Determinants of Cloud Computing Adoption

Byeong-Yun Chang', Yabibal Afework[2], Seok-Jun Ko[3] and Jong-Hun Lee[4,*]

'School of Business Administration and [2]Graduate School of International Studies, Ajou University, Suwon, Korea (South)
[3]Department of Electronics Engineering, Jeju National University, Jeju, Korea
[4]Robotics Research Division, Daegu Gyeongbuk Institute of Science & Technology, Daegu, Korea

[1]bychan7@ajou.ac.kr, [2]yabib4@gmail.com, [3]sjko@jejunu.ac.kr, jhlee@dgist.ac.kr (*corresponding author)

Abstract. The major objective of this research is to examine the main determinants of an information technology adoption with a special emphasis on cloud computing adoption in Rep. of Korea by combining and modifying the two widely used IT adoption theories i.e. Diffusion of Innovation Theory and Technology, Organization Environment Framework. To achieve the objective factor analysis and logistic regression methods are employed to analyze data from 60 IT experts' opinions. Based on data analysis relative advantage and top management support were found to be the most determining factors of cloud computing adoption in Rep. of Korea.

Keywords: Information technology adoption, cloud computing, Diffusion of Innovation, Technology Organization Environment

1 Introduction

Firms are increasingly attempting to integrate business processes into their existing information system applications and build internet based technologies to transact with their trading partners and customers [1, 2]. Traditional IT, that binds applications to specific physical hardware such as servers, storage and network devices, is too rigid to respond to organizational imperatives in a timely manner [1].

In many ways, the business benefits from the adoption of cloud computing are so obvious that the revolution should have already happened [3]. Though it has been recognized as new era of information technology which provides firms a potential to improve their business operations, it is yet to cross its stage of infancy, with only a limited number of adopters currently, owing to some of the challenges of its widespread of adoption such as infrastructure availability, technological complexity and many other cost and security related issues.

The main objective of this study is to investigate the major determinant factors of cloud computing adoption among Korean firms. By combining and modifying the two widely used IT adoption theories-Diffusion of Innovation (DOI) theory[4], and Technological, Organization and Environmental (TOE) framework[5], the following eight factors were identified as determinants of cloud computing adoption: top management support, formalization, IT infrastructure availability, organizational size, technological complexity, relative advantage, trading partners' pressure, and competitive pressure. To achieve this objective, we apply several statistical approaches including factor analysis, reliability analysis (using Cronbach's alpha), multicollinerity analysis and logistic regression. The necessary data was obtained from selected IT experts.

It was found that relative advantage and top management support are the most determining factors of cloud computing adoption while trading partners' pressure has a negative relationship with the dependent variable.

2 Research Model

After extensive review of related literature, we have incorporated the two widely used IT adoption models i.e. Diffusion of Innovation (DOI) theory and the Technology Organization Environment (TOE) framework to identify the determining factors of cloud computing adoption in Korea at organizational level. As shown in Figure 1 eight factors are considered as the most determinants of cloud computing adoption by combining both DOI theory and TOE framework. In addition, eight hypotheses are developed.

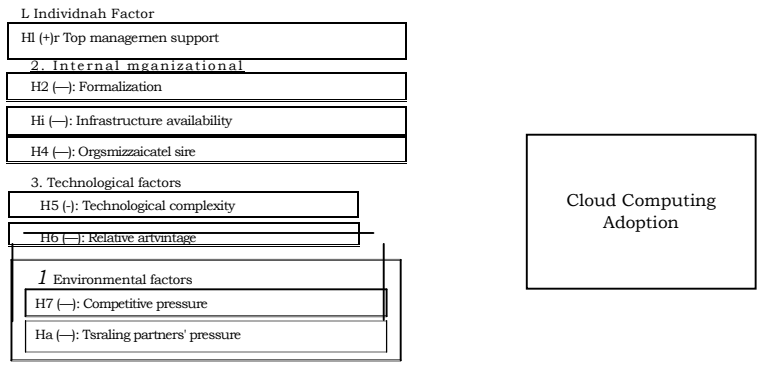

Figure 1: Conceptual Model for Cloud Computing Adoption

Hl: Top management support will be positively correlated with the adoption level of cloud computing.

