The Character of Top Leader on Adoption of Cloud Predictive Analysis for Urban Planning of Small and Medium Enterprises

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ABSTRACT
In recent years, one of the most important technology in Information Technology (IT) world is cloud computing. Small and medium enterprises (SMEs) with low budget and human resources are one of the major groups that tend to use Cloud Predictive Analysis for Urban Planning for achieving the benefit of this technology. In this case, the most fundamental factors that play important role for adoption new information technology such as Cloud Predictive Analysis for Urban Planning is top manager. Top manager behaviours are critical for creating a supportive climate and for providing adequate resources for the adoption of cloud computing. The aim of this research is to investigate four factors namely: vision setter, motivator, analyzer and task master that affect on top manager behavior, and affect of top manager behaviors on adoption of cloud computing for small and medium enterprises. In this research, we used questionnaire to evaluate the top manager behaviors and a questionnaire was given to a number of employees those worked in IT department of their SMEs in Asia that use cloud computing technology. The data were analyzed through Partial Least Square (PLS). In this study, all measurements have an acceptable value. Based on the result obtained in the study, the overall results strongly confirm the reliability and validity of the questionnaire. Finally the hypotheses support by the results.

KEYWORDS: Cloud Computing, Predictive Analysis, Urban Planning, Top Manager Behaviors

1.0 INTRODUCTION

During Economies are comprised of many companies, majority of which are Small and Medium- sized Enterprises (SMEs). They play a very important role in each market by significantly contributing to each country's Gross Domestic Product (GDP) and its labor market. Therefore proposing new strategies or developing new systems that can help SMEs become more efficient and productive is not only beneficial for SMEs but also for the economy as a whole. One of the strategies that can help SMEs become more efficient is the use of appropriate Information and Communication Technologies (ICT). Size and structure of SMEs make them face many challenges. The main challenge is to not have access to enough resources (e.g. financial resources) [1-5]. Moreover, in comparison to large companies, small firms have less tolerance in bearing cost and risk of adopting new innovations. SMEs are very cost conscious; they should keep their costs under control. Although adopting new technologies help SMEs gain competitive advantage, it usually involves high cost. Fixed costs, operation costs and training costs are different types of costs that are usually parts of any IT investment. On the other hand, in many cases the actual cost of project becomes higher than the initial estimate [5-10]. The high costs and risks that are involved in IT projects prevent SMEs to easily invest in or adopt new technologies. Cloud computing is a new phenomenon, which helps SMEs tackling many issues such as, cost and risk management [10-15]. Top management support and behaviours are critical for creating a supportive climate and for providing adequate resources for the adoption of new technologies [1-3]. As the complexity and sophistication of technologies increase, top management can provide a vision and commitment to create a positive environment for innovation [3-6]. Top management plays an important role because cloud-computing implementation may involve integration of resources and reengineering of processes [6-9]. Moreover, previous research has found that the size of a firm is one of the major determinants of IT innovation [9-12]. Some empirical studies have indicated that there is a positive relationship between top management support and adoption of new technology [12-15]

2.0 LITERATURE REVIEW

We conducted a literature review to show the impact of top manager on adoption of cloud computing on small and medium enterprises.

2.1 Cloud Computing

Cloud computing is commonly described as the usage of computing resources provided as services over network .Different definitions and domains have been attributed to cloud computing. It provides various services for users in spite of not having relevant information over the technology structures. Therefore, it actually can be called "service on the cloud" [15-20].

Cloud computing have a five important characteristics are identified by the NIST to make a distinction between cloud computing from other computing models, which could be categorized as common and essential characteristics. These characteristics are categorized as follow: On Demand Self- Service, Broad Network Access, Resource Pooling, Rapid Elasticity and Measured Service [20-25].

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. These services divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a- Service (PaaS) and Software-as-a-Service (SaaS). The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams [25-30].

Various deployment models are proposed based on the cloud computing environments availability and the intended access methods. Access permission or limitation is depending on the type of information, business processes and organization characteristics. More limited environment is required in some organizations to certify that the only accurately authorized users can use deployed cloud services of certain resources [8-15]. In this section, a number of clouds computing deployment models are discussed that comprise of public cloud, private cloud, hybrid cloud and community cloud [16-20].

