Analysis

4.1 Sample Basic Data Analysis

The questionnaire for this study was distributed from March 12 to April 3, 2011, a period of 23 days. This study adopted the convenience sampling method with two main sample sources: Facebook and PTT. A total of 785 valid questionnaires were returned, and the following texts conduct a narrative statistical analysis of the valid samples and discuss the two communities, respectively.

In the valid samples, regarding gender, the ratio of males (49.29%) was slightly lower than the ratio of females (50.7%). Regarding occupation, most subjects were students (63.44%) and office workers (22.93%), the total population of those two groups accounted for more than 80% of the total sample. Regarding academic qualification, most participants had university degrees (69.17%), followed by institute qualifications (25.86%); the university degree ratio for PTT was higher than for Facebook (73%:62%), while the institute qualification ratio of PTT was lower than Facebook (20%:36%). The daily time spent on the forums was mainly 1 to 2 hours at most (34.52%), followed by 2 to 4 hours (27.39%); a single login time on the forums was mainly for 10 to 20 minutes at most (25.6%), followed by 5 to 10 minutes (21.4%). Finally, most of the members rarely posted articles on the forums (50.32%); more than half of the Facebook members would post articles at least once every one or two days (53%), while the PTT members scarcely posted articles at all (66%).

In addition to demographics, the questionnaire also included the following community question: "Most of my friends know my true identity," to determine the two varieties of community hypothesis: real name and different name. The results were generally in line with the proposed expectations (Table 1).

Table 1: The Statistical Analysis of the Members' Representative Identities in the Community

Hypothesis	PTT	Facebook
Know my identity	33	292
Do not know my identity	493	16

4.2 Questionnaire Reliability and Validity Testing

This study used Cronbach's α and composite reliability (CR) to ensure the accuracy of the measurements. With regards to validity, this study used both convergent validity and discriminant validity. The measurement methods of convergent validity were factor loadings and average variance extracted (AVE); the greater the AVE, the smaller the relative measurement error. The judgement criterion of the discriminant validity was the square root of the construct AVE, which was greater than the correlation coefficients between constructs.

4.2.1 Reliability analysis

Reliability refers to the consistency or stability between the measurements, meaning that the scores for the same questionnaire among the same group must be consistent. Reliability is usually measured by Cronbach's α , composite reliability (CR) and the average variance extracted (AVE). Table 2 below lists the reliability measurement scores of the various constructs used in this study.

Table 2: Cronbach's α ; CR values; AVE and Testing Results of Various Constructs

Constructs	Cronbach's α	CR	AVE
Social interaction ties	0.937	0.955	0.841
Social identity	0.855	0.897	0.636
Descriptive norms	0.905	0.892	0.805
Subjective norms	0.758	0.955	0.931
Desire	0.880	0.926	0.807
Continuous intentions	0.912	0.939	0.796

Source: This Study

4.2.2 Validity analysis

This study used confirmatory factor analysis (CFA) to determine the convergent validity, and the results showed that the factor loadings of all variables were greater than 0.5, proving that the factor loadings of the questions were not too low, so this study did not have to remove any questions.

Consequently, the questionnaire had good convergent validity. Table 3 shows that the square roots of all the constructs' AVEs were greater than the correlation coefficients between constructs. Therefore, the questionnaire had good discriminant validity.

Table 3: Correlation Coefficient Matrix of Different Constructs

Constructs	SIT	SI	DN	SN	DE	INS
SIT	(0.9171)					
SI	0.5534	(0.7975)				
DN	0.7244	0.5450	(0.8972)			
SN	0.7359	0.5714	0.7169	(0.9649)		
DE	0.3863	0.5243	0.3985	0.4171	(0.8983)	
INS	0.4103	0.5392	0.4183	0.4137	0.7297	(0.8922)

4.3 Results

4.3.1 Goodness of fit test of the overall model

This study used LISREL 8.7, maximum likelihood estimation (MLE) and structural equation modeling (SEM) to obtain the parameter estimations. Table 4

shows that the results for this study are CFI = 0.98, NFI = 0.98, NNFI = 0.97, GFI = 0.89, and AGFI = 0.84. These values are in line with the recommended standard values from previous literature. Therefore, the theoretical model of this study has a considerable goodness of fit.

Table 4: The Goodness of Fit Indicator of the Overall Model

Indicator	Measurement values	Recommended values	Sources of recommended values
CFI	0.98	> 0.9	Bentler (1986)
NFI	0.98	> 0.9	Hair et al. (1998)
NNFI	0.97	> 0.9	Hair et al. (1998)
GFI	0.89	> 0.8	Browne & Cudeck (1993)
AGFI	0.84	> 0.8	Hu & Bentler (1999)

Source: This Study

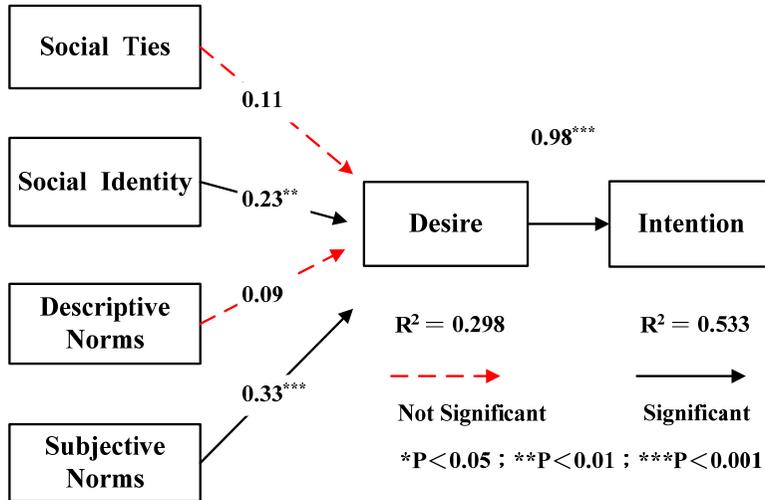


Figure 3: The Complete Standardized Structural Equation Modeling Results of all the Samples (PTT and FB)
 Source: This Study

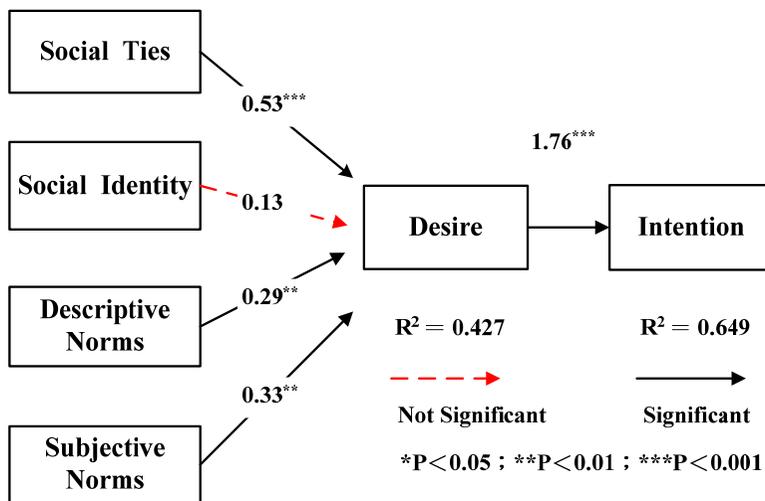


Figure 4: The Complete Standardized Structural Equation Modeling Results of Facebook Samples
 Source: This Study

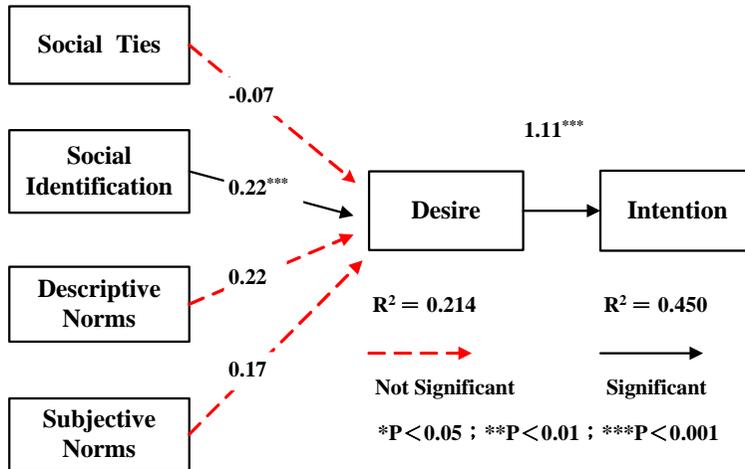


Figure 5: The Complete Standardized Structural Equation Modeling Results of PTT Samples
Source: This Study

4.4 Brief Summary

Using the virtual community as its basis, this study compared the two representative communities of Facebook and PTT to explore the influence of anonymity on posting desire and continuous posting

intention. According to the above tests and analyses, the goodness of fit in this study was within the acceptable range, and all hypotheses had a significant influence, with the exception of H2 and H6 (Table 5).

Table 5: Hypothesis Test Results

Hypothesis	Description	Supported or not
H1	The stronger the social interaction ties, the higher the posting desire motivation of community members.	Not Supported
H2	The higher the social identity, the higher the posting desire motivation of community members.	Supported
H3	The higher the descriptive norms, the higher the posting desire motivation of community members.	Not Supported
H4	The higher the subjective norms, the higher the posting desire motivation of community members.	Supported
H5	The higher the posting desire motivation of community members, the higher the continuous posting intention.	Supported
H6	Anonymity has a moderating effect on the relationship between social interaction ties and posting desire.	Supported

Source: This Study

5. Conclusions and Recommendations

5.1 Results and Discussions

5.1.1 Overall virtual community

The results have determined that social identity and subjective norms of the social influence factors affect the posting desire motivation of members, showing that subjective norms and social identity

have a positive influence on posting desire motivation. This is consistent with the research of both Bagozzi and Dholakia (2002) and Perugini and Bagozzi (2001), who suggested that a sense of belonging and the importance of people’s support would positively encourage members of the virtual community to post articles.

The posting desire motivation was found to influence continuous posting intention, which was consistent with the ma-

majority of previous studies that used the MGB research model (Bagozzi & Dholakia, 2002; Dholakia et al., 2004; Carrus et al., 2008; Lee et al., 2011). In other words, the higher the posting desire motivation, the higher the continuous posting intention.

In this study, social interaction ties and descriptive norms were not supported. Social interaction ties were defined as “the relationship strength between virtual community members, the time spent communicating with each other and the communication frequency”, and descriptive norms were defined as “individuals observing whether the people around them participate with a particular behavior and how these people do so”. These definitions were not supported by the entire virtual community in this study, and the authors have speculated that these results might be due to the two different virtual communities and the different sample size obtained by this study. Consequently, the following texts first explore the moderating effect of anonymity on the research model and then discuss the two different communities individually.

5.1.2 The moderating effect of anonymity

This study uses two different virtual communities to explore the effects of anonymity. Hypothesis H6 proposed in this study had significant support, showing that anonymity can mediate the influence of the four social influence factors of social interaction ties, social identity, descriptive norms and subjective norms, on posting desire. In other words, whether the community is anonymous or not affects the influence of social factors on the posting desire motivation of members of the virtual community. This result is consistent with the results of many past studies related to anonymity, which have indicated that anonymity had a moderating effect on the strength of social influence factors (Postmes et al., 2001; Postmes et al., 2005).

This study also explains that anonymity does not affect the relationship between posting desire and continuous posting intention, so hypothesis H10 was not signifi-

cantly supported. Based on this result, the authors speculated the following:

First, this study focused on the influence of anonymity on the members of virtual communities to post articles, but the results of the present study show that anonymity does not affect members' posting intentions. Although previous studies have shown that anonymous situations make people more willing to speak out, no such strengths were found in the virtual community. Regarding members' speaking or posting intentions, anonymity is no longer one of the major reasons members join a community or participate in community activities. Therefore, this study has reasoned that anonymity does not receive sufficient attention in today's virtual community, and thus does not have a considerable moderating effect.

Second, this study chose two different kinds of communities rather than a single kind, and the members of the two different communities might have diverse community perceptions. For example, Facebook is a virtual community dominated by a social network, in which community members want to pursue links between friends and family members or express their opinions on a community platform. In other words, for this kind of SNS platform, the majority of the community members participate in most of the activities for the purpose of achieving “emotional communication”, such as posting articles, replying to articles, expressing support, playing games, and so on. On the other hand, regarding PTT, this kind of BBS community has members that mostly want to search for information or knowledge on the platform, in other words, this type of platform is a tool. These types of BBS communities are based on group billboards or common purpose billboards; for example, e-shopping focuses on online shopping, so members do not express personal feelings on the integrated platform. However, because of the anonymous system, they are willing to post first-hand information, or initiate group activities on the platform. The members of this platform

participate in activities for the purpose of information exchange. Consequently, this platform is not the same as those of the SNS community, such as Facebook. Therefore, this study has concluded that anonymity has no significant moderating effect on posting desire or continuous posting intention.

5.1.3 Facebook

This study discussed the social influence factor on posting desire, but found no significant relationship between community identity and posting desire in the Facebook community. However, the other three social factors proposed in this study, social interaction ties, descriptive norms and subjective norms, had a significant effect on posting desire, which caused the author to conclude that:

First, as previously mentioned, the Facebook community is a SNS platform based on emotional communication, so the results showed that social interaction ties had a strong influence on posting intention. However, the Facebook community is not a "purposeful" community, meaning that the main reason members join the community is not because they have a common goal. Therefore, such communities may just be a platform for current community members to contact or communicate emotionally with each other. They leave posts, but not because they share a sense of identity with these types of community.

Second, most Facebook members use their real name in the community, moving their own identity in real life to the virtual world, so their role in the virtual world can clearly refer to who they really are. The most important people to some members, such as family members, friends or colleagues, might also appear in the same virtual community. Therefore, the norms between the community members have a more direct influence on posting desire.

In this study, posting desire also had a significant influence on continuous posting intention. The results indicate that the higher the posting desire motivation of the

Facebook community members, the higher the continuous posting intention.