112: Degree of formalization will have a positive relationship with cloud computing adoption.

113: The existence of ICT infrastructure will be positively related with the adoption of cloud computing

H4: The larger the firm, the more likely they will adopt cloud computing.

H5: Technological complexity will be a problem to adoption of cloud computing.

H6: Relative advantage will be positively related with cloud computing adoption.

H7: Competitive pressure will enhance companies adopt the cloud computing.

H8: Trading partners pressure will be positively related with the adoption of cloud computing.

3 Methodology and Data Analysis

Logistic regression is used to test the degree of correlation of the eight variables with cloud computing adoption. [6]:

$$g(y) = A + Am + AFR + AIA + AOS + ATC + ARA + ACP + ATP$$

where:

- $g(y)$ is the dependent variable which is natural logarithm of the odds ratio.
- $8_{)}$ is the constant and. ..... , 8_8 are coefficients of the independent variables.
- TS (top management support), FR (formalization), IA (infrastructure availability), OS (organizational size), TC (technological complexity), RA (relative advantage), CP (competitors pressure), and TP (trading partners pressure) are the dependent variable.

Before we proceed to conducting logistic regression, it is important to test validity and reliability of the constructs. Factor analysis helps us to simplify the complex and diverse relationships among observed variables. Moreover, it also helps to group the set of observed variables into a smaller set of new unobserved variables called factors with a minimum loss of information [6, 7]. The factor analysis is:

$$X_{1} = v_{io)}\,CF_{(1)} + v_{1(2)}\,CF_{(2)} + \cdots + v_{1(m)}\,CF_{(m)} + e_{1}$$

M

$$X_p = V_{p(D}CF_{(i)} \pm V_{p(2)}CF_{(2)} \pm \bullet\bullet\bullet\bullet + V_{p(n)}CF_{(n)} + e_p$$

- Here there are m p) common factors, denoted by $CF,_{)}$, i= 1, 2,...m.
- $v_{i(i)}$, j= 1, 2.., p, i= 1, 2...m.
- e_i,j= 1, 2...p.

The factor analysis result shows that the 7 factors are identified (TP, RA, FR,

CP, TS, TC, OS). In addition, through logistic regression analysis, relative advantage and top management support are found to be the most determinants of cloud computing adoption in Korea with the p- value of 0.017 and 0.023, respectively. The logistic regression results are shown in Table 1.

Table 1: Logistic Regression Result

Predictor variables	**13** coefficients	S.E.	Wald	df	Sig.
TP	-0.142	0.904	0.025	1	0.875
RA	2.145	0.896	5.736	1	0.017
CP	0.406	0.667	0.371	1	0.543
TC	-1.544	1.224	1.59	1	0.207
TS	2.876	1.269	5.142	1	0.023
FR	0.214	0.812	0.069	1	0.792
OS	0.133	0.722	0.034	1	0.853
Constant	-13.391	8.56	2.447	1	0.118

4 Conclusions

In this study, we have develop and validate a research model by applying Diffusion of Innovation (DOI) theory and the Technology Organization Environment (TOE) frame work in the context of cloud computing adoption in Korea. Seven factors were selected as determinants of cloud computing adoption. These were top management support (TP), formalization (FR), organizational size (OS), technological complexity (TC), relative advantage (RA), competitors pressure (CP) and trading partners pressure (TP). Primary data was collected from IT experts and analyzed using various statistical analysis techniques. Logistic regression method was applied to test the relationship between the dependent (cloud computing adoption level) and the seven independent variables. According to logistic regression analysis result, it was reviled that relative advantage and top management support are the most determinant factors of cloud computing adoption.

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