2.2 Cloud Computing & Small and Medium Enterprises

The size and structure of SMEs gives them some advantages including fast communication between employees and their managers and their ability to rapidly implement and execute decision. But in most cases these companies face many disadvantages. Most of the challenges that SMEs face are due to their lack of access to enough resources. These resources include but not limited to financial and human resources. This limitation makes SMEs weaker than large companies in terms of financing, planning, control, training and also information technologies [30-39]. Keeping cost under control is one the biggest challenges that SMEs faces. It is not feasible for SMEs to spend a significant amount of money on their Information Technology (IT). In addition to their high cost, IT projects usually involve a high risk of failure too. About 20 percent of IT projects are canceled before completion and less than a third is finished on time and within budget with expected functionality Overall SMEs have low tolerance in bearing costs and risks that are involved in IT investment [17-29].

Cloud computing, as a new computing paradigm, offers many advantages to companies, especially smaller ones. Flexibility, scalability, and reduced cost are just some of many advantages that cloud computing offer to SMEs. Cloud computing enhances companies' competitive advantage [1-16]. It also enables SMEs to access sophisticated technologies without spending significant amount money. These advantages help SMEs grow larger and become more efficient, productive and innovative, by allowing SMEs to focus on their core business [17-27]. This is applicable to both start-ups and already existing companies. It should also be noted that cloud providers are specialized in providing IT services; therefore, the service provided by these companies is better than the service that is delivered by IT department of SMEs. Relying on massive, centralized data centers, results in achieving economies of scale. Cloud's security measures are implemented on large scale, which makes it much cheaper. This is another result of levering economies of scale [28-39].

2.3 Top Manager and Information System

The study of the managerial role in an information system context is important for several reasons. First, IT in the 1990 has become less a support mechanism and more a strategic resource. Second, rising global competition, advancing technology, and the restructuring of organizations require more sophisticated technology-based communications, coordination, and control systems. If companies are to take advantage of IT as a competitive weapon in this changing world, then effective leadership in managing the development and implementation of IT is required [1-10].

Many companies are redesigning business processes in their effort to improve their competitive

position in the marketplace. Likewise, the trend toward corporate downsizing means that complex organizations are trying to do more with fewer employees. These efforts trigger the increasing use of cross-functional teams that come together for specific projects. Clearly, IT has a special role to play here. Given these staggering expenditures, top management is naturally concerned about a payoff from investments in IT [10-20].

Top management support is one of the most often-cited critical success factors among the enterprise system literature. Executives must be willing to allocate valuable organizational resources and must have the credibility to build strategic partnerships with different areas.

The critical success factor literature recognizes top management support as the most important factor for ensuring enterprise system implementation success. From an historic perspective, the management literature has also reinforced the importance of top management support. Equally, Information System (IS) implementation literature recognizes its importance [21-39].

3.0 MOTIVATION OF RESEARCH

This study has important implications for the IS and cloud computing. It is important to understand how a manager can influence adoption of cloud computing. Managers can have an impact on adoption of cloud computing through their own behavior. Therefore, managers should persistently use positive practices and focus on expressing the central values and goals of the organization [1-7].

Many studies have attempted to explain the adoption of cloud computing but little attention has been given to the individual's behavior and characteristics, in spite of the potential effectiveness of these factors. Most systems fail to meet the objectives and goals defined for them, not because of technical issues, but because of psychological and organizational issues that are not well addressed during the implementation and use of the system [8-18].

This study explores the roles of top management behavior, such as vision setter, motivator, analyzer and taskmaster, on adoption of cloud computing. The results call for managers to pay attention when use new technology such as cloud computing during the implementation, post implementation and adoption phases [19-39].

4.0 RESEARCH MODEL

Many researchers proposed a broad portfolio of top management roles including vision setter, motivator, analyzer, and taskmaster. Hopefully, this model will provide us a higher explanatory power to examine top manager role in adoption of cloud computing on SMEs. In this model, we used the most effective factors that influences top manager behavior and effect of top manager behavior on adoption of cloud computing on SMEs (Figure 1).