5.1.4 PTT

Regarding the PTT community, only social identity significantly influenced posting desire. Therefore, when exploring the influence of social factors on posting desire, the author concluded that:

First, PTT is an anonymous community, where most members have a virtual identity and do not know the true identity of the other members. As discussed earlier, the main goal of members in such communities is to exchange information. Based on the two factors above, members have little interaction with other community members. In fact, most members appear only as virtual characters to the other members, even for important people who join the PTT. Therefore, this study concluded that, under the influence of anonymity, norms and social interaction ties did not significantly influence posting intention.

Second, the PTT samples of this study were collected from a number of famous PTT communities, where most members shared a common purpose when joining the community. For example, the reason the Elephants' members join the community is because they support the Elephants team. Therefore, regarding this kind of PTT community, most members have a sense of identity or a sense of belonging. These communities are not easy to replace in Taiwan because they have a lot of members, and members will quickly provide first-hand information to other members, thus creating the current BBS wave in Taiwan. Therefore, this study concluded that, because most samples had a common purpose, social identity significantly influenced posting desire.

5.2 Contributions

Much of the previous related literature studied a single community (Chesney & Su, 2010; Valkenburg et al., 2006) or the laboratory research method (Zhang Xiuhua, et al., 2007) to explore anonymity. Although most of the prior studies showed that

anonymous situations would cause members to produce different behavior in the virtual community, very few of these studies had compared two different communities. The author has indicated that the influence of the anonymous or non-anonymous system on the virtual community does not apply to the real world. Therefore, this study took two different kinds of communities to explore whether anonymity would affect the current virtual communities.

The results suggest that, although anonymity changes the social influence factors (social interaction ties, social identity, descriptive norms and subjective norms) regarding posting motivation, it did not have much influence on posting intention. Therefore, in addition to the mediating effect of anonymity, future research could explore the influence of a larger variety of factors on the posting intention of community members.

5.3 Managerial Implications

5.3.1 The importance of the anonymous or non-anonymous system on the virtual community

This study explains that, even if anonymity has a mediating effect on social influence factors and posting motivation, it did not significantly influence continuous posting intention. This result shows that the members of the virtual world are no longer concerned with whether their comments are anonymous or not in the virtual world, as well as the posting intentions of the community members. For example, with regards to the Facebook community, most friends know each other, so there is no anonymity in the community, and the members do not seem to prioritize anonymity as they did in previous virtual communities. Most previous virtual communities provided an anonymous system for members to discuss and post articles. However, the Facebook community is now flourishing with everyone using their real names. Along with the results of this study, community managers or founders can deter-

mine whether the anonymous or non-anonymous system is still an essential factor in the current virtual community environment.

5.3.2 Social influence focused on different kinds of virtual communities

This study suggests that social factors did not have the same influence on the two different kinds of virtual communities. With regards to the Facebook community, social identity did not have a positive influence on posting desire. However, the reverse is true with regards to the PTT community, as social identity had the greatest influence. Because Facebook focuses on emotional communication, while PTT is a platform on which members have the main objectives of common purpose and information exchange, the different types of member have different reasons for participating on the two platforms. According to the results of this study, community managers can focus on the varying social factors influencing the different communities. Taking Facebook as an example, the members emphasize interaction with each other, as well as norms (descriptive norms and subjective norms) between members, but they have no sense of belonging to this community. Therefore, if managers can provide better interactive ways and content for members or find a way to strengthen the norms between members, such as fostering more interaction while playing social network games, these factors will encourage members to post more articles in the community. However, regarding the PTT community, the members emphasize a sense of identity, focusing on the correctness and rapidity of information exchange in these communities. Therefore, more topics and information for members to query, browse, and comment on, etc. will have a better influence on the posting intentions of the community members.

5.4. Limitations and Suggestions for Future Research

5.4.1 Sample size difference

This study sampled members of two different types of virtual communities, with the sample size from Facebook being considerably smaller than the PTT due to the collection time and costs involved. Therefore, this study had different sample proportions regarding the two communities. Furthermore, only two communities were discussed, but there are many other active SNS communities on the current network besides Facebook. Based on the above reasons, the author has concluded that the samples of this study were not truly representative. Therefore, future researchers might address a larger variety of communities to explore and further compare the differences between them.

5.4.2 The bias of the sample sources

In collecting the PTT samples, this study used several different communities, such as e-shopping, BuyTogether, WOW, Elephants, and C_Chat. These included shopping, video games, ball games and animation. Adopting these different communities resulted in the final samples not being representative of the whole anonymous community. Therefore, future researchers might explore the same kind of community and compare the differences between the anonymous and non-anonymous versions.

5.4.3 Exploring other factors' moderating effects on the research model

This study explored the moderating effect of anonymity on the research model. Although the study results suggest that anonymity had no moderating effect on posting desire motivation and continuous posting intention, this study only explored the anonymity factor and not other influencing factors. In accordance with the study results, if anonymity did not influence the posting intention of members, future researchers might explore other factors as moderating variables in order to

determine the factors that do influence the posting intention of members so as to extend the subject.

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Transformational Leadership and Willingness to Knowledge-Share: A Multi-Level Study of Organizational Trust and Cultures

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Abstract

In the current global knowledge-based economy, knowledge is one of the best and most sustainable competitive advantages. Leaders, especially those involved in the management process, are key people. Research on knowledge management has shown that transformational leadership contributes to the communication in an organization, and also plays an important role regarding knowledge management. What is needed now is to know more about how transformational leadership impacts on the willingness of employees to share their knowledge. Studies on organizational behavior have also found that trust and organizational culture are key aspects of an organization's leadership and its influence on employees.

This study discusses the relationship between transformational leadership, trust, and organizational culture, and their impact on the willingness to share knowledge. Trust and organizational culture are taken as the mediating and moderating variables, with a multi-level theoretical framework, to see how they interact between transformational leadership and the willingness to knowledge-share. With a final total of 220 valid employee responses from 32 work-units, the results show that a supportive culture may mediate the relationship between work-unit-level, transformational leadership and trust; the willingness to take part in knowledge sharing is influenced by an individual's perception of transformational leadership. Additionally, the relationship is reinforced by a supportive culture and trust.

Keywords: Willingness to share knowledge, transformational leadership, organizational trust, organizational culture, multi-level study

1. Introduction

Politis (2001) explored the relationship between various leadership styles and knowledge management, and found that transformational leadership has a positive effect on the communication and coordination mechanisms of knowledge management, contributing to the practice of knowledge sharing. With regards to leadership affecting followers, several implicit organizational mechanisms, such as trust and organizational culture, are often mentioned and researched (Holste and Fields, 2010; Yukl, 2001; Pillai, Schriesheim, and

Williams, 1999). To make knowledge sharing happen, a culture that encourages sharing should be established (Koulopoulos and Frappaolo, 1999). Many studies have found that, in any organizational activity involving human interaction (including teamwork or knowledge sharing), the level of trust is a significant determinant for the interaction (Nonaka, Toyama, and Konno, 2000; Senge, 1997; Davenport and Prusak, 2000). Additionally, organizational culture is formed by the values, attitudes, and interaction of the organization's members. Studies by Bass and Avolio (1993) on the

influence that leaders have on followers' behavior suggested that organizational culture should be treated as an important factor. While researching organizational performance, Vashisth, Kumar and Chandra (2010) found that, in order to enhance their competitiveness, enterprises must not only rely on their leadership to achieve a positive effect, but also take into account the establishment of a learning organizational culture. However, even though there are many prior literatures on knowledge management, there is still a lack of research that contains empirical analysis with regard to the relationship between transformational leadership and knowledge sharing. In particular, there is a lack of studies that focus on leaders' transformation processes that influence both individual perception and the mechanism of the work-unit's interactive climate perspectives.

This study aims to extend transformational leadership and knowledge sharing research in several ways. First, the integration of leadership with relationship knowledge management is important as it extends the study boundaries of these two research paradigms. It offers a critical empirical test of the impact of transformational leadership on knowledge sharing, and provides a new perspective on knowledge management regarding what organizations can do from within the organization to enhance employees' willingness to knowledge-share. Second, this study examines how transformational leadership influences employees' willingness to take part in knowledge sharing by delineating the transformation effects that leaders may have, both on the individual employees' attitudes (at the micro level) and (at the macro level) on the work-unit's interactive climate (organizational trust and culture). Third, this study also proposes that positive organizational trust and culture will act as a situational moderator and further enhance the influence of transformational leadership on employees' willingness to undertake knowledge sharing.

2. Literature Review and Hypotheses

2.1 Willingness to Knowledge-share

Weiss (1999) argued that just because knowledge can be articulated it does not necessarily mean that it is available for use by other employees. Based on the possibility for sharing, Weiss further divided explicit knowledge into the categories of rationalized and embedded. Rational knowledge refers to general, context-independent, standardized, and public knowledge; embedded knowledge refers to knowledge that is context-dependent, has limited applicability, and is personal, and is perhaps only meaningful for certain individuals or professionals. Hence, embedded knowledge, such as advertising design copy, despite being explicit, is not easily shared or used within organizations.

Individual knowledge resides in one's inner mind, so the precondition of knowledge sharing is that knowledge owners are willing to articulate and share their inner knowledge through a communication process, thereby affecting the behavior of others (Dixon, 2002). As Puccinelli (1998) stated, in organizational knowledge management, the most important strategy that can be implemented is to foster employees' willingness to share and contribute to the knowledge base. In this sense, the level of an individual's willingness toward knowledge sharing is the key for organizational knowledge sharing to occur.

Past research with regard to the willingness to take part in knowledge sharing can be identified as three idea sequences: (1) Maslow's (1954) *Hierarchy of Needs Theory*, reported that the motivation for knowledge sharing mainly comes from higher level needs (Stott and Walker, 1995; Tampoe, 1993; Jones, 2002). (2) The *Two-factor Theory* by Herzberg (1966). Hendricks' study (1999) suggested that people tend to share knowledge due to motivational factors. When there is a motivational factor, if its incentive effect is increased, employees' knowledge sharing behavior will be influenced. However, re-

search by Tampoe (1993) on knowledge workers indicated that wealth is also an important motivation for knowledge sharing. Jones (2002) pointed out that in an organization with low levels of participation, salary and safety needs are the critical factors for employee knowledge sharing. Similarly, Bartol and Srivastava (2002) noted that an organizational reward system also plays an important role in encouraging knowledge sharing. However, these two theories only show that the willingness towards knowledge sharing comes from lower level needs and hygiene factors, such as salary and healthcare, neither of which is adequate for effectively interpreting the willingness to knowledge-share. (3) Unlike the application of the two theories above, Davenport and Prusak (2000) put forward the concept of a "knowledge market" based on the market economic principle of supply and demand; they describe the knowledge demander as "the buyer," the knowledge owner as "the seller," and the subject of the transaction as "knowledge". After researching the organizational knowledge market, the authors deduced that it may be impossible for individuals to share knowledge unless they are rewarded. The rewards are grouped into three types: (a) *reciprocal*: organization members believe that, in the future, they might ask for help from the receiver, so they are willing to share knowledge for the mutual benefit of all participants; (b) *reputation*: those possessing individual knowledge are willing to share that knowledge with others to create the image and prestige as "knowledgeable," hoping for a good reputation in the organization; (c) *altruism*: some knowledge providers' altruistic characters enables them to share knowledge with others without reservation, hoping for no reciprocity due to their inherent benevolence, overall consciousness, and love of sharing.

To summarise the above literature and research on knowledge and knowledge sharing, this study perceived that knowledge in an organizational environment is nebulous and closely linked to

those who hold it (Davenport, DeLong, and Beers, 1998). Furthermore, through knowledge owners and knowledge reconstructors, an organization's implicit knowledge is socialized, externalized, combined, and internalized in a never-ending cycle. Consequently, knowledge is shared and created continuously. The concept of the willingness to take part in knowledge sharing should include need, motivation, and reward. Therefore, the view of Davenport and Prusak (2000) was adopted here as the main frame of the study on the willingness to knowledge-share, defined as the goodwill of an individual who perceives the expected rewards of reciprocity, reputation, and altruism when sharing when sharing his own knowledge.

2.2 Transformational Leadership

Bass (1985) made a comparison between transactional leadership and transformational leadership, and drew the conclusion that transactional leadership focuses on exchanges, attaching much importance to contingency rewards and management-by-exception. Transformational leaders, on the other hand, attach more importance to charisma, encouragement, inspiration, and consideration, and try to transfer their personal beliefs and confidence to followers. They excel in enhancing followers' demand levels and encouraging willingness in their work in order to achieve organizational goals. Transformational leaders are characterized by four primary factors: (a) charisma, i.e., the leader maintains an image of self-efficacy and confidence to win over followers; (b) inspirational motivation, i.e., the leader provides followers with spiritual guidance and inspiration to promote their motivation for the pursuit of success; (c) intellectual stimulation, i.e., the leader uses their own knowledge to stimulate the followers' questioning awareness, and encourage their solving ability, imagination, or belief and values in order to arouse their innovation and breakthrough; and (d) individual consideration, i.e., the leader empowers their followers and provides them with learning

opportunities to help them to develop, while showing concern for them.

The original transformational leadership theories emphasized the leader's direct influence on individual followers, assuming that the same leader may display different behavior toward each follower, and that transformational leadership is an individualized perception (e.g., Bass, 1985; Burns, 1978). However, several previous transformational leadership theories have been accused of overemphasizing the dyadic process and ignoring the group process (Yukl, 2001). Consequently, some researchers have attempted to conceptualize transformational leadership as a group-level construct. They have discussed how transformational leadership behavior is directed at the whole group and results in a shared perception among followers. Therefore, transformational leadership, as a group-level construct, has been linked to group process variables and group performance (Bass, Avolio, Jung, and Berson, 2003; Schaubroeck, Lam, and Cha, 2007).

