A Study of Work Performance Influence by Communication Process, Interactivity and Relation Network on Software Project Development Team

An Example of Bank in Taiwan

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Abstract: In this study, Instant Messaging(IM) software, E-mail software, social networking websites and knowledge sharing platform for the independent variables, the process of communication, interaction, relation networks, communication quality, mutual trust and work performance the impact study, this study used a questionnaire survey method for IT project officers on commercial bank.The following three research and found that:(1) CMC software will enable team members to communicate effectively and create an atmosphere of mutual trust. (2)CMC software will make effective communication quality for team members scattered in different places. (3)When the team members who use CMC software produce effective communication quality and trust, it will significantly enhance work performance.

1 INTRODUCTION

Modern enterprises use the openness and convenience brought by the Internet to improve team performance.Computer Communication(CMC) software is a tool that modern enterprises rely on gradually, but not in any industry.Banking industry has always been one of the highly regulated industries, especially the internal network security and digital transformation risk management strategy. If it can be proved that the application of CMC software is helpful to the communication and interaction of financial industry. It will serve as a reference for the financial industry.The purpose of this research is to explore work performance influence by communication process, interactivity and relation network on software project development team.

2 LITERATURE REVIEW

With the power of the social network, people can interact with others, share information and expand Personal Social Network by social networking websites (Clemons, 2009). Social networking websites provide people find people with common interests, discuss each other, share photos, and share personal information (Ahn, et al., 2007). "Perceived Usefulness", "Perceived Compatibility", "Technology Self-efficacy" and "Pressure from Social Contact at Work" will affect the organization's acceptance and adoption of IM software (Vos, et al., 2004).The research suggested that the use of instant messaging by organizations is not only affected by the characteristics (usefulness) of instant messaging and the characteristics of workers themselves (compatibility and self-efficacy), but also external influences of social pressure (social pressure at work). Such as the influence of friends and colleagues on workers.

IM software has considerable benefits in project management communication(Hung et al., 2006). E-mail and IM software are popular communication methods for students. IM software has many advantages over E-mail, such as expressing emotions, establishing good relationships, and improving user satisfaction (Lancaster, et al., 2007).Team members gain high team performance by using IM software.IM software is not only a

social tool, it can also help team members overcome psychological barriers and enhance their willingness to share knowledge (Ou, et al., 2010).

3 CONCEPTUAL FRAMEWORKS

We refer to the following research models: Computer Communication Interactivity Model(CMCIM), Media Synchronicity Theory(MST) research Model (Ou,et al.,2011)and Social Network Theory(SNT), Media Synchronicity Theory(MST) research model (Ou,et al.,2013), then combines social networking website as a research model to explore the work performance influence by CMC software on software project development team of bank. The conceptual model of this study is showed in Figures 1 below.

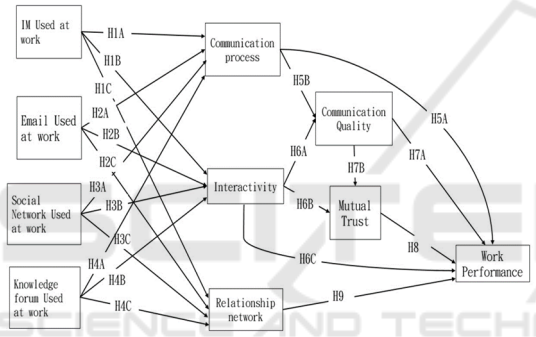


Figure 1:The research model.

The dimensions of the research model and hypotheses described below:

1. IM software used at work:
   IM software can improve active control (Nardi, et al., 2000). Team members communicate will increase team satisfaction by using real-time communication software(Ou, et al.,2011). Using IM software can affect the development of friendship between members. (Hu, et al., 2004). Combined above, the following hypotheses are presented:
   H1A: IM used at work has a positive influence on Communication Process.
   H1B: IM used at work has a positive influence on Interactivity.
   H1C: IM used at work has a positive influence on Relationship Network.