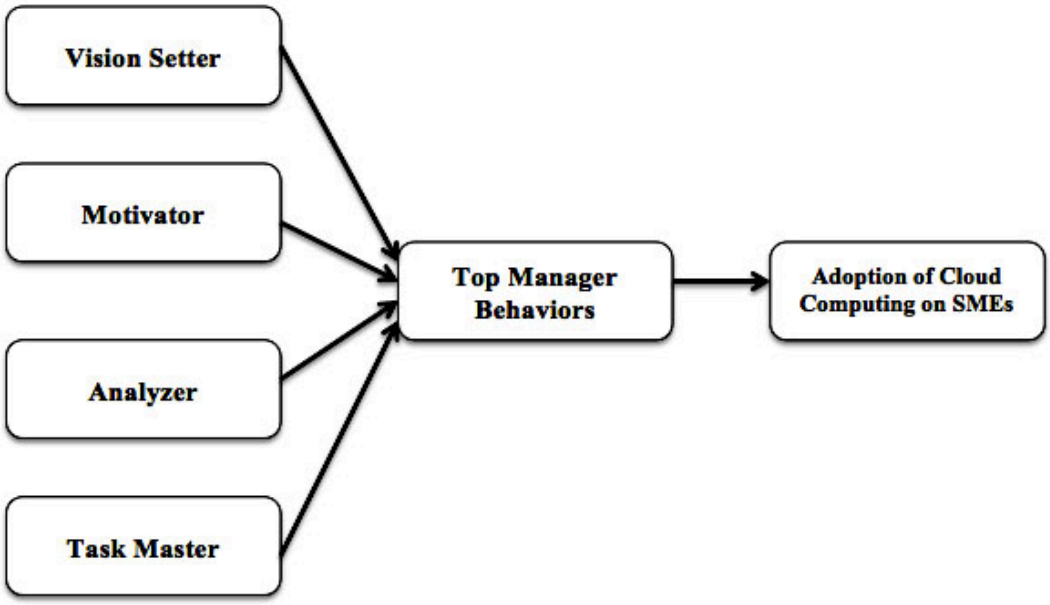

Figure 1. The Model of Top Manager Behaviors on Adoption of Cloud Computing on SMEs

5.0 RESEARCH HYPOTHESES

We proposed a broad portfolio of top management roles including vision setter, motivator, analyzer, and taskmaster. Top manager is responsible for developing the company. In the new century, information technology is used in all dimensions of sciences and works, so a successful manager must have a plan for developing their company and in base of the plan uses of required information technology. According to Hart and Quinn, we developed hypotheses (H1, H2, H3 and H4), hypothesis (H5) developed base on pervious research about adoption of cloud computing.

The vision setter role is related to defining and articulating the firm's basic purpose and future directions. To fulfill this role, the executive leader must spend considerable time monitoring and studying emerging social, economic, and technological trends. During this process, the top manager selects relevant information from the environment and sets up an appropriate vision for the organization.

H1. *Top manager vision setter role effect positively on Top manager behaviors*

The motivator role refers to translating the vision of the firm into a cause worth fighting for. To play this role, the top manager must create a sense of excitement and vitality within the organization to motivate employees to accomplish the organization's goals.

H2. *Top manager motivator role effect positively on Top manager behaviors*

In playing the analyzer role, the leader focuses on making the internal operating system efficient. An executive top manager sets the context, shapes the decisions made by the operating system, and maintains control over the process of management.

H3. *Top manager analyzer role effect positively on Top manager behaviors*

The task master role, the top manager focuses on the firm's performance and responsibilities. In a narrow sense, this role is associated with economic performance and the demands of the market. In a broader sense, it results in social performance and responsibility. To fulfill this role, an executive top manager needs not only to influence decisions made at lower levels, but also to make trade-offs explicit and to allocate resources to the highest priority activities.

H4. *Top manager task master role effect positively on Top manager behaviors*

Top management behavior plays an important role in cloud computing adoption as it involves the allocation of resources, integration of services and re-engineering of processes. Top manager is responsible for developing the company. In the new century, information technology is used in all dimensions of sciences and works, so a successful manager must have a plan for developing their company and in base of the plan uses of required information technology.

H5. *Top manager behaviors effect positively on adoption of cloud computing on SMEs*

6.0 MATERIALS AND METHODS

Study population and research design

The study design used for this research was Structural Equation Modeling (SEM). The population of interest was defined as a group of cloud computing expert chosen from employees of small and medium enterprises in Asia. The respondents were the individual's expert in IT field who have worked for the SMEs.

Research tool

This was a survey research. A questionnaire was developed after extended literature review. The questionnaire was given to a number of expert employees from IT department, who presents the actual sample of this study. Therefore, the questionnaire was emailed into the IT department in 66 SMEs of Asia that used cloud computing in their systems.