For example, Liao and Chuang's (2007) study proposed that transformational leadership may function both at the individual level and at the work-unit level. Individual-level transformational leadership refers to the leadership behavior experienced and perceived by an individual employee; it can be viewed as a type of "discretionary stimulus" that transmits to individual employees differentially. Work-unit level transformational leadership refers to the overall pattern of leadership behavior displayed to the entire work unit; it can be viewed as a type of "ambient stimulus" that pervades the work unit and is shared among unit members (Hackman, 1992). In this study, theoretical rationales regarding the effects on transformational leadership at different levels differ. Individual-level transformational leadership enhances employees' willingness to take part in knowledge sharing, although not entirely, through transformation of the attitudes of individual employees. Meanwhile, work-unit-level transformational leadership

enhances knowledge sharing partially by transforming the climate of the overall working environment.

2.3 Individual Level: Transformational Leadership and Willingness to Knowledge-share

Leadership can influence employees' knowledge sharing, and approval and engagement from high-level management will effectively enhance the willingness to share (Lord and Shondrick, 2011). According to Politis' (2001) study on the relationship of various leadership styles to knowledge management, the behavior of transformational leaders has a positive effect on the communication and coordination mechanisms of knowledge management that contributes to knowledge sharing. Additionally, Bryant (2003) has also reported that transformational leadership can improve employee creativity and innovation at an individual level.

El-Gonte (2005) has marked the structure of work as a crucial factor that stands in the way of knowledge transfer, especially when it is characteristically mechanistic, to the extent that it limits knowledge repositories within certain organizational domains. Furthermore, Ellerman, Denning, and Hanna (2001) espoused that attention should be drawn to how knowledge sharing can be better facilitated. However, the many thoughts drawn on knowledge sharing had not appeared to have considered what Teece (2000) referred to as "strategic management roles in terms of procedure or structures". Managerial roles, as implied in the knowledge management spectrum, must be viewed with high concern as they initiate the organizational climate that best encourages the willingness to share knowledge.

According to Yukl (2001), in an organizational climate of transformational leadership, organizational members can sense the trust and praise from the leader. In return, they respect the leader and perform beyond expectations. Transformational leaders have idealized and influenced admiration, respect, pride, and faith, and

tend to emphasize the importance of having a collective sense of the organization's mission (Bass and Riggio, 2012). When members feel that their leaders have confidence in them, trust in their capabilities, care about their work and appreciate their efforts to create knowledge, they will be more willing to offer their opinions and share knowledge (Lee, Gillespie, Mann, and Wearing, 2010). When they exhibit intellectual stimulation, transformational leaders generate different ways of thinking, challenge their followers' assumptions, and seek new solutions to problems from multiple perspectives. Transformational leaders who promote discussion, reviews, and the open sharing of ideas are more likely to encourage knowledge sharing activities (von Krogh, Nonaka, and Rechsteiner, 2012). Transformational leaders who also use individualized consideration are aware of their followers' needs and concerns as individuals, and will develop their strengths through coaching and consulting (Bass and Riggio, 2012). Shih, Chiang, and Chen (2012) have also found that transformational leaders who are aware of the unique knowledge of their members and who listen to their views are more likely to motivate them to share their knowledge with others. Therefore, this study proposes:

H1: Individual perceived transformational leadership has a positive effect on the willingness to knowledge-share.

2.4 Work-Unit-Level: Transforming the Work-Unit Climate

Harris (1984) identified organizational culture as: (a) a bureaucratic culture, which is usually a hierarchical organization, stressing control and rights, clear responsibilities and empowerment, and systematic and immobilized work; (b) a supportive culture, which is an open, harmonious and impersonal-relationship-oriented working environment with a safe and cooperative spirit; and (c) an innovative culture, which encourages creation and vitality so as to promote development in an intense and changing environment. From these three cultures, Creed and Miles (1996) have

found that an organization exhibiting high control, centralization, and formalization attaches too much importance to efficiency, thereby limiting or reducing the development of trustworthy behavior. However, without such trustworthy conditions, a bureaucratic culture is not necessarily a good organizational environment to improve knowledge sharing, as the employee providing the knowledge resides in his inner mind to others. Therefore, in this study, there is more focus on a supportive and innovative culture.

Leaders have the power to affect the intentions of employees to collect knowledge by developing a knowledge culture within their organization. Shih et al. (2012) showed that transformational leadership can increase research and development (R&D) workers' knowledge exchange behavior by creating a trusting climate. Furthermore, Bass and Avolio (1993) showed in their study that we are likely to see transformational leaders who build on assumptions, such as those who are trustworthy and purposeful, ensuring that everyone has a unique contribution to make, and so on, and that these are articulated to followers.

This is typically done to exhibit a sense of vision and purpose, and to foster a culture of high innovation and mutual help. With inspirational motivation and individualized considerations, transformational leaders can provide an open, harmonious and people-oriented working environment with a safe and cooperative spirit, thereby promoting a supportive culture in their work-unit. With their charisma and intellectual stimulation, transformational leaders may encourage creation and vitality so as to promote development, conducting an innovative culture in his work-unit.

On the other hand, trust can be defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Da-

vis, and Schoorman, 1995). Bhattacharya, Devinnery, and Pillutla (1998) define trust as the “expectancy of positive (or nonnegative) outcomes that one can receive based on the expected action of another party in an interaction characterized by uncertainty”. Building upon these definitions of trust, Shockley-Zalabak, Ellis, and Winograd (2000) establish *organizational trust* as the “expectations individuals have about networks of organizational relationships and behaviors”. Researchers have found that organizational trust, as an essential factor in promoting cooperation within organizations, leads to improved behavioral and performance outcomes (Dirks and Ferrin, 2001; Kramer, 1999).

A variety of different organizational cultures as managerial mechanisms may influence individuals’ interactional behavior, and further, their perceived organizational trust as a whole. An organization with low control, higher decentralization, and lower formalization, (a supportive culture) is likely to increase open communication and empowerment, and thus contribute to higher organizational trust (Creed and Miles, 1996). Additionally, certain management mechanisms, such as project-based organization and efficiency orientation (an innovative culture), encourage employee participation, empowerment and effective communication, thereby promoting the employees’ sense of belonging and encouraging them to learn and express opinions. This will increase their self-efficacy and trust towards the organization (Nyhan, 2000; Carnevale, 1998).

Thus, we expect organizational cultures (supportive and innovative cultures) to act as a mediator through which work-unit-level transformational leadership influences employees’ organizational trust. Therefore, this study proposes:

H2-1: A supportive culture is the mediator between transformational leadership and organizational trust.

H2-2: An innovative culture is the mediator between transformational leadership and organizational trust.

2.5 Work-Unit-Level Moderator: Organizational Culture

Academics have stated that, at an individual level, the individual perception of organizational culture plays a role in the collective mechanism regarding the relationship between perceived leadership and followers’ behavior, as a situational enhancer (Howell, Dorfman, and Kerr, 1986). Accordingly, culture is a set of values and beliefs expressed by the leader in order to guide the organization, which can be converted into appropriate behavior once interpreted by organizational members, and can be strengthened by reward and punishment (Holste and Fields, 2010). Ott (1989) conducted a survey of past research and concluded the consensus of organizational culture: organizational culture is a social construct and an “objective” reality; it is unique, and provides a view on the understanding of literature and symbols, and is a powerful guide for organizational members.

Lok and Crawford (2004) have found empirically that various organizational cultures have a different effect on organizational commitment. In their results, supportive and innovative cultures provide an impersonal-relationship-oriented working environment, which reinforces an employee’s commitment. With better commitment, employees tend to pay more attention to what leaders say and do when addressing specific goals, such as knowledge management performance, and are thus more willing to share their own knowledge. Therefore, this study proposes:

H3-1: A supportive culture reinforces the influence of an individual’s perceived transformational leadership regarding the willingness to knowledge-share.

H3-2: An innovative culture reinforces the influence of an individual’s perceived transformational leadership regarding the willingness to knowledge-share.

2.6 Work-Unit-Level Moderator: Organizational Trust

It has been found that, in the case of transformational leadership, organizational

members are able to feel the leader's trust and praise in the organizational atmosphere. In return, they show their respect for the leader, are more efficient, and work beyond expectations (Yukl, 2001). A number of studies have supported the same idea (Ben-nis and Nanus, 1985; Podsakoff, MacKen-zie, Moorman, and Fetter, 1990).

Knowledge can be shared on the condi-tion that people trust each other (Senge, 1997). To make it possible for organiza-tional members to share their implicit knowledge, there should be strong concern, trust, and commitment among organiza-tional members, as trust is one of the major factors that support knowledge sharing (Nonaka et al., 2000). Hutchings and Michailava (2006) have indicated that knowledge sharing is often confined to an in-group of organizational members. Al-meida and Kogut (1999) have also found that knowledge tends to be a regional re-source, as people usually only trust those who they know, and it is difficult for them to transmit knowledge without adequate trust.

Many studies have also assumed that trust plays an important role in influencing the leader and the followers' behavior, and that the leader has an effect on followers' behavior under an environment full of trust (Holste and Fields, 2010; Pillai et al., 1999). From a knowledge market point of view, Davenport and Prusak (2000) proposed that trust must be visible, enabling members to experience mutual benefits, and must be comprehensive enough to allow the organiza-tion to reduce mistrust evaluations and nurture a trust culture. Meanwhile, the es-tablishment of trust must start from the higher-level leaders, with the employees following suit. This study therefore pro-poses:

H4: Organizational trust reinforces the influence of individual perceived transformational leadership and the willingness to knowledge-share.

3. Research Design

3.1 Theoretical Framework and Meas-urement of Variables

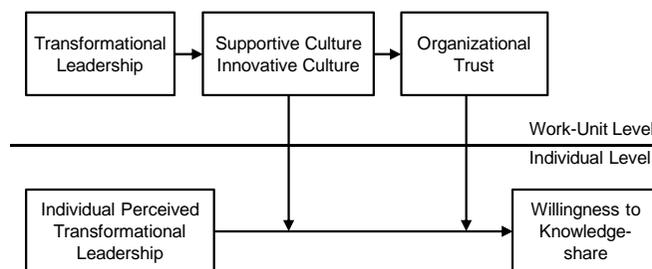


Figure 1 Theoretical Framework

Figure 1 shows the theoretical frame-work of this study. Most studies on the willingness to take part in knowledge shar-ing have been conducted using qualitative interview observation methods. Nonethe-less, this field is still short of empirical studies, and in the small number of empir-ical studies that do exist, respective opera-tional definition was applied in order to develop the scale.

Willingness to Knowledge-share. To measure employees' willingness towards knowledge sharing, employees were asked

to rate the scale referred to by Davenport and Prusak's (2000) study. The example items are "I would share my knowledge to other members to make them aware that I have professional skills", "Sharing knowledge with others make me feel good", and "I would share knowledge with others, as someday I may need some from them".

Individual perceived transformational leadership. To measure employees' indi-vidual experience and perception of lead-ership behavior, we asked the employees to rate the work-unit manager's transforma-

tional leadership behavior using Bass and Avolio's (1993) Multifactor Leadership Questionnaire (Form 5X—Short). The example items are “inspires others with his/her plans for the future”, “encourages employees to be team players”, and “shows respect for my personal feelings”. Meta analysis has shown that the four dimensions - charisma, inspirational motivation, intellectual stimulation, and individual consideration - of transformational leadership are very highly correlated (measured as .93 after correction for unreliability) and are thus, empirically, hard to separate from each other (Judge and Piccolo, 2004). In the current data, a principal factor analysis of the 20 items was conducted and this found only one factor with an eigenvalue greater than 1.0. Therefore, an index of transformational leadership was created.

Work-unit-level transformational leadership. To assess the overall pattern of the leadership behavior displayed to the work-unit as a whole, the work-unit employees' evaluations of their manager's transformational leadership were averaged to form a work-unit-level transformational leadership score.

Supportive culture and innovative culture. The work-unit's organizational culture was measured using the Organizational Culture Index (OCI) by Wallach (1983) with reference to the Organizational Climate Description Questionnaire by Litwin and Stringer (1968). This study made a reference to the OCI questionnaire and quoted two of its cultural dimensions (supportive and innovative cultures) from Wallach's (1983) original design of the items. For a supportive culture, the employees responded to a Likert 5-point scale on the basis of their observations regarding such aspects as “members are cooperative”, and “I feel a sense of safety working here”. For an innovative culture, aspect examples are “members are aggressive”, and “I feel energetic working here”. Organizational culture (supportive and innovative culture) is formed via a bottom-up process (Kozlowski and Klein, 2000) and has been

theorized and tested by the work-unit level analysis in the literature (Schneider, Ehrhart, Mayer, and Saltz, 2005). Therefore, individual employees' cultural perceptions were aggregated to the work-unit level to form the measurements for supportive and innovative cultures.

Organizational trust. The work-unit's organizational trust was measured with the Organizational Trust Inventory (OTI) conducted by Nyhan and Marlowe (1997), using the section regarding the testing of employee trust toward the whole work-unit. The employees responded to a Likert 5-point scale on the basis of their observations on aspects such as “I feel that the members in my work-unit trust each other”, “I trust my work-unit as we treat everyone equally” and “the decisions of my work-unit can be trusted”. Organizational trust is also formed via a bottom-up process and has been theorized and tested at the work-unit level of analysis in the literature (Ranca and Iordanescu, 2013). Therefore, individual employees' trust regarding work-unit perceptions in relation to the work-unit level was aggregated to form the measurement of organizational trust.

3.2 Data Collection

In the theoretical framework, variables in the work-unit-level, such as transformational leadership, supportive culture, innovative culture, and organizational trust, were aggregated for multi-level analysis. Additionally, the proposed theoretical framework was tested using data collected in two phases from a sample of employees in enterprises listed by the Chinese Knowledge Management Association (CKMA) in Taiwan and who have applied knowledge management for at least three years. The use of information obtained in the two phases and at multiple level designs may allow this study to reduce common method bias (Podsakoff, MacKenzie, Lee, and Podsakoff, 2003).

In the first phase, starting from November 2012 and spanning approximately four and a half months, data were collected regarding items of knowledge sharing and

organizational culture. After a further three months, in the second phase, data were collected regarding items of organizational trust and transformational leadership. In the first phase, a total of 428 responses from enterprises were collected, and many had left their email addresses for the next phase of the study. In the second stage, from the 428 first-phase responses, 315 responses were collected from 48 work-units in 48 different enterprises. Among the 48 work-units, 16 work-units had an insufficient number of samples (fewer than 4 responses). Consequently, the responses from these 16 work-units, 95 responses in total, were all excluded. Finally, a total of 220 valid employee responses from 32 work-units were obtained.

