A CLASSIFICATION OF FACTORS RELATED TO THE ACCEPTANCE OF CLOUD COMPUTING TECHNOLOGY BY PERSONNEL IN SMALL BUSINESS IN THAILAND

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ABSTRACT

In the age of digital economy in which digital technology is changing the game in business across the globe, technology is key for the success of a business operation. An important aspect affecting the success of technology implementation lies in the acceptance of the technology by corporate users. Many researchers have studied factors related to the acceptance of new technologies in various contexts using different theories. This research study aims to investigate the factors which previous works have shown to provide conflicting results and which are tested in the present study in the context of the acceptance of cloud computing technology by personnel in small business in Thailand. Eight factors are derived from 3 theories, namely Perceive Ease of Use and Perceived Usefulness from TAM, Compatibility, Complexity, and Relative Advantage form DoI, and Security and Trust, Technology Readiness, and External Pressure form TOE Framework. Testing the classification of these factors using Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) reveals that classifying the factors according to the original data from the literature review corresponds to the empirical data, thus making it suitable for a study of factors influencing the acceptance of cloud computing technology of personnel in small businesses in Thailand. These factors can be further analyzed using advanced statistical analysis.

Keywords: 1) Technology Acceptance 2) Factor Analysis 3) Cloud Computing Technology 4) Small Business

1. Introduction

Digital Technology is vital and widespread in today's world. In order to succeed in the digital economy, a business corporation must be ready to make adjustments for the transition into a technology-based organization, which involves the ability to implement digital technology for its administration and operation, the introduction of modern digital technologies into the organization and the status as a data-management organization. The development of information technology and online social media produces information from many different channels. Organizations in the age of digital economy are, consequently, faced with constantly overwhelming information. The ability to manage information has become essential in creating a competitive edge. (Chareonwongsak, 2017) Implementing digital technology in various aspects of a business operation helps create a significant difference that will, in turn, help the business maintain its competitiveness because digital technology can reduce cost, increase production quality, enhance operation flexibility and efficiency, minimize the time required to respond to customers' needs, and generate new

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business opportunities and innovations. It is essential, therefore, for both public and private organizations to welcome a transition to the digital world. (Lorenzini, 2017)

The Thai government has announced the policy for Thailand to become Thailand 4.0. A main concept of this policy states that an adjustment to embrace digital technology is one of the major directions that are changing the world. (Karnasuta, 2017) The policy framework called Thailand Information and Communication Technology Policy Framework (2011-2020), or ICT2020, aims to make necessary preparations for Thailand to enter a digital economy in order to achieve sustainability, comprehensiveness and equality. Cloud computing technology is referred to as a technology that is effecting global changes and that is to have a larger impact in the next 5-10 years. Making use of this technology in business operation will help the business cut costs, access data through Internet networks and implement shared services for economical purposes. The expense for system rental is charged on a pay-per-use basis according to the users' present and future demands. This enables small organizations to compete with larger ones without having to make a major investment in information technology. (Alkhater, et al., 2014; Alshamaila, et al., 2013; Powelson, 2012)

However, an important aspect in introducing a new technology into an organization is the technology acceptance of the users in the organization, which affects the degree of success of the technology implementation. If the technology is not accepted by the users, the implementation cannot be successful (Tan, 2009) and will result in a waste of money, time, and business opportunities. A study by Achimugu et al. (2009) found that the levels of technology acceptance in small- and medium-sized businesses in developing countries are quite low.

2. Research Objectives

To find factors related to the acceptance of cloud computing technology by personnel in small business in Thailand, and to classify the factors in order to find a guideline to investigate further how to enhance the level of the acceptance of cloud computing technology in businesses which will, in turn, increase the opportunity for business success.

3. Literature Review

A review of literature related to the acceptance of new technologies indicates that there are many factors influencing the acceptance of new technologies in both public and private organizations. The factors vary according to the theories employed and applied by the researchers. There are, however, 3 main theories used in studies of new technology acceptance, namely Technology Acceptance Model (TAM), Diffusion of Innovation Theory (DoI) and Technology-Organization-Environment Framework (TOE Framework). TAM was proposed by Davis (1989) and is accepted and recognized as providing an indicator of the success of technology implementation, a detailed explanation of users' behavior and intention, and a prediction of an individual's acceptance of information technology.DoI, a concept proposed by Rogers (1995), explains the process of communication to create social perception and introduce an innovation through a channel at a specific time. This theory focuses mainly on the qualifications of the innovation. The TOE Framework, developed by Tornatzky et al. (1990), is a decision-making process to analyze the acceptance of an information system to be implemented in an organizational operation. The framework comprises 3 key components affecting the technology acceptance, namely technology, organization, and environment.

