Effect of Third-Party Cloud Computing Usage on Intra-Organizational Coordination

Research-In-Progress

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Abstract

Previous studies have established the impact of information technology on interdepartmental cooperation. However, the move from distributed computing to centralize computing as a result of cloud adoption is having an impact on the current type and level of coordination in workplaces. This study attempts to identify factors influencing the type of coordination strategy and the moderating effect of cloud computing usage. Specifically the study contends that cloud computing usage strengthens the effect of goal alignment and task interdependence on the cooperative intensity between the IT department and business line. Hopefully, data from an online survey of managers and their subordinates will be used to test hypothesis advanced in this study.

Keywords

Organizational coordination, cloud computing, cooperative intensity.

Introduction

Increasingly cloud computing is the tool used to achieve organizational goal of effective operational processes and efficient use of information technology resources (Marston et al. 2011). Cloud computing has a potential to transform the IT industry by making software and hardware more attractive as a service. One dimension of cloud computing, software-as-a-service, has been forecasted to increase by 17.9% to $14.5 billion and the growth will remain strong through 2015 (Gartner, March 2012) as firms are looking forward to lowering initial set up cost, painless integration and regular updates of software.

Although customers are excited about the benefits of cloud computing, they are fretful at the same time about the prospects of cloud computing. They are excited at the opportunities to reduce capital costs in acquiring information system, a chance to divest infrastructure management, an opportunity to focus on their core competencies and the ability to align information technology with business strategies more readily. However, customers are also very concerned about business continuity, data lock-in, data transfer, performance unpredictability, data confidentiality, data auditability and the loss of direct control over systems for which they are nonetheless accountable for (Armbrust et al. 2010). This loss of control over computing resources affects the ability of IT department to deliver its core functions to the business line in a timely fashion which could result in inter-functional conflict. Inter-functional conflict can impede growth in organization. Thus it important to go beyond the structural form of an organization and to look more closely at how the use of cloud computing impacts processes that use this type of computing resource to accomplish its task.

The summary report of the 4th Annual trend in cloud computing by CompTIA (2013) states among other things that 60% of firms that adopted cloud computing but later switched to their on-premise computing attributed the cause of the switch to cloud computing providers not providing the needed control, security, integration, reliability and performance. Hall and Khan (2003), opinioned that the benefits of a new technology can only be realized when the new technology is widely diffused and used. Decision to use a new technology is made after comparing the uncertain benefits of the new technology against the uncertain cost of adopting it. An understanding of the impact of the use of a technology such as cloud computing on organization is important to both the creators and users of such technologies.

Prior literature on cloud computing has focused on the technical perspective covering topics such as security protocols, performance improvement and technical resource maximization. Business researchers have called for the need to investigate business issues related to cloud computing (Marston et al. 2011). Research on cloud computing in the business domain has focused on the study of the strength, weakness, opportunity and threats to the use of cloud computing (Sultan 2010; Sabahi 2011). However, cloud computing has been thought to have an impact on corporate culture. Marston et al. (2011) called for more scholarly research in this respect. One aspect of corporate culture is the level or type of cooperation that exist within the organization and it is in this respect that this study extends from the extant literature on business related cloud computing to look more closely at the impact that using a third party cloud computing has on organization culture.

In information system research, studies on adoption of cloud computing have discussed issues such as drivers and inhibitors of the technology (Nkhoma and Dang 2013; Benlian et al. 2009; Armbrust et al. 2010). There is little theoretical framework specific to the impact of cloud computing on inter-functional or intra-organizational coordination. This study therefore seeks to explore if the rapid adoption and use of cloud computing will affect the way different departments or functional units interact. The focus of this study is to examine the moderating effect of third party cloud computing usage on the coordination between IT department and Business.

This study will attempt to apply coordination theory and determinants of cloud usage to explore answers to the above research questions by conducting an online survey of staff of organizations using cloud computing has their source of computing resources. A parsimonious model that include the effect of key factors such goal alignments, task interdependence, cloud computing usage and cooperative intensity will be tested. Cooperative intensity as a characteristic that describes an organization's culture is a reflection of the level of cooperation among its various units. Coordination theory has used to study process design which requires cooperation between various units in organization (Crowston 1997). This study contributes to the information systems literature by using the concepts of coordination theory to understand how cloud computing usage impacts organizational management.