4. Data Analysis and Results

Principal component analysis of exploratory factor analysis (EFA) was con-

ducted to verify the construct validity of the questionnaire. Results show the factors were as the constructs expected, and displayed good factor loadings (0.45-0.92). Additionally, according to the factor analysis results, all the constructs were tested for reliability, with the results of Cronbach's alpha all being greater than 0.8 (0.834 - 0.932). The descriptive statistics of the variables are shown in Table 1.

This research was designed so as to conduct a multi-level analysis. Because many of the variables were taken from the data of a large number of individuals, theoretically, there should be a certain degree of consistency or consensus between these individuals. Therefore, consistency between the individuals regarding the perception of a specific phenomenon is a key criterion that determines whether a work-unit-level variable can be generated.

Table 1 Descriptive Statistics of Variables

Variables	1	2	3	4	5
1. Individual perceived transformational leadership					
2. Work-unit-level transformational leadership ^a	0.51*				
3. Supportive culture ^a	0.29*	0.43*			
4. Innovative culture ^a	0.33*	0.55*	0.07		
5. Organizational trust ^a	0.21*	0.64*	0.48*	0.09	
6. Willingness to knowledge-share	0.14*	0.12*	0.34*	0.07	0.44*
Mean	3.17	3.42	3.55	3.12	3.78
Standard Deviation	1.18	0.92	0.73	0.87	1.14

^aWork-unit means of variables are assigned to employees of the same work-unit to calculate the individual-level correlations.

To test the hypotheses regarding the multilevel theoretical framework, Hierarchical Linear Modeling (HLM) analysis was used. The study grand-mean centered the Level 1 (individual level) predictors. This centering approach facilitates the interpretation of the HLM results, and ensures that the Level 1 effects are controlled during the testing of the incremental effects of the Level 2 (work-unit level) variables. It lessens multicollinearity in the Level 2 estimation by reducing the correlation between the Level 2 intercept and slope estimates (Hofmann and Gavin, 1998; Raudenbush, 1989).

Additionally, the variance of the variable should be tested by explaining the work-unit-level variable and measuring the mean reliability at the work-unit level. The test was conducted by measuring rwg (within group agreement), intra-class correlation coefficient (ICC(I)), and reliability at the group level (ICC(II)). The results show that all the rwg values (0.73 – 0.90) are greater than the 0.7 threshold suggested by James (1982). With HLM analysis, estimated on the basis of Model C1 in Table 4, the ICCI(I) regarding the “willingness to knowledge-share” is 0.073, greater than the 0.059 standard proposed by Cohen (1988).

Additionally, the ICC(II) value is 0.832, greater than the 0.6 standard proposed by Glick (1985).

The results of Model A1 and A2 in Table 2 present that work-unit-level transformational leadership is significantly related to both a supportive culture and an innovative culture; the results of Model B1 and B2 in Table 3 present that a work-unit-level with a supportive culture is significantly related to organizational trust, but not to innovative culture.

To test the mediating effect of a supportive culture and an innovative culture, the steps of Baron and Kenny (1986) were followed. Comparing the results of Model B1 and B2 in Table 3, only a supportive culture is finally significantly related to trust, but not an innovative culture. From the results of Model A1 and A2, transformational leadership has a direct relation to both a supportive culture and an innovative culture. Also, the results of Model B1 and B2 show that the impact of transformational leadership on organizational trust decreases, while the model adds to both supportive and innovative cultures. Therefore, it was found that a supportive culture only has a partial mediating effect (Baron and Kenny, 1986) between transformational leadership and organizational trust. Consequently, hypothesis H2-1 is supported but H2-2 is not.

Table 2 Regression Results of Supportive and Innovative Cultures regarding Work-unit Level

Independent	Model A1 Supportive Culture	Model A2 Innovative Culture
Transformational Leadership	0.458 *	0.510 **
R ²	0.210	0.236
F	10.132 ***	11.392 ***

*P<0.05; **P<0.01; ***P<0.001

Table 3 Regression Results of Organizational Trust regarding Work-unit Level

Independent	Model B1	Model B2
Transformational Leadership	0.628 ***	0.440 **
Supportive Culture		0.393 *
Innovative Culture		0.124
R ²	0.395	0.595

Independent	Model B1	Model B2
ΔR ²		0.197 **
F	19.561 ***	13.548 ***

*P<0.05; **P<0.01; ***P<0.001

The results of Model C2 regarding HLM in Table 4 show that individual perceived transformational leadership is positively related to the willingness to knowledge-share. Therefore, hypothesis H1 is supported. However, when including cross-level interactive variables, the results of Model C3 show the moderating effects of a supportive culture and organizational trust are significant. However, the moderating effect of an innovative culture is not. Therefore, hypotheses H3-1 and H4 are supported but H3-2 is not.

Table 4 HLM Results of Willingness to Knowledge-share

Independent	Model C1	Model C2	Model C3
Individual			
(constant)	3.97 ***	3.97 ***	3.90 ***
Transformational Leadership		0.13 *	0.08
Cross-Level			
Transformational Leadership × Supportive Culture			0.80 *
Transformational Leadership × Innovation Culture			-0.31
Transformational Leadership × Organizational Trust			1.48 ***
Between-Group Residual Variance	0.073 ***	0.037 ***	0.002 ***
Within-Group Residual Variance	0.458	0.336	0.335

*P<0.05; **P<0.01; ***P<0.001

5. Conclusions and Suggestions

5.1 Research Findings

In the era of economic globalization, knowledge is one of the most critical competitive advantages for enterprises. Knowledge sharing is identified as a major focus area for knowledge management, as knowledge gained without sharing can only benefit individuals. On the other hand, it has been verified in past studies that the behavior of leaders will affect that of their

followers. Consequently, the most effective approach of leadership that contributes to enhancing employees' willingness for knowledge sharing is transformational leadership, which can help knowledge management to achieve twice the results with half the effort.

Transformational leadership directly affects employees' willingness regarding knowledge sharing, which is consistent with Politis' (2001) research result on the relationships between various leadership styles and knowledge management. Nonetheless, between transformational leadership and the willingness to knowledge-share, there exist several other factors which may form essential mechanisms.

Organizational trust is one of the keys that have an impact on employees' willingness to knowledge-share. When employees perceive trust from an organization and its executives, they are more likely to be willing to share knowledge. This idea is consistent with those of a number of scholars in their research (Almeida and Kogut, 1999; Nonaka et al., 2000). The positive relationship of trust not only improves the teamwork of employees, but also promotes their willingness regarding knowledge sharing. Organizational members tend to interact well with each other in trust relationships, whereby employees' lowered risk expectations towards the substantial benefits and sense of accomplishment that they are able to gain from knowledge sharing can promote their willingness to knowledge-share.

Organizational trust can affect employees' willingness to take part in knowledge sharing and, as described above, the determinants of trust are transformational leadership and organizational culture. Consistent with many research findings (Bennis and Nanus, 1985; Podsakoff et al., 1990), it was found that a transformational leader's readiness to sympathize with followers and establish their confidence contributes to the building of employees' trust toward the leadership and the organization.

Whitener, Brodt, Korsgaard, and Werner (1998) further indicated that transformational leaders are willing to spend time communicating with followers, thus making them feel that the leader is trustworthy. Nyhan's (2000) research results suggested that transformational leaders are good at delegating, which is the prerequisite for developing organizational trust.

The organizational culture of cooperation, support, fairness, and security, as well as the attachment of great importance to the morale and personal autonomy of employees, are significant factors for building employee trust. In this regard, the current study found similar results to previous researches, and proposes that, with regard to such an organizational culture, a supportive culture is the most typical organizational culture. On the contrary, an innovative culture emphasizes innovation, risk, and change, and thus may increase employees' awareness of risk in a highly competitive and fast-paced environment. Golembiewski and McConkie (1975) indicated that, in an organization that encourages individual competition, it is difficult to cultivate trust. Unlike a supportive culture, an employee's particular awareness of risk does not have an obviously positive effect on trust.

5.2 Practical Implication

Knowledge sharing is the critical part of knowledge management. Consequently, enhancing employees' willingness with regards to knowledge sharing is a high priority. The leader plays the most crucial role in the whole process of knowledge management. The behavior of transformational leaders contributes to the improvement of employees' willingness to knowledge-share. Therefore, the executives of an enterprise or organization should adopt transformational leadership and use their charm, spiritual motivation, intellectual enlightenment, and caring attitude to influence their employees and encourage them to be more devoted and willing to share their valuable knowledge. Most importantly, trust is the key factor. In addition to leadership style and a secure environment, trust is crucial

for interpersonal interaction within an organization. To enable employees to feel trust, the leader's behavior and attitude are very important. Transformational leadership provides a set of behavior criterions sufficient for promoting employees' trust, thereby increasing the number of team members who are willing to share knowledge in an organizational climate of trust and engage in the work that contributes to achieving organizational goals.

However, the creation of a climate of trust within an organization relies on an organizational culture that contributes toward promoting interactive security. In an innovative culture, where innovation and frequent changes are pursued, employees are required to work hard to meet high performance requests, and consequently, knowledge is quite likely to be shared. However, from the perspective of trust, in this type of culture, members tend to believe only in close colleagues, whilst not believing in other members or that the organization will develop and grow in a stable manner. As a result, they may withhold knowledge sharing and devotion. Therefore, the leader of an enterprise or organization, when pursuing reform, innovation, and work performance, must pay close attention to those environmental factors that may cause the instability of employees and which may affect their working behavior and attitude.

A supportive culture is the most reliable for employees. In an organization with a supportive culture, where there is the power of security, together with the leader's empowerment, individualized consideration, and a vision of charismatic leadership, employees will be ready to share their own knowledge for the sake of the company or their personal relationships. Knowledge sharing constitutes the characteristics of knowledge, and the motivation and opportunities for sharing. An organizational culture with a relationship that encourages trust together with a leader with the charm of transformational leadership

will offer the best opportunity and motivation for employees to share knowledge.

5.3 Research Limitation and Suggestions for Future Studies

With regards to the research on organizational behavior, it has been found that there are many factors that can affect employee behavior, although it is impossible to explore all of them due to time and cost limitations. Moreover, individual answers concerning the willingness to take part in knowledge sharing only represent individual perceptions, which may contain evaluations of the individual's morals rather than their actions. Additionally, willingness itself is only the motivation before an action, and this can change to the contrary under the moderating effects of other factors. Thus, future studies might construct proper measurement tools for, and conduct analyses of, the actual behavior of knowledge sharing, which would be of more direct value for knowledge management application.

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Acceptance of Web-Based E-Learning Systems: Behavioral Intention and Impacts

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Abstract

Information technology has been a critical factor to organizational success because of its great impact on organizational and individual achievement. Through information technology and information systems, e-learning not only makes changes to the learning model but also overcomes the limitations of face-to-face learning. Based on the technology acceptance model (TAM) and DeLone & McLean's model (D&M model), this study develops a comprehensive research framework to give a better explanation to intention to use e-learning and its impact. This study identifies the determinants of intention to use and the consequences of using e-learning systems. The proposed framework includes seven variables, through which we examine the relationship between critical factors (perceived quality, perceived support, perceived benefits, users' anxiety, self-efficacy), and intention to use, and how the intention to use e-learning systems will influence individuals and organizations (individual impact and organizational impact). Based on 206 e-learners' responses, Structural Equation Modeling (SEM) with AMOS 21.0 was used to conduct data analysis. The results show that perceived quality and perceived benefits have a direct impact on intention to use e-learning, which support the proposed hypotheses. However, the study ascertained that the influence of perceived support, users' anxiety and self-efficacy on intention to use e-learning, conflicts with the proposed hypotheses. This finding may come from the mandatory nature of e-learning systems (Saba, 2012). The findings from this study confirm the importance to organizations of using e-learning. Using e-learning in the workplace can improve the staff's individual and organizational performance. However, organizations should be more careful when considering compulsory or optional policies for using e-learning systems. The mandatory nature may result in negative behavior intention and impact. In order to avoid blind investment in new technology, managers can base their decisions on quality factors when reviewing the success of different e-learning systems. Due to organizations' limited resources, this finding is very meaningful. Additionally, organizations should pay attention to the intrinsic and extrinsic motivation of their staff to enhance the e-learning system's effectiveness.

Keywords: TAM, D&M model, SEM, e-learning, intention to use

1. Introduction

In recent years, web-based learning systems have been widely employed in both educational and non-educational institutions. Moreover, academia and the business community have paid attention to the model and performance of e-learning systems (Wang and Wang, 2009). Addi-

tionally, Pituch and Lee (2006) argued that if users lacked the sufficient motivation and intention to use web-based learning systems, the unused systems would eventually become useless. Thus, it is becoming more and more important to apply information technologies/systems to facilitate student learning, enhance instructor teaching performance and reduce educational costs

(Pituch and Lee, 2006; Selim, 2007). Asia has the highest growth rate for e-learning in the world at 17.3%. Its revenues, which reached \$5.2 billion in 2011, are predicted to more than double to \$11.5 billion by 2016 (Sam, 2012). The e-learning model has been changed by the evolution of technology. The recent advance in cloud computing and mobile devices empowers many innovative e-learning systems or applications with increased interactivity and improved features.

E-learning systems, taught through the Internet, multimedia and information systems, have made changes to learning methods. E-learning has broken face-to-face learning methods, which are time-space constrained. One of the main goals of the systems is to deliver instruction which can produce an equal or better outcome than previously. To achieve this goal, many researches have been conducted to explore the antecedents of e-learning user behavior.

