International Journal of Applied Engineering Research
ISSN 0973-4562 Volume 10, Number 4 (2015) pp. 9185-9200

http://www.ripublication.com

Task-Technology Fit (TTF) Model To Evaluate Adoption of Cloud Computing: A Multi-Case Study

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Abstract

Cloud computing technology (CCT) provides software applications, storage, computing power and other services from remote data centers with internet support. Obeidat and Turgay (2012) applied Triple-T and TAM models to evaluate adoption of cloud technology. To evaluate the performance impact of cloud technology in the organization, this study attempts to apply TPC (technology to performance chain) model, which is a combination of TTF (task technology fit) and utilization models. A detailed survey in the form of questionnaire was carried out around four multinational IT firms. The feedback data collected from senior project people has been examined in detail. It is found that all the surveyed firms supported use of CCT to increase effectiveness of individuals in performing their job tasks. Production timeliness, system reliability, ease of use, authorization to access data, automation and training are found as positive factors that influence the individual performance through CCT usage. TPC is found as a useful model to evaluate adoption of CCT.

Keywords: Cloud Computing, mobile cloud computing, Technology to Performance Chain.
JEL: C42, C83, L86.

Introduction

Based on its features, characteristics and capabilities, a technology extends its services to perform particular tasks of a user. Businesses have been rapidly adopting

mobile and cloud-based technologies with an eye on achieving strategic goals. There are several and almost similar descriptions in literature about cloud computing as a technology. According to Murah (2012), cloud computing is a technology that allows users to access software applications, hardware, storage, technology processes directly from the web. It is one of the latest technologies that is being feted by the IT industry as the next (potential) revolution to change how the internet and information systems operate and are used by the world at large (Sharif, 2010). According to Ercan (2010), cloud computing is becoming an adoptable technology for many of the organizations with its dynamic scalability and usage of virtualized resources as a service through the Internet. Krikos (2010) reported that there are three criteria assessing in characterizing cloud computing as a disruptive technology - as an innovation, targeting customers at the low end of a market with modest demands on performance, and networking in the form of a fully integrated single entity or a set of modular entities.

Cloud computing is a new information technology (IT) paradigm that promises to revolutionize traditional IT delivery through reduced costs, greater elasticity, and ubiquitous access (Hsu, Ray and Li-Hsieh, 2014). Cloud computing is a service-oriented technology that incorporates both hardware and software delivered on-demand through a network regardless of time and location (Marston, Li, Bandyopadhya, Zhang and Ghalsasi, 2011). Cloud computing is a dynamic technology platform that addresses a wide range of needs by providing cyber-infrastructure to maintain and extend information storage capabilities (Ratten, 2013). Cloud computing uses the Internet and central remote servers to maintain data and applications. It provides the ability to save files or run applications for external host servers. Cloud computing permits many businesses keep their business plan up to date, whilst withholding the necessary resources to quickly adapt to the market.

Application, storage and connectivity are the three major segments of Cloud computing and each segment is meant for a purpose and presents different products for businesses and individuals around the world. Cloud computing supports various service models like Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) and deployment models like Public cloud, Private cloud, Hybrid cloud and Community cloud.

Mobile cloud computing (MCC) also comes under cloud computing and is treated as cloud2 technology used for collaboration and mobility. According to Dihal et al (2013), MCC is a way to obtain cloud computing resource, that is storage, processing power, development and software for mobile value services accessible via a combination of mobile and/or wireless networks, using resources available in the platform within the networks and/or combined with a shared pool of technology resources available on mobile devices. Mobile cloud applications move the technology power and data storage away from mobile phones and into the cloud, bringing applications and mobile technology to not just smartphone users but a much broader range of mobile subscribers. With the explosion of mobile applications and the support of cloud computing for a variety of services for mobile users, MCC is introduced as an integration of cloud computing into the mobile environment. It brings new types of services and facilities for mobile users take full advantages of cloud computing (Dinh et al , 2013). Cloud computing is a way to enhance the world

of mobile application by providing disk space and freeing the user of the local storage needs, by providing cheaper storage, wider accessibility and greater speed for business (Ularu et al , 2013).

Literature Review

The literature review reveals that many studies were (and currently are being) conducted on the use of cloud computing by large scale enterprises primarily on their perceptions about cost reduction, ease of use and convenience, reliability, sharing and collaboration, security and privacy. Obeidat and Turgay (2012) used the Technology Trade Theory (Triple-T) model, which is the product of the integration of two models: the social exchange theory and the technology acceptance model (TAM) to evaluate the adoption of cloud technology. Their study concluded that the adoption of cloud computing leads to a net balance of benefits over costs and organizations should adopt cloud computing systems.