The rest of this study is structured as follows the next sections outline recent literature on coordination theory and clouding computing. The research model and method used for this research are then discussed. Detail explanation of how the analysis of data will be conducted will be discussed next. Finally, expected results and limitation to the study will be presented.

Background and Model

The study bridges two distinct research areas from the literature on organizational management and cloud computing adoption. More specifically, the two areas of relevance are interdepartmental (IT – Line of Business) cooperation and the effective use of cloud computing respectively. Thus, this section will describe the current research landscape in each of these areas and discusses the contribution of this study which ties these areas together and advances an understanding of the interaction between cloud computing usage and interdepartmental interaction through hypotheses.

IT department-Business Line interaction

The wide spread use of information systems has affected the productivity of most activities in organizations. The IT department plays several roles in organizations among which include providing technological support to the whole organization wherever needed and enhancing the efficiency of the organization by keeping hardware and software up to date. In studying the challenges facing the role of IT department, (Hoyer and Stanoevska-Slabeva 2009) concluded that it is the responsibility of the IT department to abstract the complexities of the underlying information technology infrastructure and provide support to actual end-users towards services delivery. This could place the IT department as an intermediary between different functions of the organization and between the organization and its external partners. Successful execution of an intermediary role of IT department requires support and cooperation from management and other functions. Some organizations appoint IT champions has a focal point for the advancement and resolution of issues when a new technology is being implemented or during normal operation. The value of IT champion is realized when resources, information and political support availability are not a constraint (Beath 1991).

Model Development

Coordination theory

This study uses coordination theory as one approach to analyzing the interaction between IT department and other functional areas. Coordination theory consists of principles about how activities can be coordinated to achieve a harmonious working environment (Crowston 1997). According to coordination theory, actors in organizations face coordination problems because of dependencies between actors and process that constraints how tasks can be performed (Crowston, 1997:159). This requires identifying the coordination mechanisms currently in use and then trying alternative coordination mechanisms in their place. Formal and informal coordination involves many mechanism including goal development and alignment, resource management and employee interaction managements that all contribute to effective cooperation between various functional units within the organization. Cooperative intensity measures the degree and frequency of the lateral social interactions between various subunits or functional units within the organizations (Luo et al. 2006). There is evidence that cooperation and competition be strategically stimulated to promote knowledge transfer across functions in organization within the firm to enhance financial performance and customer satisfaction (Luo et al. 2006).

Goal Alignment

Organizations are composed of different functions which are either self-regulatory or centrally managed. Irrespective of the structure, functions require a coordinated mechanism to achieve their objectives (Bariff and Galbraith 1978). The quality of goal alignment which is the degree to which organizational and functional goals are supported and activities are synchronized is important to making firms competitive. Therefore, objective alignment is a coordination mechanism for managing the dependency between tasks and between actors by finding the appropriate action to achieve organizational goal. Achieving these goals require timely and appropriate decision making based on available information. This makes the role of the information technology department even more relevant in today's organizational settings. In a conceptual study researching the political impact of information systems, Bariff and Galbraith (1978) suggested that since information systems have the ability to preserve or alter decision-making processes and structure of the organizations. Information systems have been used as a means for redistributing influence within organizations and these impacts the interactions between the IT department and other departments. However, if the goals of IT department and other departments are properly aligned, the quality of the interactions between these departments will be impacted. Thus, for the organization to achieve its objectives, the working relationship between the IT department and other departments must be cordial. Hence,

> H1: IT department-Business goal alignment has a positive effect on IT department-Business Line cooperative intensity.

Satisfaction with Co-worker

Because organizations are made of individuals who compete for organization's scare resources to achieve their functional goals, the type of interactions between the individuals in the organization will affect the level of cooperation between the functional units. The presence of any form of conflict will affect the productivity of employees thus influencing the effect of the relationship between the functional units. The main differentiating factors between low and high performing organizations are the incentive systems, employee commitments and effective inter-functional and intra-functional coordination that exist in those organizations (Tuominen et al. 2000). The functional relationship between the IT department and other units in organizations that are highly dependent on information technology has to be effective and conflict free. And this depends on satisfaction of the working relationship between co-workers in the organization. This inter-functional relationship depends not only management mandated working relationship but on the level of cordial relations between the individuals in the various units. Therefore,

> H2: The quality of satisfaction with co-workers has a positive effect on IT department-Business Line cooperative intensity.