The TAM (Technology Acceptance Model) and the D&M model (DeLone and McLean, 1992) have been widely applied to address this issue. However, the TAM is too focused on internal cognitive variables (perceived usefulness and perceived ease of use), which limits most of the external environmental variables in this regard. Meanwhile, the D&M model is biased in favor of quality related aspects of information system (IS). Only using quality variables to measure the systems seems too narrow. Besides, many research findings indicate that there are dozens of external environmental factors that affect the intention to use and actual use behavior (Davis, 1989; Wixom and Todd, 2005; Roca et al., 2006; Martinez-Torres et al., 2008; Wang and Wang, 2009; Cho et al., 2009; Saba, 2012). To date, due to the involvement of many factors, there has not been a comprehensive model to address this issue.

On the other hand, we find that researchers seldom study the impact of e-learning use behavior on both individuals and an organizations performance. De-

Lone and McLean (1992) argued that “use” and “user satisfaction” are direct antecedents of individual impact; and lastly, this impact on individual performance should eventually have some organizational impact. Similarly, it will result in certain “net benefits”. Gable et al. (2008) proposed that the IS-Impact measurement model represents the stream of net benefits from an information system. Although they mentioned individual and organizational impact, they have not been demonstrated empirically. Instead, most of these negligible researches are used to evaluate the relationship between quality and IS success or the impact of e-learning systems usage on individuals or organizations, respectively (Lin et al., 2011; Chen, H.J. 2010; Liao et al., 2009; Chiu et al., 2007).

Therefore, based on the TAM and D&M model, this study combines and develops a more comprehensive research framework to give a better explanation to intention to use e-learning. The proposed framework includes seven variables (perceived quality, perceived support, perceived benefits, users’ anxiety, self-efficacy, intention to use e-learning and e-learning impact), aiming to explore the antecedents and the consequences of using e-learning systems.

The objectives of this study are to identify the determinants of users’ intention to use e-learning systems and explore how systems will impact on individual and organizational performance.

It is hoped that the research objectives and research findings provide organizations with more references to promote the use of e-learning, as well as a reference for future research. Through a literature review and questionnaire, this study collates and analyzes relevant factors to establish a comprehensive model for decision-making on e-learning use. This study includes four parts: literature review, research methodology, research analysis and results, conclusions.

2. Literature Review

2.1 Theoretical Background

2.1.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) was first developed by Davis (1989), and aims to explain and predict the users' acceptance behavior. This model emphasized that the two important drivers of information technology system acceptance are perceived usefulness and perceived ease of use. The TAM model is an adaptation of the Theory of Reasoned Action (TRA, Fishbein and Ajzen, 1975) and Theory of Planned Behavior (TPB, Ajzen, 1991). The original TAM (Davis, 1989) has six constructs: external variables, perceived usefulness, perceived ease of use, attitude towards usage, intention to use and actual use. However, in 1992, "attitude" was dropped from the TAM because it was believed to be a weaker mediator. Since then, many researchers keep extending this model by adding different constructs.

2.1.2 Theory of Information Success

DeLone and McLean (1992) reviewed IS related researches published during 1981-1987 and developed an interactive model for IS success. At first there were six main dimensions in this model, which were: system quality, information quality, use, user satisfaction, individual impacts and organizational impacts. Ten years after the first version of the D&M model, the paper was cited by around 300 researches.

In 2003, the two authors of the D&M model made some modifications to this model. The new version of the D&M model accepted service quality as a new construct. The variables of individual impact and organizational impact were also combined into "net benefits". Also, in the new version, "intention to use" is suggested as a worthwhile alternative to "use" behavior.

2.2 Hypotheses Development

2.2.1 Perceived Quality

The previous IS literatures studied perceived quality including systems quality, information quality and service quality. These factors have a different influence on IS systems. DeLone and McLean (2002) indicated that information quality and systems quality can be important to measure a system's success while service quality can be a more important variable for the overall success of IS.

Systems quality mainly elaborates on the characteristics of a system, including the e-learning system's ease of use, flexibility and reliability, as well as the system's features of intuitiveness, sophistication, flexibility and response time. Information quality describes the characteristics of the system's outputs, which are management reports and web pages, including relevance, understandability, accuracy, conciseness, completeness, currency, timeliness, and usability. Service quality is the quality characteristics that the support users receive from the IS/ IT department. The measurement scales of SERQUAL can also be used to measure part of the service quality constructs. For example, responsiveness, assurance, reliability, visibility and empathy (DeLone and McLean, 2003; Wixom and Todd, 2005; Petter, DeLone and McLean, 2008).

However, recalling the e-learning related literatures which study the impact of perceived quality on intention to use e-learning, some scholars believe that perceived quality is not a key factor leading to intention to use. Nevertheless, the promotional effects, which arise from the indirect impact of perceived quality, cannot be ignored (Wixom and Todd, 2005; Roca et al., 2006; Wang and Wang, 2009; Udo, Bagchi and Kirs, 2011). Although many scholars believe that perceived quality only has an indirect or mediating effect on intention to use, from the system users' point of view, whether users will use e-learning or not often depends on certain quality factors, such as ease of use, richness and practical-

ity of the systems. This view is supported by some research findings (DeLone and McLean, 1992; DeLone and McLean, 2002; Martínez-Torres et al., 2008). Based on the preceding discussion, perceived quality is proposed to have certain effects on intention to use e-learning but this impact is still questioned by some scholars. Therefore, the first hypothesis is:

H1: Perceived quality has a positive effect on intention to use e-learning.

2.2.2 Perceived Support

In the past researches, seldom perceived support is studied independently. Due to a huge number of various support factors, some scholars consider studying part of them as environmental or contextual factors (Wu and Hwang, 2010). In this study, perceived support will be systematically explored. This construct is measured with three dimensions, including managerial support, job support and organizational support. Managerial support is concerned with the degree to which the users perceive that their supervisors or managers give them opportunities for acquiring new knowledge, skills and ability through e-learning. Job support refers to the degree to which the users perceive that work is designed to facilitate the attainment of knowledge, skills and ability. Organizational support represents the degree to which users perceive the support through their organizational policies, such as rewards and promotion (Cheng et al., 2012).

Also, IS relevant literature shows that perceived support has an important impact on intention to use. Extrinsic motivation formed by perceived support can urge the users to use e-learning, meanwhile, enhancing the users' intention to use regardless of their gender, age, previous usage experience, and working experience (Cho et al., 2009; Wu and Hwang, 2010; Cheng et al., 2011). Additionally, Cheng et al. (2012) indicate that managerial support, job support and organizational support are key motivations for employees to adopt e-learning systems. Based on the above discussions, perceived support is critical to

enhance intention to use. Accordingly, the following relationship is proposed:

H2: Perceived support has a positive influence on intention to use e-learning.

2.2.3 Perceived Benefits, Users' Anxiety and Self-efficacy

In the past literature regarding users' attitudes, scholars mostly focused on perceived usefulness and perceived ease of use. Many researches find that these two factors have a significant effect on intention to use. However, perceived usefulness and perceived ease of use belong to users' extrinsic motivation. Only studying extrinsic motivation and ignoring intrinsic motivation would undermine the explanatory power of an IS model for users' intrinsic decision-making and intention to use (Venkatesh et al., 2003). Hence, this study includes both intrinsic and extrinsic motivation to explore their impact on users' perception. Liaw et al. (2007) found that understanding and identifying the learner's attitude towards e-learning is extremely important when designing effective e-learning systems. In numerous previous researches, users' attitude is explored through a large number of intrinsic and extrinsic factors, for example, motivation, beliefs, anxiety, self-efficacy, interaction, effort expectancy, performance expectancy, perceived fun, perceived usefulness, and adaptation etc. (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003; Liaw et al., 2007; Martínez-Torres et al., 2008; Ozkan and Koseler, 2009).

Based on a literature review, in this study, the relationship between intention to use e-learning and users' attitude, together with two aspects of extrinsic and intrinsic motivation, will be studied. Extrinsic motivation takes perceived benefits as the main variable, of which the dimensions include perceived ease to use (Davis, 1989; Roca et al., 2006; Wang and Wang, 2009; Lin, 2011), perceived usefulness (Davis, 1989; Roca et al., 2006; Wang and Wang, 2009; Cho et al., 2009; Lin, 2011) and perceived fun (Martínez-Torres et al., 2008; Ozkan and Koseler, 2009). The main con-

structs of intrinsic motivation are users' anxiety (Sun et al., 2008; Ozkan and Koseler, 2009) and self-efficacy (Sun et al., 2008; Ozkan and Koseler, 2009; Wang and Wang, 2009; Cho et al., 2009; Zhang et al., 2012, Saba, 2012), among which the users' anxiety, and the occurrence of a user's trepidation and confusion due to e-learning systems, hampers user's intention to use. It is also the negative construct of this model.

As user attitude is an important driver of intention to use, regardless of the users' relevant experience (Lin, 2011), users will decide to use e-learning under extrinsic and intrinsic motivations. Many scholars have proved that the impact of extrinsic motivation on intention to use is significant (Davis, 1989; Roca et al., 2006; Wang and Wang, 2009) while the effect of intrinsic motivation is also confirmed by relevant research findings. Based on these arguments, the effect of intrinsic and extrinsic motivation can be deeply explored through perceived benefits, users' anxiety and self-efficacy. This leads to hypotheses:

H3: Perceived benefits have a positive influence on intention to use e-learning

H4: Users' anxiety has a negative influence on intention to use e-learning

H5: Self-efficacy has a positive influence on intention to use e-learning.

2.2.4 Intention to Use and E-learning Impact

Intention to use indicates the subjective probability that one will use something. The stronger the intention to use, the more possible that use behavior will take place. In the TAM model, the positive effect of intention to use on use behavior is proved to be significant. However, the D&M model believes that "intention to use" is an attitude while "use" is a behavior. Due to the difficulties in interpreting multi-dimensional aspects and the complex causal relationship of "use", intention to use is suggested to be a worthwhile alternative measure (DeLone and McLean, 2003). From the above discussion, these two variables, whether explored separately or in combination, have relevant correlative

impact. This study mainly emphasizes the influence of antecedents on intention to use.

The second important aspect of this paper is the effectiveness resulting from the impact of intention to use. The e-learning impact caused by intention to use is also one of the specific indicators used to measure the success of IS implementation. Regarding the e-learning impact, in addition to individual impact, which is widely studied, a deep exploration of organizational impact is essential (DeLone and McLean, 1992). In the previous researches on e-learning related issues, organizational performance, individual learning effect and user satisfaction have been mostly adopted to measure the system's success. However, a unilateral measure seems too simple. E-learning performance measurement should be more widely studied. Initially, the D&M model believes that there is a causal relationship between individual and organizational impacts arising from IS because individual achievement will directly influence organizational performance (DeLone and McLean, 1992). With the development of the D&M model, IS success is more comprehensively studied. Individual and organizational impacts are combined into net benefits, which becomes the comprehensive measure for IS success (DeLone and McLean, 2002). Individual impact measures the degree to which IS influences the capacity and efficiency of an organizations' representatives or key users while organizational impact measures the degree to which IS influences organizational performance and the ability to make improvements. Therefore, it can be hypothesized:

H6: Intention to use e-learning has a positive influence on e-learning impacts.

Based on defined motivation, objectives and the literature review, this paper studies the relationship between various variables including the antecedents of intention to use e-learning (perceived quality, perceived support and perceived attitude)

and the e-learning impact arising from intention to use; from which we can conclude which factors contribute to promoting e-learning use. The dimensions of each antecedent (perceived quality, perceived support, perceived benefits, user's anxiety and self-efficacy) are separately hypothesized to have an effect on intention to use (H1-H5) and the relationship between intention to use and e-learning impact is also proposed (H6).

3. Research Methodology

3.1 Scale Development

The hypotheses are examined with data collected from questionnaire surveys. There are seven variables in this framework: perceived quality, perceived support, users' anxiety, self-efficacy, perceived benefits, intention to use e-learning and e-learning impact. According to the literature review and operational definitions (Table 1), scale items are designed. This study uses the Likert 5 point scale where 1 reflects "strongly disagree" and 5 reflects "strongly agree". The original questionnaire was first reviewed by a senior researcher and 10 PHD students of Yuan Ze University. Then it was revised accordingly to make the text for the scale items more comprehensible and acceptable.

The first construct, perceived quality with three dimensions of systems quality, information quality, and service quality, is measured with items mainly from Roca et al. (2006). Roca et al.'s (2006) research is also aimed at e-learning systems in school education sections. However, different

e-learning systems have different characteristics and functions, for example, our e-learning systems don't have predicted results but their information is up-to-date enough for the study purposes. They also have visually appealing materials and so on. Furthermore, DeVellis (2003) suggested not using reverse items in the questionnaire to avoid the respondents difficult to judge. Therefore, this study screened and replaced some of the original items with more appropriate ones for the questionnaire. Finally, there are a total of 9 scale items regarding to perceived quality.

Perceived support formed by the dimensions of organizational support, management support, and job support is measured with items from Cheng et al. (2012), which are modified and reduced to nine. Perceived benefits with the dimensions of perceived usefulness, perceived ease of use and perceived fun adapt measures from Martínez-Torres et al. (2008) and Wang and Wang (2009). After scanning to remove the items with similar content, there are only nine scale items left for this construct. Measures for user's anxiety and self-efficacy are constructed in accordance with the existing scales from Sun et al. (2008) and Wang and Wang (2009). Measures for intention to use e-learning are constructed by modifying the existing related items from Wang and Wang (2009). There are four items in total. E-learning impact, with the dimensions of individual impact and organizational impact, is based on Gable et al.'s (2008) items, six items in total.