2. E-Mail used at work:
   E-mail is considered to be an appropriate CMC tool (DeSanctis& Poole,1994; Lee,1994;Ngwenyama& Lee,1997). The following hypotheses are presented:
   H2A: E-Mail used at work has a positive influence on Communication Process.
   H2B: E-Mail used at work has a positive influence on Interactivity
   H2C: E-Mail used at work has a positive influence on Relationship Network

3. Social Network websites used at work:
   Social networking websites help people find people who share a common interest, discuss each other, share photos, and share personal information (Ahn, et al.,2007). the following hypotheses are presented:
   H3A: Social Network websites used at work has a positive influence on Communication Process.
   H3B: Social Network websites used at work has a positive influence on Interactivity
   H3C: Social Network websites used at work has a positive influence on Relationship Network

4. Knowledge Sharing Forum used at work:
   (Voelpel& Han,2005) advocates that in the process of internal knowledge exchange, knowledge is constantly magnified and expanded in the context of sharing. Combined above, the following hypotheses are presented:
   H4A: Knowledge Sharing Platform used at work has a positive influence on Communication Process.
   H4B: Knowledge Sharing Platform used at work has a positive influence on Interactivity
   H4C: Knowledge Sharing Platform used at work has a positive influence on Relationship Network

5. Communication Process:
   Rogers(1986) argued that communication is a process by which information is shared to understand each other, and the interrelated process of information sharing in interpersonal interaction is called network. Borzel(1998) argued that the proposed network is based on communication and trust. Combined above, the following hypotheses are presented:
   H5A: Communication Process has a positive influence on Work Performance.
   H5B: Communication Process has a positive influence on Communication Quality.

6. Interactivity:
   Cummings(2004) argued that interaction is an important factor influencing team performance. Costa(2003) argued that team interaction is positively related to team performance, and different degree of interaction affects task performance, team satisfaction, attitude commitment and continuous commitment. Combined above, the following hypotheses are presented:
   H6A: Interactivity has a positive influence on Communication Quality.
   H6B: Interactivity has a positive influence on Mutual Trust.
   H6C: Interactivity has a positive influence on Work Performance.

7. Communication Quality:
   (Hambley, et al.,2007)argued that higher the interaction between the members of the team, the less super-vision. the following hypotheses are presented:
   H7A: Communication Quality has a positive influence on Work Performance.
   H7B: Communication Quality has a positive influence on Mutual Trust.

8. Mutual Trust:
   Mutual trust among employees has been seen as a must (Panteli&Sockalingam, 2005). The trust in the team has positive relationship with team performance, team satisfaction and commitment. High trust will produce better team performance (Costa, 2003). Combined above, the following hypotheses are presented:
   H8: Mutual Trust has a positive influence on Work Performance.

9. Relationship Network
   (Ou, et al., 2010)argued that team members can reduce the cost of searching knowledge by sharing knowledge. The following hypotheses are presented:
   H9: Relationship Network has a positive influence on Work Performance.

4 DATA ANALYSIS

4.1 Descriptive Statistical Analysis

We adopt convenience survey in this study, the questionnaire was distributed to the information project participants of each bank, and the paper questionnaire and online questionnaire were adopted. The paper questionnaire was issued to the northern bank in Taiwan. The questionnaire was issued on May 05, 2015, and 244 valid questionnaires were collected. Information project development for 6-10 years seniority of participants most, ac-counted for 44.26%, more than 6 years seniority, accounted for 81.9% of the whole.

From the questionnaire statistics, In the use of IM software, Line is the most frequently used, with a proportion of 41.35% and Microsoft Lync with 36.43%, while Skype accounts for 16.83%. In the use of E-MAIL software, Microsoft E-mail was the highest, accounting for 65.10 percent, compared with 27.57 percent for Gmail. It can be seen that the degree of relying on Microsoft E-mail is very high, which is related to the choice of Microsoft Operation System and Microsoft Office. In the use of social networking websites, about 51 percent of people have used it, half of whom have not used it.In the use of knowledge sharing platform, Microsoft's SharePoint is up to 52.80 percent. It's the same brand of the computer operating system used by most companies. This product takes the pre-emptive opportunities. The second is "Google Sites" 21.68% and the third is Open KM 6.29%.

4.2 Reliability and Validity Analysis

In this study, the reliability and validity analysis of SmartPLS and SPSS statistical software were conducted.On reliability, using the method of internal consistency Cronbach's alpha value as this questionnaire reliability measure standard, the results of the analysis as shown in table 1, the various dimensions Cronbach's alpha values are higher than 0.7 above, this study all dimensions internally consistent method has a good reliability.

This study used convergent validity and discriminant validity as the criterion for test validity. Composition reliability (CR) is greater than or equal to 0.7 and the average variance extraction (AVE) is greater than or equal to 0.5. It can be seen from table 1 that the numerical values of each dimension of this study are consistent, and therefore, all the dimensions of this study have convergent validity.