Task Interdependence

Organizations have numerous computer applications process a lot of task or activities that are either independent or create interdependencies among functional units. The impact of any loss of IT process or activities and the length of time it takes to recover these activities influences other units' view of the IT department. The interdependencies created by these computer systems have the potential to cause strain between functional units. Organizational strain usually arises between units when one of the units controls the other conventionally or legitimately. Stymne (1968), premised in his empirical study of communication and strain in organizations that, strain arises in communications when there exist differences in influence between units of formal equal importance. Therefore to meet functional goals, units that highly depend on information technology will have to establish open and effect communications and working relationship between them and the IT departments. Also, since the achievement of overall organizational goals in IT dependent organizations has an effect on the funding and reputation of IT department. It is in the interest of the IT department therefore to work towards establishing a good working relationship with other units. As a result,

> H3: IT department - Business line level of task interdependence has a positive effect on IT department-Business Line cooperative intensity.

**Cloud Computing and Task Inter-dependability**

Cloud computing offers organizations the ability to effectively use time- distributed computing resources. Low et al. 2011, in a study investigating factors that affect the adoption of cloud computing by firms in the high-tech industry identified relative advantage, top management support, firm size, competitive pressure and pressure from trading partner as factors influencing their decisions. Cloud computing usage leads to reduced infrastructure costs and energy savings as well as reduced upgrades and maintenance costs. Cloud computing services allow an organization to control when, where, and how employees have access to the organization's computer systems which is managed over a simple web-based interface such Amazon Web Services (AWS). This arrangement helps employees make full use of the company's computer systems through powerful devices such as a smartphone or a netbook. Since providers of this kind computing system are external to the organizations, it is the responsible to the IT department to monitor the external partner to make sure service level agreements are met. Also, it is the responsible of IT department to provide the other units of the organization with any needed technical support (Hoyer and Stanoevska-Slabeva, 2009) since the providers of computing services do not reside within the organization. This increases the role IT department as an intermediary between the organization and external entities. Thus,

> H4: Effective cloud computing usage moderates the relationship between task interdependence and IT department-Business Line cooperative intensity such that increased cloud usage strengths relationship between resources dependability and cooperative intensity.

Cloud Computing and Goal Alignment

A challenge to the adoption of cloud computing by large organizations is the lack of confidence in cloud computing providers to manage mission-critical applications (Dillon et al. 2010). Large organizations seek commitment to high quality of service and availability guarantees. While Amazon Web Services Service Level Agreement currently commits to an annual uptime percentage of 99.95% over the trailing 365 days, which is enough for most small and medium-sized organizations, large organizations deemed that as insufficient for mission-critical applications. Even though many in-house IT services often fail to live up to such uptime standards, organizations adopting cloud computing have a higher chance of aligning their ideal requirements with cloud providers than with only their IT departments. Hence,

> H5: Effective cloud computing usage moderates relationship between goal alignment and IT department-Business Line cooperative intensity such that increased cloud usage strengthens the relationship between goal alignment and cooperative intensity.

Figure 1. Research Model
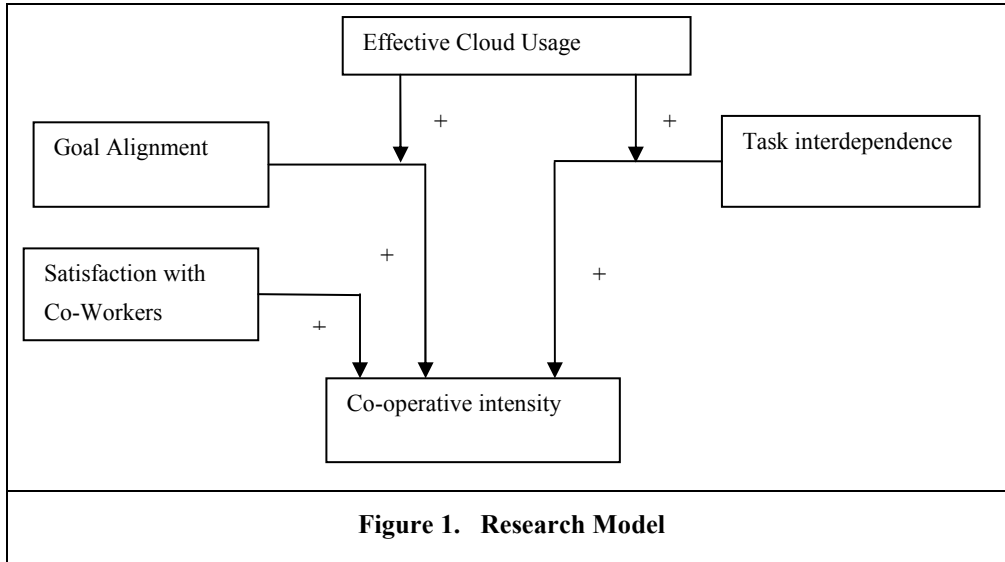
Research Plan – Data Collection Strategy and Measures