Each theory features a different set of investigative factors. Employing only one theory in a study would be insufficient for a comprehensive analysis. Therefore, the current

study brings together the major theories to provide more comprehensive results. In addition, the researcher attempts to provide a new perspective in this issue by isolating dominant factors in each theory that were said to have conflicting results in previous studies and testing them in the context of the acceptance of cloud computing technology by personnel in business corporations in Thailand. These factors are 8 in total, as follows: Perceived Ease of Use and Perceived Usefulness from TAM, Compatibility, Complexity, and Relative Advantage from DoI, and Security and Trust, Technology Readiness, and External Pressure from TOE Framework, as shown in Figure 1

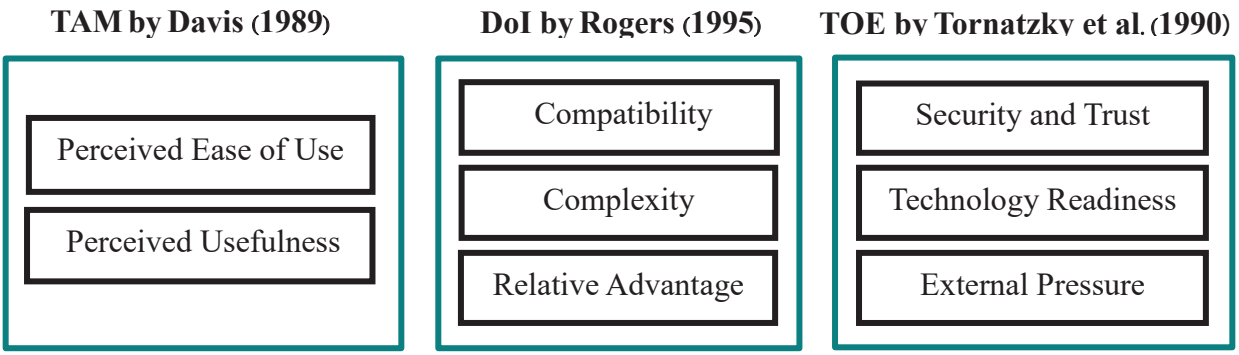

Figure 1: Eight Key Factors from Their Respective Theories

Since the 8 factors are derived from 3 different theories, the researcher conducts a factor analysis using Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) in order to investigate the suitability of grouping the 8 factors according to the data from the literature review and the possibility of regrouping the questions in new categories in order to conduct a further study based on these results.

4. Research Methodology

The population of this research study comprised 2,747,943 people engaged in small businesses in Thailand. (National Statistical Office, 2017). The data collection employed a questionnaire. The data analysis was conducted based on the 447 questionnaires that were completed.

5. Results

5.1 Findings from the Confirmatory Factor Analysis (CFA)

A Confirmatory Factor Analysis (CFA) was conducted to check whether the questions under the same variables (9 variables comprising 8 major factors (independent variables) and 1 dependent variable, and 38 questions in total) were internally consistent and whether the questions should remain grouped under their respective original categories. Cronbach's Alpha was used to determine whether each component was at an acceptable level of .7 (Cronbach, 1990). The results are shown in Table 1.

Table 1: The Cronbach's Alpha Results of the 9 Variables

Independent/Dependent Variables	Number of Questions	Question Items	Cronbach's Alpha Results
Independent Variables (Major Factors)			
Compatibility	4	1-4	0.846
Security and Trust	4	5-8	0.853
Technology Readiness	4	9-12	0.892
External Pressure	5	13-17	0.850
Perceived Ease of Use	4	18-21	0.791
Complexity	4	22-25	0.806
Relative Advantage	4	26-29	0.885
Perceived Usefulness	5	30-34	0.865
Dependent Variable			
Intention to Use Cloud Computing	4	35-38	0.937

Table 1 shows that all the 9 variables have the Cronbach's Alpha results that are higher than 0.7. This confirms that classifying the questions according to the data from the literature review is effective and can be applied in a study of factors influencing the acceptance of cloud computing technology by personnel in small businesses in Thailand. Nevertheless, the researcher also conducted an Exploratory Factor Analysis (EFA) to see if the results from the data collection based on the completed questionnaires could be used to develop a questionnaire featuring new factors.