Table 1: Constructs and Operational Definition of Dimension

Constructs	Dimensions	Operational definitions
Perceived quality	System quality	The quality characteristics of e-learning system's hardware, software and functions perceived by users.
	Information quality	The quality characteristics of the e-learning system outputs, (management reports and web pages) that users perceive.
	Service Quality	The quality characteristics of the support users receive from the IS/ IT department
Perceived support	Managerial support	The degree to which the users perceive that their supervisors or managers give them opportunities for acquiring new knowledge, skills and ability through e-learning.
	Job support	The degree to which the users perceive that work is designed to facilitate the attainment of knowledge, skills and ability.
	Organizational support	The degree to which users perceive the support through their organization's policies, such as rewards and promotion
Perceived benefits	Perceived ease of use	The degree to which users believe that using e-learning is free of effort
	Perceived usefulness	The degree to which users believe that using the e-learning system will help them to fulfill their tasks.
	Perceived fun	The degree to which users perceive using an e-learning system enjoyable in its own right.
Users' anxiety		The degree to which users feel confused due to the e-learning system
Self-efficacy		The users' confidence and judgment ability that enables them to complete the e-learning course.
E-learning Intention to use		The degree to which users intend to use an e-learning system
E-learning Impact	Individual Impact	The measurement of the degree to which IS influences the capacity and efficiency of an organization's representatives or key users
	Organizational Impact	The degree to which IS influences organizational performance and the ability to make improvements

3.2 Sampling and Analysis Method

The targeted e-learning systems in this study are web-based learning systems and the authors used the web-based learning systems of the Institute of Technology for the survey. The system has been considered as the primary one for creating and digitizing online courses in the college since 2006. The sample includes students of the Business Administration Department who receive continuous education in this college. They all have experience of using e-learning systems. A random sample of 300 students

participated in the survey. The survey lasted for 6 weeks, from 29th April to 10th June 2013 and was conducted using paper questionnaires in the college. 300 papers and online questionnaires were distributed. 206 valid responses were received (excluding 23 invalid and incomplete responses). The valid response rate for the total sample is 69%.

Table 2 presents the demographic profile of the sample population, among which 49% of the respondents were male and 51% were female. In addition, 85% of the respondents were between 21 and 50 years

old. The respondents' jobs were mainly in the military and government (35%) and financial sector (28.2%). More than 69.9% of the respondents had more than 1 year of usage experience.

In this paper, Structural Equation Modeling (SEM) with AMOS 21.0 is used. A measurement model and the structural model of SEM were used for analysis. Firstly, confirmatory factor analysis (CFA)

was used to investigate the relationship between observed and latent variables and ensure correct variable measurements. This was followed by a path analysis to explain the potential causal relationship between the variables, namely structural model validation. Finally, testing basis fit, overall model fit and internal model fit were used to evaluate the goodness of fit for the model.

Table 2: Profile of the Respondents

Items		Frequency	Percentage (%)
Gender	Male	101	49.0
	Female	105	51.0
	Total	206	100.0
Age	Under 20	7	3.4
	21-30	107	51.9
	31-40	46	22.3
	41-50	24	11.7
	51-60	19	9.2
	61 and above	3	1.5
	Total	206	100.0
Job	Military and government	72	35.0
	Financial sector	58	28.2
	Services	33	16.0
	Others	43	20.8
	Total	206	100.0
Years of using systems	Under 1 year	62	30.1
	2 - 3 years	74	35.9
	4 years and above	70	34.0
	Total	206	100.0

4. Research Analysis and Results

4.1 Measurement Model

Anderson and Gerbing (1988) suggested that if there is high correlation among the dimensions of the first order structure, a common factor of two second-order structures should exist. Kline R.B. (2005) considered that conditions for the high-order model identification are (1) each second-order dimension needs to have at least three first-order dimensions; and (2) each first-order dimension must have at least two indicators. As the sub-dimensions of perceived quality, perceived support, perceived benefits and e-learning impact all have high correlation for each structure, the authors established a second-order model for these variables. In order to construct a

more accurate measurement model, Doll et al. (1994) suggested conducting a comparative analysis for the first-order and second-order structures, which enables the construction of an accurate model. Then, the structure with the indexes that are a better fit can be adopted for CFA. According to the result of the comparative analysis (Table 3), the second-order structure was proven to possess a better model fit. Consequently, it was used to conduct the subsequent analysis.

To conduct confirmatory factor analysis and model fit test, maximum likelihood (ML) was used to estimate the model's parameters. The result shows the estimates of non-standardized factor loadings, standard errors, t-value, p-value, standardized factor loadings and SMC (R-square) for each scale item. Overall, all standardized

factor loadings are greater than 0.70 and the p-values are significant. Except for the fact that the standardized factor loadings of PS6 (0.509; $R^2 = 0.259$) are too low, the rest are under ideal conditions. Additionally, among the fit indexes shown in Table 4 (Normed chi-square (χ^2/df) = 2.473, GFI = 0.685, AGFI = 0.640, RMR = 0.058,

RMSEA=0.085, TLI=0.853, CFI=0.865, IFI=0.867), only Normed chi-square and RMSEA fit the cut-off criteria, while others indicated a poor fit. Therefore, a method of revising the model by examining the standardized factor loadings and modification indices (MI) was found.

Table 3: Fit Indexes of Comparative Model

CFA model	$\chi^2/d.f$	GFI	AGFI	TLI	CFI	RMSEA
First order	4.150	0.672	0.600	0.744	0.791	0.124
Second order	2.057	0.809	0.760	0.918	0.930	0.072

Table 4: Fit Indexes of Measurement Model

Fitness indices	Criteria		Fit indexes of original model	Fit indexes of modified model
$\chi^2/d.f$	$1 < \chi^2/d.f < 3$		2.473	2.057
GFI	GFI >0.8	Acceptable fit	0.685	0.809
	GFI >0.9	Acceptable fit		
AGFI	AGFI >0.8	Acceptable fit	0.640	0.760
	AGFI >0.9	Acceptable fit		
RMR	RMR <0.05		0.058	0.049
RMSEA	RMSEA <0.05	Good fit	0.085	0.072
	$0.05 < RMSEA < 0.08$	Mediocre fit		
	$0.08 < RMSEA < 0.10$	Acceptable fit		
TLI(NNFI)	NFI >0.9	Acceptable fit	0.853	0.918
CFI	CFI >0.9	Acceptable fit	0.865	0.930
IFI	IFI >0.9	Acceptable fit	0.867	0.931
AIC	The smaller the better		2283.804	889.706
BIC	The smaller the better		2676.493	1189.215
ECVI	The smaller the better		11.141	4.340

Firstly, since most of the items' standardized factor loadings are greater than 0.70, while the loadings of PS6 are low and its reliability is also poor (0.509; $R^2 = 0.259$), this item should be removed. Secondly, examining the MI in the AMOS report, changes were made to the items with excessive covariance. The covariance residuals of PQ1, PQ6, PQ9, PS1, PS6, PS7, PB3, PB4, PB9, ANX1, EUI1, EUI2, EI1 and EI5 were all too high. However, according to the principle of independence for residuals, the excessive covariance residual cannot establish relevant links. Thus, these items were removed to improve the model fit. Testing the modified model, standardized factor loadings were in the

range between 0.7 to 0.969 and R^2 was between 0.582 to 0.939. The fit indexes are Normed chi-square (χ^2/df) = 2.057, GFI = 0.809, AGFI = 0.760, RMR = 0.049, RMSEA = 0.072, TLI = 0.918, CFI = 0.930, IFI = 0.931, which show good model fit. Finally, a competitive model with fit indices was established to verify the most proper model between the original one and the modified ones (Table 4). The fit indexes of the modified model (AIC = 889.706, BIC = 1189.215, ECVI = 4.340) are smaller than the original one (AIC = 2283.804, BIC = 2676.493, ECVI = 11.141). Hence, the modified model is obviously better.

According to Hair et al., (2009), the measurement model should meet the fol-

lowing conditions for gaining convergent validity: (1) factor loadings are greater than 0.7; (2) composite reliability (CR) is greater than 0.7; (3) the average variance extracted (AVE) is greater than 0.5; and (4) the squared multiple correlation coefficient (R^2) is greater than 0.5. As shown in Table

5, the factor loading for each of the items is greater than 0.7, the results for CR are all greater than 0.85, AVE is also greater than 0.5, and R^2 is more than 0.6. Thus, the measurement model has good convergent validity.

Table 5: Convergent Validity for the Measurement Model

Construct	Dimension	Items	Loading	R ²	CR	AVE			
Perceived Quality (PQ)	System quality	PQ2	.763	.582	.941	.728			
		PQ3	.908	.825					
	Information quality	PQ4	.896	.802					
		PQ5	.861	.741					
	Service quality	PQ7	.903	.815					
		PQ8	.777	.604					
	Perceived Support (PS)	Managerial support	PS2	.914			.835	.970	.845
			PS3	.945			.893		
Job support		PS4	.862	.743					
		PS5	.922	.850					
Organizational support		PS8	.910	.828					
		PS9	.961	.923					
Perceived benefits (PB)		Perceived ease of use	PB1	.937	.878	.960	.801		
			PB2	.945	.892				
	Perceived usefulness	PB5	.824	.679					
		PB6	.843	.711					
	Perceived fun	PB7	.915	.837					
		PB8	.901	.811					
	Users' Anxiety (ANX)		ANX2	.969	.939			.948	.902
			ANX3	.929	.863				
Self-efficacy (SE)		SE1	.823	.677	.872	.694			
		SE2	.816	.667					
		SE3	.860	.739					
Intention to use e-learning (EUI)		EUI3	.934	.872	.911	.837			
		EUI4	.895	.802					
E-learning Impact (EI)	Individual impact	EI2	.904	.818	.943	.805			
		EI3	.883	.779					
	Organizational impact	EI5	.833	.694					
		EI6	.963	.927					

Finally, based on Hair et al.'s (2006) suggestions, a correlation matrix was used to assess discriminant validity. Table 6 shows the correlation matrix, of which the diagonal value 1 is replaced with individual AVE, and the other values are the square of the correlation coefficients. If AVE is greater than the square of the correlation

coefficients of the correspondent horizontal row and vertical column, it means that the model possesses discriminant validity.

As good convergent and discriminant validity are possessed, the measurement model also has construct validity. Since the composite reliability of each dimension is greater than 0.80, the model has a high

degree of reliability and good internal consistency.

Table 6: Discriminant Validity for the Measurement Model

Construct	Mean	Std	PQ	PS	PB	ANX	SE	EUI	EI
PQ	3.680	0.868	0.728						
PS	3.520	0.951	0.430	0.845					
PB	3.700	0.858	0.610	0.600	0.801				
ANX	2.340	0.955	0.110	0.030	0.200	0.902			
SE	3.570	0.769	0.390	0.280	0.550	0.130	0.694		
EUI	3.510	0.887	0.550	0.340	0.670	0.050	0.240	0.837	
EI	3.660	0.865	0.550	0.740	0.780	0.130	0.340	0.750	0.805

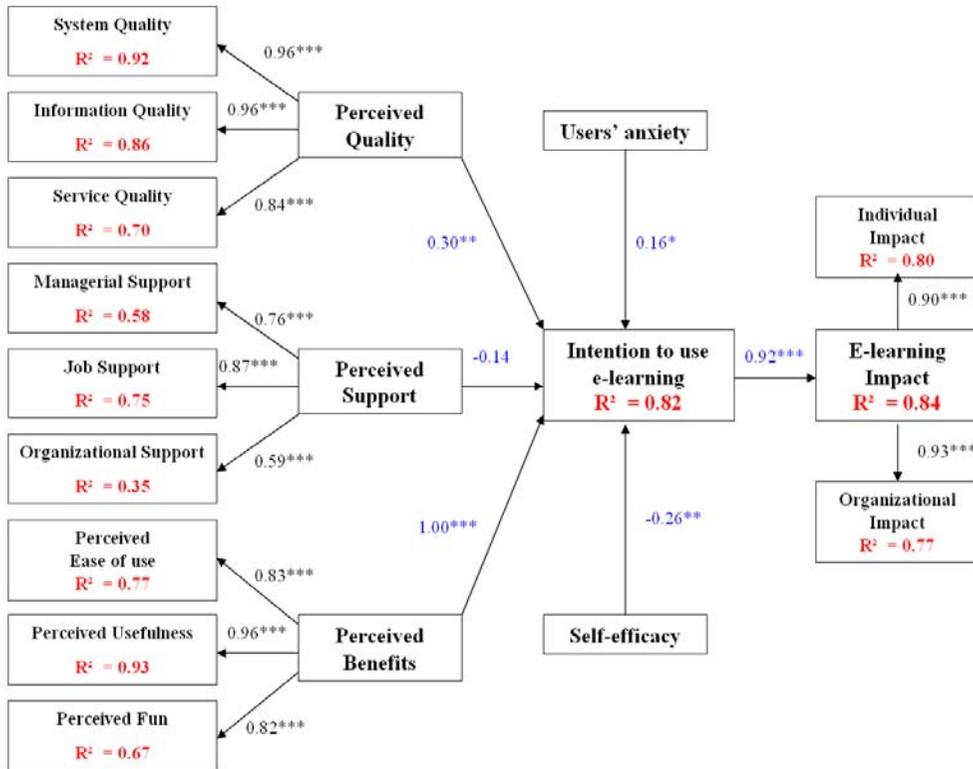
Note. The diagonal values indicate the AVE.

4.2 Structural Model

After examining the measurement model through CFA and goodness-of-fit testing, a structural model and path analysis were established to determine the causal relationship among the variables. Firstly the overall fit of the structural model was examined. All fit indexes achieve a good fit (Normed chi-square (χ^2/df) = 2.071, GFI = 0.807, AGFI = 0.759, RMR = 0.051, RMSEA = 0.072, TLI = 0.917, CFI = 0.929, IFI = 0.929), which means that the model also has good fit. A path diagram is drawn to explain the causal relationship among the variables (Figure 1). The results of the path analysis show that the higher the perceived quality, the more it will have a significant positive impact on the intention to use e-learning (regression coefficient = 0.30, $p < 0.01$). This result supports H1. The proposed relationship between perceived quality and intention to use e-learning is proved, which is in line with Roca et al.'s (2006) findings. Also, it clarifies that perceived quality has a direct impact on intention to use e-learning. Perceived support doesn't affect intention to use e-learning as the relationship between perceived support and intention to use e-learning is insignificant (regression coefficient = -0.14, $p = 0.257$). Hence, H2 is not supported. This result fits Cheng et al.'s (2012) findings, which indicates that perceived support (managerial support, work support and organizational support) has an indirect influence on the intention to use e-learning.