In Discriminant validity, the average variance extraction(AVE) method was used in this study. Table 2 is the result of the AVE test in this study. For each Dimension, the AVE value of diagonal lines is greater than the square value of the correlation coefficient between horizontal and

vertical. Therefore, the questionnaire data have discriminative validity.

5 HYPOTHESIS VERIFICATION RESULTS

In this study, the research model analysis, t value, path coefficient and significance as show in table 3.

Hypothesis 1A to 4A, independent variable was respectively "used of IM software", "used of E-mail", "used of social networking websites" and "used of knowledge sharing platform". The dependent variable was “communication processes”. The results show that the independent variable is 0.336 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.05. therefore, hypothesis H1A, H2A and H3A are all valid. Used IM software, used of E-mail and used of social networking sites have a positive influence on the communication process. Hypothesis H4A is not established, which means that team members do not think that the knowledge sharing platform is an important means of communication.

Hypothesis 1B to 4B, independent variable was respectively "used of IM software", "used of E-mail", "used of social networking websites" and "used of knowledge sharing platform". The dependent variable was “Interactivity”. The results show that the independent variable has 0.291 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.01. However, the used of knowledge sharing platform has no statistically significant influence on the interaction. Therefore, hypothesis H1B, H2B and H3B are valid, H4B is not valid. Used of IM software is the most significant, and it means that members of the project agree to interact with IM software.

Hypothesis 1C to 4C, independent variable was respectively "used of IM software", "used of E-mail", "used of social networking websites" and "used of knowledge sharing platform". The dependent variable was “Relationship Network”. The results show that the independent variable has 0.26 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.05. However, the use of knowledge sharing platform has no statistically significant influence on the Relationship Network. Therefore, hypothesis H1C, H2C and H3C are valid, H4C is not valid.

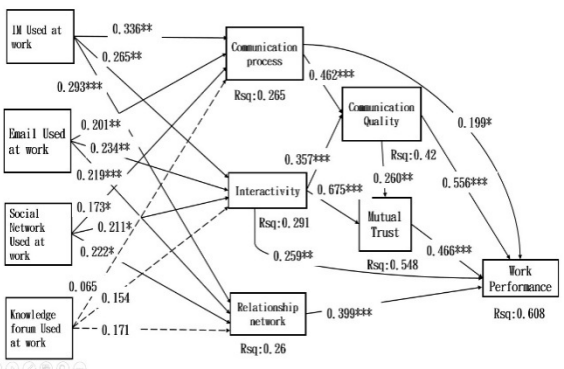
Hypothesis 5B, 6A, independent variable was respectively "communication process” and “Interactivity”. The dependent variable was “communication quality”.The results show that the independent variable has 0.42 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.001. Therefore, hypothesis H5B and H6A are valid. The “communication process” and “Interactivity” have positive influence on the “Communication Quality”.

Hypothesis 6B, 7B, independent variable was respectively "Interactivity" and "Communication Quality". The dependent variable was “Mutual Trust”.

The results show that the independent variable has 0.548 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.01. Therefore, hypothesis H6B and H7B are valid.

Hypothesis 5A, 6C, 7A, 8, 9, independent variable was respectively “Communication Process”, “Interactivity”, “Communication Quality”, “Mutual Trust”, “Relationship Network”. The dependent variable is the Work Performance. The results show that the independent variable has 0.608 for the dependent variable R Square. In terms of statistical significance, the P-value significance less than 0.05. Therefore, hypothesis H5A, H6C, H7A, H8 and H9 are valid.

It can be seen from table 3 that except for the use of knowledge sharing platform to other dependent variables, all other hypotheses are valid. In terms of statistical significance, the Interactivity has the highest influence on the Mutual Trust. It also means that information project developers will increase their mutual trust by increasing interactivity during the project development process. Figure 2 shows the R Square, path coefficient, and significance of the various configurations.



p<0.05* p<0.01** p<0.001***

Figure 2: Research model and path coefficient

6 CONCLUSIONS

The sample is based on people involved in the development of financial information projects. From the statistical evidence in this research and the verification of the measurement tools, the results show that the model proposed in this study has 26%~60.8% explanation power. It is pointed out that, apart from the fact that the knowledge sharing platform is not significant, all the other aspects have significant influence. The results are as follows:

1. The research results indicate that the management of the information project development team should be able to improve the quality of work by using CMC software in the communication process, interactivity and relationship network.
2. According to this research result, the information project development team will enhance the team's communication quality and mutual trust when communicating and interacting with CMC software, which will also significantly enhance the performance of the work. However, most of the information development project members use IM software, E-mail software, and less knowledge sharing platform. Team members believe that knowledge sharing platform is used for knowledge sharing rather than instant interaction, so it is less willing to use knowledge sharing platform.
3. When the project development has not been completed, the knowledge sharing platform has less influence on the performance of team members, perhaps be influenced by after the project development is complete.The application of knowledge sharing platform to education training after product completion may improve the performance of other team members.Other empirical research may be needed.