The above hypotheses will be empirically tested by gathering data through a survey of managers and subordinates in organizations using cloud computing. A list of clients of a large cloud computing provider will be contact to participate in the survey. We are hoping to receive enough responses from these clients for statistically significant test. However, to arrest any potential low response rate, we are in contact with another cloud provider for a potential list of clients to be contact to participate in the study.

Cloud Computing clients will be surveyed using a 23 multi-item measures scored on seven-point liker scale each ranging from strongly disagree to strongly agree as shown in the table below.

Table 1. Construct Definition and Measurement Item Sources

Table			
Main Constructs, Sources and Definition			
Main Constructs	Constructs Sources	Definition	Key Informants
Cross-functional cooperative intensity	Luo, Slotegraaf, & Pan, (2006b)	the extent of the frequency and closeness of the lateral social interactions between IT Department and Business Line	Functional Managers
Goal Alignment quality	Mirani, Rajesh & Lederer, Albert ,(1998)	The degree to which a process ensures that organizational and functional goals are supported and that resulting actions are synchronized.	Functional Managers
Task interdependence	Campion et al. 1993	Structural task interdependence that relates to the inherent technological structure of production of goods or service processes	Functional Employees
Co-Workers Satisfaction	Shouksmith, G; Pajo, K; Jepsen, A, (1990)	assesses opinions about coworkers on technical competence, attitudes towards innovations, and assessments of personal characteristics	Functional Employees
Effectiveness of Cloud Use	Ananth Srinivasan, (1985)	a firm's expertise in usage of cloud services	Functional Managers

Conclusion

Using coordination theory this study attempts to answer the unaddressed question about the impact of cloud computing adoptions on the level of cooperation between the IT department and other units within an organization. This study will make a theoretical contribution by bridging the gap between management and information systems as it seeks to understand the theories that explain of cloud computing adoptions and interdepartmental management.

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Appendix I- *Sample Questionnaire:*

		Strongly Disagree	Disagree	Agree	Nether Disagree Nor Agree	Agree	Agree
	Cross-Functional Co-operative intensity	1	2	3		4	5
1	All departments here share communications frequently in our business						
2	All departments frequently discuss common problems in our business	1	2	3		4	5

3	Information technology department personnel share close ties with people in other departments	1	2	3		4	5
4	Relationship with other departments is mutually gratifying and highly cohesive	1	2	3		4	5
5	Strong interdepartmental social relationship expected to exist far into the future	1	2	3		4	5
6	There is little informal interaction among people from different departments	1	2	3		4	5

Goal Alignment

7	Departments are aligned well with stated organizational goals	1	2	3		4	5
8	Information technology help establish useful linkages with other organizations/departments	1	2	3		4	5
9	Information technology enabled the organization to response more quickly to change	1	2	3		4	5

Cloud Computing Usage

10	Frequency of use or accesses cloud computing resources per month	1	2	3		4	5
11	Average connect time per access to cloud computing resources	1	2	3		4	5
12	A large number of formal reports/documents generated per month using cloud computing	1	2	3		4	5
13	My department is a frequent user of cloud computing relative to other departments	1	2	3		4	5

Task Interdependence

14	I cannot accomplish my task without information or materials from other members of IT department	1	2	3		4	5
15	Other departments depend on me for information or materials needed to perform their task	1	2	3		4	5
16	In the organization, jobs performed by department are related to other department	1	2	3		4	5

Satisfaction with Co-Workers

17	The people you work with in your organization are friendly	1	2	3		4	5
18	The people you work with in your organization are intelligent	1	2	3		4	5
19	The people you work with in your organization are too old fashioned	1	2	3		4	5
20	The people you work with in your organization should not have gotten to where they are	1	2	3		4	5
21	The people you work with in your organization are unwilling to try out new ideas	1	2	3		4	5
22	The people you work with in your organization are snobbish	1	2	3		4	5
23	The people you work with in your organization are boring	1	2	3		4	5