Data Collection

Data collection was conducted via an online questionnaire emailed to heads of Information Systems of 66 SMEs in Asia (all of these SMEs as some cloud customers of one cloud provider in Asia and 50 completed responses were received. The respondents who were cloud computing expert users in small and medium enterprises and have been worked in IT department of their SME were asked to answer the questions according to their top manager.

7.0 DEMOGRAPHIC FACTORS

All of the 50 respondents were from IT department of their SMEs. Table 1 depicts the Socio-demographic characteristics of the respondents. According to our findings, most of the respondents were male (66 %) and they were between 30-40 years old (56%). 66% or participants were married and 64% of them had a bachelor degree. Table 1 shows the result of this section.

Table 1. Socio-Demographic Characteristics of the Respondents

Variable	Classifications	N	%
Gender	Male	33	66%
	Female	17	34%
Age (Year)	20-30	11	22%
	30-40	28	56%
	40-50	10	20%
	>50	1	2%
Marital Status	Single	17	34%
	Married	33	66%
Education	Bachelor	32	64%
	Master	13	26%
	PhD	5	10%

8.0 EVALUATE PROPSE MODEL

8.1 Statistical analysis

We used Partial Least Square (PLS) for data analysis. Indeed, even a casual glance at the IT literature suggests that Structural Equation Modeling (SEM) has become necessary in validating

instruments and testing linkage between constructs [1-18]. The PLS procedure, as one of the SEM techniques, has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of non- normality and small to medium sample sizes. It allows the researchers to both specify the relationships among the conceptual factors of interest and the measures underlying each construct. The logical analysis was running by using smart partial least squares (Smart PLS 2.0), which adopted the structural equation modeling (SEM) technique [19-28].

The PLS technique can be very helpful to obtain measures about the internal reliability and validity of the research model. These measures can show the level of relationship's strength between the defined constructs in the model. These three concepts are as the requirements the model proposed that should be acquired. Thus, in order to confirm the reliability and validity of the research model, this paper has shown the results from the internal reliability perspective and the validity perspective for the constructs [29-39].

8.2 Reliability and Validity

Internal consistencies of all variables are considered acceptable since they exceed 0.70, signifying tolerable reliability [1-6]. Smart PLS also shows the composite reliability. The acceptable values for composite reliability would be the same as the researcher sets for Cronbach's alpha. The composite reliability should be greater than 0.60 for exploratory purposes [35]. The composite reliability of this study is greater than 0.60 for all measurements (Table 2). The internal consistency was measured using Cronbach's alpha (α) [7-17]. Alpha should be greater or equal to 0.80 for a good scale, 0.70 for an acceptable scale, and 0.60 for a scale for exploratory purposes.

Validity is displayed when each measurement item related strongly to its assumed theoretical construct. These two validities capture some of the aspects of the goodness of fit model, i.e., how well the measurement items relate to constructs. When factorial validity is acceptable, it means each measurement item correlates strongly with the one construct it is related to, while correlating weakly or not significantly with all other constructs. Smart PLS also shows the validity. Establishing discriminant validity requires an appropriate Average Variance Extracted (AVE) analysis. We examined to check whether the square root of every AVE (there is one for every latent construct) is much larger than any correlation among any pair of latent constructed. As a rule of thumb, the square root of each construct should be much larger than the correlation of the specific construct with any of the other constructs in the model [18-24] and should be at least 0.5 [25-39] (Table 3).

Table 2 illustrates the results of the reliability and validity analysis of different constructs of the questionnaire. The composite reliability should be greater than 0.60 for exploratory purposes. The composite reliability of this study is greater than 0.80 for all measurements [1-6]. Moreover, reliability of the scales is tested using the Cronbach alpha. The internal consistency was measured using Cronbach's alpha (α) [7-17]. Alpha should be greater or equal to 0.80 for a good scale, 0.70 for an acceptable scale, and 0.60 for a scale for exploratory purposes. In this study, all measurements have a value greater than 0.80. Establishing discriminant validity requires an appropriate AVE analysis that must be at least 0.50 [18-29]. In this study, all measurements had values much higher than 0.60 (Table 2).