Perceived benefits have a highly significant positive effect on intention to use e-learning (regression coefficient = 1.00, $p < 0.001$), which not only confirms the hypothesized relationship in H3, but also meets many perceived benefit related findings (Roca et al., 2006; Martínez-Torres et al., 2008; Wang and Wang, 2009; Lin, 2011).

There is a significant positive relationship between users' anxiety and intention to use e-learning (regression coefficient = 0.16, $p < 0.05$), while self-efficacy has a significant negative effect on intention to use e-learning (regression coefficient = -0.26, $p < 0.001$). Thus, H4 and H5 are not supported. These results occur probably because e-learning systems are usually combined with certain courses that are compulsory for learners to undertake and complete. Under this circumstance, a contradictory situation is produced. Saba (2012) also mentioned that, "This negative finding may be explained by the mandatory nature of the e-learning systems". Finally, there exists a highly significant positive correlation between intention to use e-learning and e-learning impact (regression coefficient = 0.92, $p < 0.001$), which asserts that the intention to use e-learning will enhance the e-learning impact, including both individual impact and organizational impact. In addition to supporting H6, it also meets DeLone and McLean's (2002) findings.



Note: Path significance: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Figure 1. Structural Model and Path Analysis

5. Conclusions

5.1 Discussion

This research finds that perceived quality and perceived benefits have a direct impact on intention to use e-learning while the relationship between perceived support, users' anxiety and self-efficacy has no influence on the intention to use e-learning as proposed. This finding may come from the mandatory nature of e-learning (Saba, 2012). Meanwhile, based on some research findings, it is believed that the effects of these three variables on intention to use e-learning are indirect. These relationships are in need of future research for clarification. Additionally, the influence of the intention to use e-learning on e-learning impact is significant, which confirms the suggestion that, to some extent, the intention to use can replace "use" behavior as a

better alternative measure (DeLone and McLean, 2003).

5.2 Managerial Implications

The findings from this study confirm the importance of using e-learning for organizations. Using e-learning in the workplace can improve the staffs' individual and organizational performance. However, organizations should be careful when considering compulsory or optional policies for using e-learning systems. A mandatory nature may result in negative behavior intention and impact. In order to avoid the blind investment in new technology, managers can base their decision on quality factors so as to predict the success of the different e-learning systems. Due to organizations' limited resources, this finding is very meaningful. Additionally, organizations should pay attention to the intrinsic and extrinsic motivation of their staff to

enhance the e-learning system's effectiveness.

5.3 Conclusion

In theory, with research model development and analysis, this study identifies the correlation between various antecedents and the intention to use e-learning, and then explains how e-learning impacts on organizational and individual effectiveness. Adopting extrinsic motivation, intrinsic motivation, intention to use e-learning and e-learning impact into a comprehensive model, it is hoped that this study can provide more references to explore related literature on e-learning use. In practicality, it can be based on different motivational factors and effectiveness to determine whether it is suitable for organizations or individuals to adopt e-learning systems. Additionally, through this study, researchers can learn more about the critical factors of an e-learning platform's success, which can help to enhance and improve online learning (Saba, 2012). Moreover, organizations can avoid ignoring the actual effectiveness due to the blind pursuit of technological innovation (Porter, 2001).

5.4 Future Research

Although this study provides valuable insights, some potential limitations should be recognized. Firstly, the study relied on a sample of people who use e-learning systems to learn. Future research might enhance the sample size and increase the valid response rate. Secondly, there are a wide range of potential antecedents for the intention to use e-learning, and the limited theoretical and empirical research that has been conducted to date on factors that lead to the intention to use e-learning. Future research studies can widen their examination including other factors. Thirdly, the interpretations of issues pertinent to cross cultures and cross countries were not addressed in this paper and this could be a topic for future research.

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Innovative Evaluation and Management of the Medical Care Network in Taiwan

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Abstract

The medical care network plays a critical role within the health care system in Taiwan and consumes a huge amount of resources from budgets each year. However, very little study has been conducted to evaluate its performance. This study aims to conduct a performance evaluation and make suggestions for the innovative management of the medical care network.

A structured questionnaire was completed by health care professionals and administration staff working in southern Taiwan. The studied medical care network provides services to a metropolis and three rural areas, together with more than three million inhabitants. The questionnaire applied an importance-performance analysis (IPA) to measure respondents' perceptions regarding the importance of and satisfaction with 19 projects. Descriptive and inferential statistics were analyzed for the importance-performance analysis.

There were 380 valid questionnaires returned. Female respondents (75.5%) numbered considerably more than the male respondents. More respondents were aged 31-40 (31.8%). The occupation categories of the survey respondents included nurse (45.2%), clinicians (38.6%), and administrative staff and others (16.2%). More than 70% of the survey respondents had participated in related courses associated with the medical care network. The *t*-test results presented a significant difference between the average scores for the importance and satisfaction for each project ($p < 0.05$). Projects associated with "patient safety and quality of care" had higher scores for importance and satisfaction. Projects associated with "community care" had lower scores for importance and satisfaction. Projects that "improve the quality of care for a disabled and vulnerable population" and that "prevent sexual harassment in health care facilities" have higher importance scores but lower satisfaction scores (located in quadrant II). It is necessary to concentrate more effort in these projects.

Based on our best knowledge, this is the first time in the literature that an importance-performance analysis has been applied to evaluate the performance of the medical care network in Taiwan. Study results showed the performance of the medical care network did not reach an optimum level. It is necessary to continuously evaluate the performances of the medical care network in order to develop effective strategies that enable innovative management policies for further improvement.

Keywords: Importance-performance analysis (IPA), medical care network, program evaluation

1. Introduction

In 1986, the Department of Health in Taiwan began a medical care network policy promotion plan that was introduced in different phases. Phases I, II, III and IV

focused more on hardware construction and manpower planning. Phases V and VI were the "Holistic Health Care Project" and the "New Generation Health Navigation Project", respectively. Apart from enhancing the distribution of regional resources, the

plan includes the pursuit of high-quality medical care and patient safety. The embodiment of the six medical care regions in Taiwan is based on the medical needs of each district. The priorities are: to develop a medical care network, reinforce the exchange and cooperation between medical institutions within the region, and elevate the quality of regional medical care. The medical care network is classified as a major health policy. Therefore, achieving the effective allocation of resources whilst facing annual government budget cuts is critical.

Medical care networks play an essential role within the health care system in Taiwan and consume an enormous amount of resources each year. On average, the Taiwanese government has spent more than US\$ 5.5 hundred million each year on the medical care network (Department of Health, 2009). However, little study has been conducted to evaluate its performance. Whether the medical care network is able to meet its goals and offer a good performance or not is an important research and policy question. This study aims to conduct a performance evaluation and make suggestions for the innovative management of the medical care network.

To encourage better resource allocation under the increasing pressure of budget cuts, public policies, such as medical care networks, need to understand more about the important project topics and their performances, enabling policymakers to make effective adjustments. Therefore, it is appropriate to apply an importance-performance analysis to evaluate the medical care network in order to gather the necessary information. The importance-performance analysis (IPA) method measures user satisfaction regarding a given service so as to identify necessary improvement areas (Miranda, Chamorro, Murillo, Vega, 2010). The IPA has been applied in many fields to provide an insight into survey respondents' evaluations of critical issues in service programs and as an effective method to set priorities

(Abalo, Varela, and Manzano, 2007; Hemmasi, Strong, and Taylor, 1994; Martilla and James, 1977; Matzler et al., 2004). Examples of such fields are the automobile industry (Martilla and James, 1977), hotel selection (Chu and Choi, 2000), higher education (Lewis, 2004), banking services (Matzler, Sauerwein and Heischmidt, 2003), hospitality and tourism research (Oh, 2001; Deng, 2007), and government projects (Wong et al., 2011). The IPA method has also been extended to evaluate health care programs and provided useful improvement suggestions. Examples include primary health care service evaluations (Miranda, Chamorro, Murillo, and Vega, 2010), management of health care services (Lopes and Maia, 2012), the internal marketing of hospital management (Chen and Lin, 2013), health care system evaluation (Dolinsky and Caputo, 1991), and hospital analysis (Yavas and Shemwell, 2001). The importance perspective can be perceived as expectations and the performance perspective can be perceived as satisfaction that is analyzed by categorizing them into four quadrants (Figure 1). No previous study has applied the importance-performance analysis to measure the performance of the medical care network in Taiwan. This study will conduct such an innovative evaluation in order to assess the medical care network in detail.

2. Methods

This study conducted survey research through a structured questionnaire. The questionnaire was designed and based on the literature review and the applied framework of the importance-performance analysis. The questionnaire has two main parts. The first part is associated with the socio-demographic information of the survey respondents. The second part measures the respondents' perceptions about importance and satisfaction for each project within the medical care network. The questionnaire was evaluated during several steps. First, experts were invited to review the questionnaire and conduct a content

validity analysis. Inappropriate words or sentences were removed or modified based on the experts' comments. Six experts reviewed the questionnaire and provided comments on the revision of items regarding the collection of respondent's background information (such as age group, hospital type) and project names (to be more specific) in the measurements. The experts were from different professional fields (one professor, three senior physicians working in different hospitals, one hospital president, and one hospital manager) and who had experience of projects undertaken by the medical care network. Second, a principal component analysis and the varimax method were used to conduct an exploratory factor analysis. Two major factors were extracted, namely "patient safety and quality of care" and "continued education and community care". The reliability test indicated that "patient safety and quality of care" and "continued education and community care" had a Cronbach's alpha value equal to 0.949 and 0.924, respectively. The closer the Cronbach's alpha coefficient is to 1.0 presents greater internal consistency of the scale items. Cronbach's alpha of 0.7 or above is considered adequate (Chen and Lin, 2013; Watson and Thompson, 2006).

The importance-performance analysis was applied to analyze the survey respondents' perceptions associated with different projects regarding the medical care network. A two-dimensional quadrant grid was drawn to indicate the associations between importance and performance from the respondents' perceptions. Within the quadrant grid, the perceptions of im-

portance were measured on the Y-axis and the perceptions of performance (measured as satisfaction) were measured on the X-axis (Figure 1). Satisfaction is a proxy measurement of project performance. It is taken from the health care professionals' perspectives. If the project performs well, then the health care professionals will have higher satisfaction with such a project. A 5-point Likert scale was used to evaluate respondents' perceptions about the importance and satisfaction of each project within the medical care network. The questionnaire items were scored as "strongly agree/satisfied (5)", "agree/satisfied (4)", "not sure (3)", "disagree/unsatisfied (2)", and "strongly disagree/unsatisfied (1)". The mean scores for overall importance (3.83) and overall satisfaction (3.68) were used to split the axes. This is based on the suggestion by Martilla and James (1977) that cross-hair placement is a relative judgment, rather than an absolute measurement (Chen and Lin, 2013). Specific scores for the importance and satisfaction for each project were placed onto the quadrant grid accordingly.

The studied medical care network provides services to a metropolis and three rural areas totaling more than three million inhabitants. Eight hundred and fifty four questionnaires were sent to health care professionals and administrative staff working in health care facilities located in southern Taiwan. Four hundred and twelve questionnaires were returned with a 48.3% response rate. SPSS 17.0 statistical software was applied to analyze the descriptive and inferential analyses.

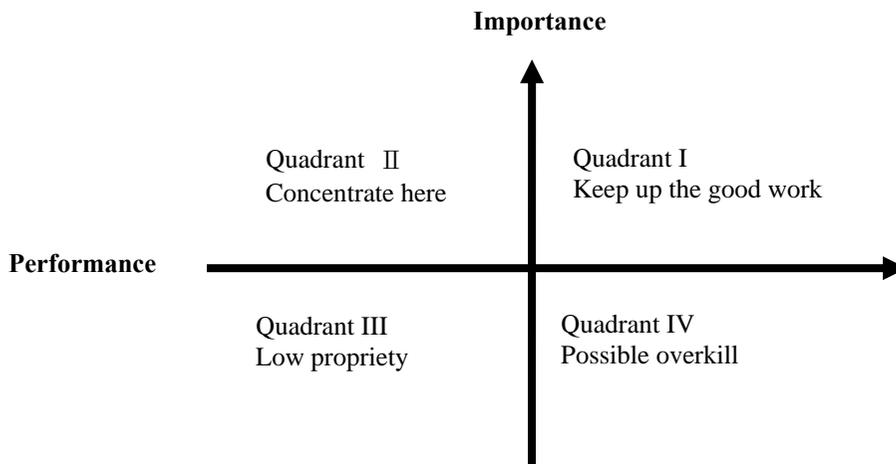


Figure 1: Importance – Performance Analysis

3. Results

The major study results include descriptive analyses and importance-performance analysis. After excluding the incomplete questionnaires, there were 380 valid questionnaires. Table 1 presents the demographic factors of the survey respondents. Female respondents (75.5%) numbered more than the male respondents. A large number of respondents were aged 31-40 (31.9%). Among the respondents working in different hospital types, community hospitals accounted for the largest number of participants (36.2%), followed by clinics (31.5%), regional hospitals (18.3%), medical centers (12.4%), and long term care facilities (1.6%). The majority of facilities were in private ownership (62.5%). The occupation categories of the survey respondents included nurses (45.2%), clinicians (38.6%), and administrative staff and others (16.2%). More than 70% of the survey respondents have participated in related courses associated with the medical care network, such as continued education, patient safety, patient-centered care, quality of care, community care, and early intervention for children with developmental problems.

Table 2 presents the average scores and standard deviations of importance and satisfaction for each project. All of the av-

erage scores for importance are higher than the average scores for satisfaction. A paired *t*-test was conducted to evaluate whether or not the mean importance scores differed significantly from the mean satisfaction scores. The *t*-test analyses indicated a significant difference in the average scores between importance and satisfaction ($p < 0.05$). The gap scores between importance and satisfaction for each project were also estimated and all had positive values.