5.2 Findings from the Exploratory Factor Analysis (EFA)

The Exploratory Factor Analysis (EFA) based on Total Variance Explained results in the classification of 6 components, with each component featuring the Eigen Value of higher than 1. However, the new components are internally inconsistent, and the number of questions in each group varies dramatically one from another. When the components are purposively grouped by increasing and decreasing the number of groups by 1 at a time starting from the number derived from the Eigen Value which is 6, the resulted numbers of groups are 5, 7, 4, 8 , 9, and 10 respectively, and the statistical results still reveal that the new groups of factors are internally inconsistent and that the numbers of questions in the groups are different in that some groups do not have corresponding questions, some only have one question, some have two, and some have more than 8 questions. It could, therefore, be deduced that the new classification of the factors is inefficient and not suitable for further statistical analysis. This also shows that the classification of factors according to the data from the literature review is suitable for a study of factors influencing the acceptance of cloud computing technology by personnel in small business in Thailand.

6. Conclusions

The results from the Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) indicate that grouping the factors according to the data from the literature review corresponds to the empirical data and can be used suitably to study factors influencing the acceptance of cloud computing technology by personnel in small business in Thailand in an analysis using advanced statistical analysis.

7. Recommendations for Future Research

The findings of this factor analysis can be used as preliminary data for further studies investigating the relationships among components using Path Analysis in Structure Equation Model (SEM) in order to explore the influences of causal relations among factors related to the acceptance of cloud computing technology in business corporations in Thailand

8. Appendix: Measurement Items

Compatibility (Adapted from Oliveira, et al., 2014; Lian, et al., 2013)

1. Cloud computing technology is relevant to the organizational culture and values.
2. The characteristics of the work in the company suit the implementation of cloud computing technology.
3. The implementation of cloud computing technology is well suited to today's business operation.
4. Cloud computing technology can be used with the existing hardware and software in the company.

Security and Trust (Adapted from Park and Kim, 2014; Lian, et al., 2013; Gupta, et al., 2013; Pavlou and Fygenson, 2006)

5. The company's private data are secure when serviced by a cloud computing technology service provider.
6. Unauthorized parties cannot access the company's information or data stored by cloud computing technology.
7. Cloud computing technology provides a safe transfer channel for mass data.
8. Cloud computing technology providers are able to safely store the company's data even though they are damaged by spam/malware.

Technology Readiness (Adapted from Oliveira, et al., 2014)

9. The company is able to use cloud computing technology to support its operation.
10. The company's personnel have necessary skills to use cloud computing technology.
11. The company has the necessary infrastructure for the implementation of cloud computing technology.
12. The company has an infrastructure for the Internet connection necessary for the implementation of cloud computing technology.

External Pressure (Adapted from Hsu, et al., 2014; Oliveira, et al., 2014)

13. The company thinks that cloud computing technology is influential in business competition.
14. The company is pressured by the fact that the competitors are using cloud computing technology (hence, the necessity to also implement it).
15. The company is pressured by the fact that the business partners are using cloud computing technology (hence, the necessity to also implement it).
16. The government has a policy to support the use of cloud computing technology in businesses.
17. The government has enforced appropriate regulations to control the use of cloud computing technology.

Perceived Ease of Use (Adapted from Gupta, et al., 2013; Opitz, et al., 2012; Pavlou and Fygenson, 2006; Yi, et al., 2006)

18. Cloud computing technology is easy to use.
19. Implementing cloud computing technology would not cause technical complication in the company.
20. Implementing cloud computing technology in the company would not require much effort to change the employees' mindset.
21. Cloud computing data and tools can be accessed anywhere.

Perceived Complexity (Adapted from Lian, et al., 2013)

22. Transferring or adjusting existing systems to a cloud computing technology platform is complicated.
23. Using cloud computing technology is complicated.
24. Using cloud computing technology is too complicated for a business operation.
25. The skills necessary for the implementation of cloud computing technology are too complicated for the company's employees.

Relative perceived advantage (Adapted from Oliveira, et al., 2014; Lian, et al., 2013)

26. Cloud computing technology enables efficient business management.
27. Using cloud computing technology can increase business production.
28. Cloud computing technology can enhance the efficiency of the communication of business partners.
29. Cloud computing technology can provide users with real-time data.

Perceived usefulness (Adapted from Park and Kim, 2014; Hsu, et al., 2014; Lian, et al., 2013; Opitz, et al., 2012; Davis (1989)

30. Using cloud computing technology enhances the performance and effectiveness of the operation.
31. Using cloud computing technology increases the flexibility of the company's implementation of information technology.
32. Using cloud computing technology can enhance the relationship between the company and its customers.
33. Cloud services can be customized and designed to meet the company's needs.
34. Cloud services can analyze different sets of online data simultaneously.

Intention to Use Cloud Computing (Adapted from Opitz, et al., 2012)

35. If I were in a position to make decisions, I would intend to use cloud computing technology.
36. If I could access cloud computing technology, I expect that I would use this technology.
37. I intend to use cloud computing technology.
38. We will start using cloud computing technology soon.

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