Table 2. Reliability and Validity Statistics for the Questionnaire Items

Construct	Composite Reliability	Cronbachs Alpha	Average Variance Extracted (AVE)
Vision setter	0.898568	0.935608	0.835315
Motivator	0.899123	0.881406	0.927117
Analyzer	0.915642	0.912219	0.984081
Task master	0.920351	0.953395	0.875447
Top manager behaviors	0.904726	0.984578	0.847131
Adoption of Cloud Computing on SMEs	0.945972	0.883738	0.984082

Table 3. Square root for the Top Manager Behaviors and Adoption of Cloud Computing

Construct	R Square
Top manager behaviors	0.768562
Adoption of Cloud Computing on SMEs	0.699126

9.0 HYPOTHESES TEST

For preceding the study, according to the evaluation and prediction of the structural model, some data about the path coefficients (β), T-values (T), P-values (P) and squared R (R^2) are identified in details.

- Path coefficients (β): Path coefficients (β) show how strong and significant the associations between dependent and independent variables are. It means that, a path coefficient reveals the immediate influence of a variable (considered as cause) that is supposed to result in a different variable (considered as effect). Since a Path coefficient can be identified based on the correlation, it is standardized while a path regression coefficient cannot be considered standardized.

- Hypothesis testing: According to Reddy and Chin, for conducting the hypothesis testing the path significance can be determined via t-tests values by using the bootstrapping procedure. Commonly, the acceptable value for T-values larger than two. (T-value >2) means significant level.

- P-value: The P-value can be considered as a quantitative measure of the numerical importance of testing a hypothesis. Furthermore, regarding the studies conducted formerly, P-value < 0.05 implies the significance of the related hypothesis.

- Squared R (R^2): The R^2 shows the expected effect of the model of dependent variables through estimating the percentage of a construct's variance in the model.

Table 4. Summary of the Results

Construct	Path coefficients	T-value	P-value
Vision setter → Top manager behaviors	0.356902	5.231513	3.32588E-06
Motivator→ Top manager behaviors	0.407190	6.418291	4.87824E-08
Analyzer→ Top manager behaviors	0.3600871	5.300726	2.61071E-06
Task master→ Top manager behaviors	0.3496521	6.784345	1.30525E-08
Top manager behaviors→Adoption of Cloud Computing for SME	0.6432019	9.329542	1.57474E-12

The results showed that all hypothesized relationships were significant. In summary, the results of hypothesis testing are as below:

I. First hypothesis, vision setter did positively influence on top manager behaviors, was supported.
   - (β=0.356902, t- value=>1.96, p=<0.5)

II. Second hypothesis, motivator did positively influence on top manager behaviors, was supported.
- (β=0.407190, t- value=>1.96, p=<0.5)

III. Third hypothesis, analyzer did positively influence on top manager behaviors, was supported.
- (β=0.3600871, t- value=>1.96, p=<0.5)

IV. Forth hypothesis, taskmaster did positively influence on top manager behaviors, was supported.
- (β=0.3496521, t- value=>1.96, p=<0.5)

V. Fifth hypothesis, top manager behaviors did positively influence on adoption of cloud computing for SME, was supported.
- (β=0.6432019, t- value=>1.96, p=<0.5)

In summary, the formulated hypotheses were supported by the data. The preceding constructs together explained 0.768562 of the variance in the dependent construct: Top Manager Behaviors, and Top Manager Behaviors showed 0.699126 of the variance in the dependent construct: Adoption of cloud computing for SMEs (see table 3). Past research in adoption of information technology shows top manager is one of the most important factors in adoption of new technology. And also the pervious study about adoption of cloud computing shows the importance of top manager. In this research, the results show the influents of top manager behaviors and shows the top manager affect directly and positively on adoption of new technology such as cloud computing.

10.0 CONCLUSION

Cloud computing will be a new trend for companies using in near future, because of the benefits, which it brings to its adopters. The number of users is also growing at a fascinating rate. Cloud computing is a new IT with only few companies who have already adopted and implemented it to their business operations. Following top management that recognizes the benefits of cloud computing will likely allocates the necessary resources for its adoption and influences the organizational members to implement the change. Where they fail to conceive the benefits of cloud computing to the business, the management will be opposed to its adoption. The purpose of this study is to identify factors that affect on top manager behaviors that play important role for adoption of cloud computing. Top manger behaviors and the factors that affect on top manager behaviors influent directly and positively on adoption of new information technology like cloud computing.

In summary, our findings confirmed the optimum number of items for each of the constructs of the prepared model to produce adequate reliability. The survey measurement tool was revised based on the findings of this research. The questionnaire will be administered to a larger population for data analysis and examining the hypotheses. The findings of the main study could help the small and medium enterprises to understand the potential of top manger behaviors as an important factor adoption of cloud computing.

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