This study evaluated the importance and performance of the medical care network by collecting survey respondents' viewpoints about importance levels and satisfaction levels associated with different projects. The average scores of the importance levels for different projects were used as the Y values with the average scores of the satisfaction levels used as the X values in order to ascertain the IPA figures (Figure 2). Quadrant I of Figure 2 indicates "keep up the good work", which implies these projects have a higher importance and satisfaction within the respondents' viewpoints and should continue to be maintained. Projects located in quadrant I include: continued education for health care professionals and non-health care professionals in the Kaohsiung area (project 1), the setting-up of goals for patient safety among different health care

facilities (project 3), education courses and benchmark learning for patient safety (project 4), medical care models for stroke and acute myocardial infarction (project 5), workshops on health education and ethics (project 7), promotion of the quality of

primary care (project 11), building a community care network (project 12), the integration of regional medical care resources (project 18), and website performance of the medical care network (project 19).

Table 1: Backgrounds of Survey Respondents (N=380)

Variables	Frequency	%	Cumulative %
Areas			
Kaohsiung	302	79.5	79.5
Ping-Tung	74	19.5	99.0
Peng-Hu	4	1.0	100.0
Gender			
Men	93	24.5	24.5
Women	287	75.5	100.0
Age			
≤ 30	105	27.7	27.7
31-40	121	31.9	59.6
41-50	93	24.5	84.1
51-60	42	11.1	95.2
≥ 61	18	4.8	100.0
Health Care Facilities			
Clinics	119	31.5	31.5
District hospitals	137	36.2	67.7
Regional hospitals	69	18.3	86.0
Medical centers	47	12.4	98.4
Long term care	6	1.6	100.0
Ownerships of health care facilities			
Public	38	10.0	10.0
Private	237	62.5	72.5
Not-for-profit	81	21.4	93.9
Non-profit associations	23	6.1	100.0
Health care facility department			
Administration	48	12.8	12.8
Medical care	146	38.6	51.4
Nursing	171	45.2	96.6
Other	13	3.4	100.0
Have participated in courses or activities in the medical care network			
Yes			
Continued education	269	70.8	70.8
Patient safety	208	29.3	29.3
Patient-centered care	100	14.1	43.4
Patient-centered care	138	19.4	62.8
Quality of care	127	17.9	80.7
Community care	71	10.0	90.7
Early intervention for children with development problems	21	3.0	93.7
Emergency medical care	45	6.3	100.0
No			
	111	29.2	100.0

Table 2: Assessment of Importance, Satisfaction and Gap

Projects	Importance		Satisfaction		Gap		t-test
	Mean	SD	Mean	SD	Mean	SD	
01. Continued education for health care professionals and non-health care professionals in the Kaohsiung area	4.04	0.703	3.88	0.722	0.16	-0.019	.000
02. Continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas	3.74	0.826	3.67	0.751	0.07	0.075	.043
03. Setting-up of goals for patient safety among different health care facilities	3.96	0.754	3.79	0.767	0.17	-0.013	.000
04. Education courses and benchmark learning for patient safety	3.98	0.731	3.78	0.772	0.2	-0.041	.000
05. Medical care models for stroke and acute myocardial infarction	3.9	0.736	3.69	0.778	0.21	-0.042	.000
06. Improve the quality of care for disabled and vulnerable population	3.87	0.772	3.67	0.808	0.2	-0.036	.000
07. Workshops on health education and ethics	3.89	0.741	3.76	0.765	0.13	-0.024	.000
08. Health care workshops for the vulnerable population	3.77	0.802	3.63	0.803	0.14	-0.001	.000
09. Prevention of sexual harassment in health care facilities	3.84	0.789	3.67	0.795	0.17	-0.006	.000
10. Promote electronic medical records system in health care facilities	3.76	0.838	3.66	0.825	0.1	0.013	.006
11. Promotion of quality of primary care	3.84	0.786	3.68	0.833	0.16	-0.047	.000
12. Building a community care network	3.87	0.777	3.72	0.798	0.15	-0.021	.000
13. Patient referral system	3.81	0.772	3.64	0.764	0.17	0.008	.000
14. Comprehensive evaluation center for children's development in the Ping-Tung area	3.65	0.9	3.56	0.792	0.09	0.108	.020
15. Early intervention for children with developmental problem in the Peng-Hu area	3.63	0.882	3.56	0.815	0.07	0.067	.104

Projects	Importance		Satisfaction		Gap		t-test
	Mean	SD	Mean	SD	Mean	SD	
16. Enhance emergency care for remote areas	3.68	0.897	3.55	0.835	0.13	0.062	.003
17. Integration of patient referral systems in remote areas	3.77	0.837	3.62	0.821	0.15	0.016	.000
18. Integration of regional medical care resources	3.88	0.821	3.71	0.822	0.17	-0.001	.000
19. Website performance of the medical care network	3.85	0.817	3.69	0.826	0.16	-0.009	.000

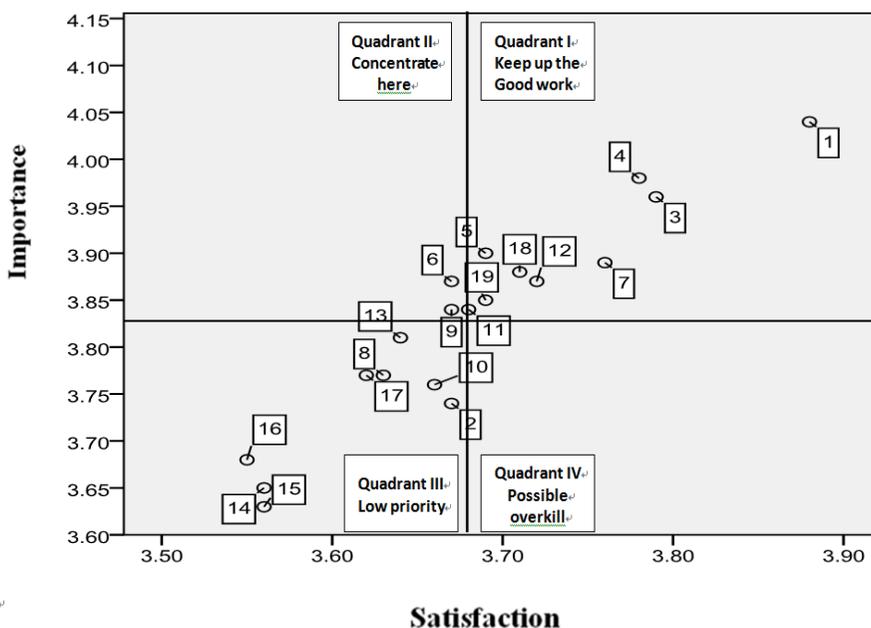


Figure 2: Results of the Importance-Performance Analysis

Quadrant II of Figure 2 indicates “concentrate here”, which implies that projects located here have higher importance but lower satisfaction from the respondents’ viewpoints. Projects in quadrant II include: improve the quality of care for the disabled and vulnerable population (project 6), and prevent sexual harassment in health care facilities (project 9). These projects need to put more effort toward improving their performances.

Quadrant III of Figure 2 indicates “low priority”, which implies that projects in this area having lower importance and lower satisfaction from the respondents’

viewpoints. The medical care network needs to reconsider the efficiency of putting resources toward them. Projects in quadrant III include: continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas (project 2), health care workshops for the vulnerable population (project 8), promotion of electronic medical records system in health care facilities (project 10), patient referral system (patient 13), comprehensive evaluation center for children’s development in the Ping-Tung area (project 14), early intervention for children with developmental problems in

the Peng-Hu area (project 15), enhance emergency care for remote areas (project 16), and the integration of patient referral systems in remote areas (project 17).

Quadrant IV of Figure 2 indicates possible overkill”, which implies projects in this area as having lower importance but higher satisfaction from the respondents’ viewpoints. The priority of providing resources for these kinds of projects needs to be reviewed. However, there is no project in this study that is located in this quadrant.

4. Discussions

The medical care network plays a significant role in the health care system of Taiwan. However, little research has studied its performance to date, nor made suggestions for effective management. This study aims to fill this research gap. Based on our best knowledge, this is the first time in literature that an importance-performance analysis has been applied to measure the performance of the medical care network in Taiwan. To enable better policy evaluations and suggestions, it is necessary to understand the importance of the network and how it performs from the health care professionals’ perspectives. Because health care professionals are directly involved in various projects in the medical care network, their experiences and opinions can provide valuable insights for network improvements. The IPA was conducted as an analysis approach, which is the innovative evaluation of the medical care network. Meanwhile, based on the study results, recommendations are proposed for management improvements, which have not been properly undertaken in previous years. The study results for the importance-performance analysis indicated that not every project presents high importance and high satisfaction from the viewpoints of health care professionals. Some projects have higher importance but lower satisfaction. Some projects even have lower importance and lower satisfaction. It is necessary to look at the characteristics of these projects in details.

The health care professionals expressed significantly higher importance scores than the satisfaction scores for every project within the medical care network ($p < 0.05$). These results are similar to previous studies (Chen and Lin, 2013; Miranda, Chamorro, Murillo, and Vega, 2010). The results also imply that there is room for improvement across all projects. With limited resources, the medical care network may look at the discrepancies between the importance and satisfaction scores and give a higher priority to those projects with greater differences in scores (Miranda, Chamorro, Murillo, and Vega, 2010). Project 5 (medical care models for stroke and acute myocardial infarction) and project 6 (improve quality of care for a disabled and vulnerable population) were the two projects with the highest differences in scores. It is necessary to place more effort into these projects in order to decrease the differences. For example, the survey respondents recorded a much higher importance score (3.90) for project 5. The satisfaction score of project 5 is slightly higher than average (3.69). Project 5 involves medical care models for cardiovascular and heart diseases. These diseases are among the top ten causes of death in Taiwan. This implies that even though health care professionals are satisfied with project 5, they still wish for it to be continuously improved because they think project 5 is very important. It is necessary to review the current medical care models for these diseases in order to ascertain areas for improvement. The benchmark learning process and shared experiences form good models that will assist the network to have better medical care models for these diseases.

Nine out of the nineteen projects (9/19=47%) are located in the “keep up the good work” quadrant. In quadrant I, the health care professionals expressed higher importance and higher satisfaction with these projects. These projects are more associated with patient safety and patient-centered care. This could due to the

increase in the awareness of quality of care in recent years. The health care delivery system in Taiwan has employed numerous resources to improve its quality when providing health care services. Several projects in the medical care network focus on providing related educational programs and workshops for health care professionals. Health care professionals will be able to receive necessary information on important topics. Thus, they presented higher satisfaction with higher importance perspectives for those projects.

Two projects (2/19=10.5%) were located in the “concentrate here” quadrant. In quadrant II, health care professionals expressed higher importance but lower satisfaction for these projects. One is project 6 “improve the quality of care for the disabled and vulnerable population. Quality of care is an important issue in the medical care network and health care professionals have higher satisfaction with general projects. However, it still did not reach optimal goals for providing care to the disabled and vulnerable population. Taiwan introduced National Health Insurance with universal coverage for its residents in 1995. Over time, access to care had been greatly improved for different populations including a disabled and vulnerable population (Lu and Hsiao, 2003). Nevertheless, more efforts are needed for continuous improvements. A medical care network can provide more access to care for those people living in remote areas and set up appropriate community programs care delivery. A medical care network can also re-evaluate the care needs of the disabled population and provide feasible services, such as dental services. Through health care system modifications and the assistance of health care professionals, it is possible to improve the quality of care for a disabled and vulnerable population. The other project in this quadrant is project 9 “prevent sexual harassment in health care facilities”. This topic is not only associated with health care professionals but also related to patients. The result implies that

such a topic still has a lot of room for improvement. A medical care network can evaluate the causes of sexual harassment and conduct reasonable activities for effective prevention. The network can provide more educational programs regarding the correct perceptions of sexual harassment to health care professionals and patients. Continual promotions in health care facilities are also in great demand. Meanwhile, regulations using the law to stop or punish sexual harassment behavior can decrease the probability of such events.

Eight projects (8/19=42%) are located in the “low priority” quadrant. In quadrant III, health care professionals expressed lower importance and lower satisfaction with these projects. The project topics were varied and more associated with specific community care. For example, comprehensive evaluation and early intervention for children with developmental problems in rural and remote areas (project 14 and 15) had relatively lower scores for importance and satisfaction. This implies that such issues do not raise the attention of health care professionals and are not really a significant problem. It may also be because there is less awareness among health care professionals and this is worthy of further evaluation. The medical care network should reassess the priority of health care delivery in rural and remote area, and make further efficient resource allocations.

There is no project located in the “possible overkill” quadrant. This result suggests that the medical care network does not waste resources on project allocation. This is a good outcome when evaluating the medical care network and can be maintained for future projects.

The study results of this research can provide valuable insights and references for other medical care networks in Taiwan. For continuous improvements, more research on performance evaluations of the medical care network in different areas are in great need.

5. Conclusions

Health care systems around the world have a similar situation with resources. Efficiently allocating the resources to the appropriate fields so as to promote population health is critical for the health care system. The medical care network in Taiwan also tries to achieve such a goal. Nevertheless, the study results indicate that its performance has not yet reached the optimum level. It is necessary to continuously evaluate the performance of the medical care network in order to develop effective strategies that ensure there is an innovative management structure in place for further improvement.

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Appendix: Importance & Satisfaction Measurement

Items	Importance		Satisfaction	
	1 ← → 5		1 ← → 5	
	Very unimportant	Very important	Very dissatisfied	Very satisfied
01. Continued education for health care professionals and non-health care professionals in the Kaohsiung area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
02. Continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
03. Setting-up of goals for patient safety among different health care facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
04. Education courses and benchmark learning for patient safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
05. Medical care models for stroke and acute myocardial infarction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
06. Improve the quality of care for disabled and vulnerable population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07. Workshops on health education and ethics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08. Health care workshops for vulnerable population	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
09. Prevent sexual harassment in health care facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Promote electronic medical records system in health care facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Promotion of the quality of primary care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Building a community care network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Patient referral system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Comprehensive evaluation center for children's development in the Ping-Tung area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Early intervention for children with developmental problems in the Peng-Hu area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Enhance emergency care for remote areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Integration of patient referral systems in remote areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Integration of regional medical care resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Website performance of the medical care network	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>