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APPENDIX

Table 1: Reliability, Component Reliability and Average Variation Extraction analysis

Dimensions	Reliability Cronbach's Alpha	Component Reliability	AVE	R Square
Use of instant messaging software.	0.712	0.816	0.601	
Use of Email software.	0.702	0.825	0.608	
Use of Social Network web sites.	0.707	0.831	0.622	
Use of Knowledge Sharing Platform	0.700	0.830	0.626	
Communication Process	0.709	0.827	0.614	0.265
Communication Quality	0.891	0.914	0.606	0.420
Interactivity	0.867	0.894	0.515	0.291
Mutual Trust	0.850	0.890	0.576	0.548
Relationship Network	0.854	0.896	0.632	0.260
Work Performance	0.884	0.905	0.502	0.681

Table 2: Reliability, Component Reliability and Average Variation Extraction analysis

Dimensions	Use of instant messaging software.	Use of Email software.	Use of Social Network web sites.	Use of Knowledge Sharing Platform	Communicat ion Process	Communicat ion Quality	Interactivity	Mutual Trust	Relationship Network	Work Performa nce
Use of instant messaging software.	0.775									
Use of Email software.	0.747	0.780								
Use of Social Network web sites.	0.191	0.269	0.789							
Use of Knowledge Sharing Platform	0.356	0.278	0.277	0.791						
Communication Process	0.446	0.610	0.241	0.218	0.783					
Communication Quality	0.512	0.501	0.252	0.260	0.547	0.778				
Interactivity	0.284	0.515	0.163	0.269	0.235	0.466	0.717			
Mutual Trust	0.340	0.622	0.218	0.205	0.533	0.532	0.703	0.759		
Relationship Network	0.335	0.451	0.284	0.238	0.507	0.505	0.505	0.682	0.795	
Work Performance	0.289	0.417	0.282	0.319	0.581	0.404	0.581	0.699	0.682	0.710

Table 3: The research result

Hypothesis		Standardized Coefficient (Beta)	t Statistics	p Value	Result
H1A	Using IM software -> Communication Process	0.336	3.190	0.001(**)	Valid
H2A	Using Email -> Communication Process	0.201	2.890	0.005(**)	Valid
H3A	Using Social Network web sites -> Communication Process	0.173	1.967	0.049(*)	Valid
H4A	Using Knowledge Sharing Platform -> Communication Process	0.065	0.531	0.596	not valid
H1B	Using IM software ->Interactivity	0.265	3.178	0.001(**)	Valid
H2B	Using Email -> Interactivity	0.234	3.258	0.006(**)	Valid
H3B	Using Social Network web sites -> Interactivity	0.211	2.268	0.01(*)	Valid
H4B	Using Knowledge Sharing Platform -> Interactivity	0.154	1.131	0.189	not valid
H1C	Using IM software ->Relationship Network	0.293	3.865	0(***)	Valid
H2C	Using Email -> Relationship Network	0.219	3.175	0(***)	Valid
H3C	Using Social Network web sites -> Relationship Network	0.222	2.582	0.01(*)	Valid
H4C	Using Knowledge Sharing Platform ->Relationship Network	0.171	1.592	0.1	not valid
H5B	Communication Process ->Communication Quality	0.462	5.085	0(***)	Valid
H6A	Interactivity -> Communication Quality	0.357	3.865	0(***)	Valid
H6B	Interactivity ->Mutual Trust	0.675	8.329	0(***)	Valid
H7A	Communication Quality ->Work Performance	0.200	1.805	0.006(**)	Valid
H7B	Communication Quality -> Mutual Trust	0.260	2.812	0.005(**)	Valid
H5A	Communication Process ->Work Performance	0.199	1.144	0.049(**)	Valid
H8	Mutual Trust -> Work Performance	0.466	4.612	0(***)	Valid
H6C	Interactivity -> Work Performance	0.259	3.101	0.009(**)	Valid
H9	Relationship Network -> Work Performance	0.399	4.034	0(***)	Valid

$p<0.05$* $p<0.01$** $p<0.001$***