Lin and Chen (2012) used the diffusion of innovation (DOI) theory proposed by Rogers (1995) to identify the factors that potentially affect IT professionals' intention of using cloud computing to provide products and services to their customers. Their findings suggest that in addition to the benefits of cloud computing such as its computational power and ability to help companies save costs, as the primary concerns of IT managers and software engineers are compatibility of the cloud with companies' policy, IS development environment, business needs, and relative advantages of adopting cloud solutions.

Low, Chen and Wu (2011) used technology-organization- environment (TOE) framework for their research model by incorporating technological, organizational, and environmental contexts as important determinants of cloud computing adoption in different industries. They reported that relative advantage, top management support, firm size, competitive pressure, and trading partner pressure characteristics have a significant effect on the adoption of cloud computing.

Using TOE Nkhoma and Dang (2013) conducted a secondary data analysis on the recent large-scale survey of IBM to investigate the drivers and barriers of cloud computing adoption. They reported that adopters with lower IT are less willing to adopt cloud and vice versa for those with better technological ability and Information security is found as major challenge that organizations need to overcome to adopt cloud computing and the other technologies. Most of the earlier research related to cloud technology had adopted TOE framework, DOI theory, and TAM and Resource Based View (RBV) theories.

To investigate the fit of cloud computing technology (CCT) to handle different tasks in the organizations, in this study, Task Technology Fit (TTF) model is applied to evaluate the performance impact of CCT on individual in the organization. TTF model views technology as a means by which a goal-directed individual performs tasks. TTF focuses on the degree to which system characteristic match the user's task needs. Higher task-technology fit will result in better performance (Goodhue, 1995). A technology can have positive performance impacts if it "fits" the task that is being supported. (Goodhue, 2006).

Tasks are broadly defined as the actions carried out by individuals in turning inputs into outputs. Task characteristics of interest include those that might move a user to rely more heavily on certain aspects of the information technology. Automation, sharing of resources, multitenancy, remote implementation are the daily routine tasks of the organization that are fulfilled by cloud computing (Obeidat and Turgay, 2012).

Technologies are viewed as tools used by individuals in carrying out their tasks. In the context of information systems research, technology refers to computer systems (hardware, software, and data) and user support services (training, help lines, etc.) provided to assist users in their tasks. There are various characteristics of cloud computing such as free maintenance and management, on-demand self-service, broad network access, rapid elasticity, resource pooling, virtualization, service-oriented architecture that are important for the organizations to complete the tasks (Mell, and Grance, 2011, Obeidat and Turgay, 2012).

Individuals may use technologies to assist themselves in the performance of their tasks. Characteristics of the individual (training, computer experience, motivation) could affect how easily and well he or she will utilize the technology (Goodhue and Thompson, 1995). Task-technology fit (TTF) is the degree to which a technology assists an individual in performing his or her portfolio of tasks. More specifically, TTF is the correspondence between task requirements, individual abilities, and the functionality of the technology. Utilization is the behavior of employing the technology in completing tasks. The impact of TTF on utilization is a link between task-technology fit and beliefs about the consequences of using a system. This is because TTF should be one important determinant of whether systems are believed to be more useful, more important, or give more relative advantage (Goodhue and Thompson, 1995).

The research of Goodhue and Thompson (1995) portrays the relationship between the task requirements of the user and the functionality of the system and their impact on utilization. Performance impacts will occur when the technology meets the users' needs and provides features that support the fit of the requirements of the task. The objective of their study was to have better understanding of the linkage between information systems and individual performance. They presented and empirically tested a new, comprehensive model of this linkage by drawing on insights from two complementary streams of research - user attitudes as predictors of utilization and task-technology fit as a predictor of performance. The core of this new model, called the Technology-to-Performance Chain (TPC), is the affirmation that for an information technology to have a positive impact on individual performance, the technology must be utilized, and the technology must be a good fit with the tasks it supports. They tested across all the core components of the model, from task and technology to performance impacts, with a particular importance on the role of TTF. The biggest change is the direct link from TTF to utilization. This is based on two important assumptions: first, that TTF will strongly influence user beliefs about consequences of utilization; and second that these user beliefs will have an effect on utilization.

Provided a better understanding of factors that influence the use of personal computers, Thompson, Higgins and Howell (1991) conducted a preliminary test of a

model of personal computer (PC) utilization using a subset of Triandis (1980) theory of attitudes and behavior. This theory implies that the utilization of a PC by a knowledge worker in an optional use environment would be influenced by the individual's feelings (affect) toward using PCs, social norms in the work place concerning PC use, habits associated with computer usage, the individual's expected consequences of using a PC, and facilitating conditions in the environment conducive to PC use.

Utilization should ideally be measured as the proportion of times users choose to utilize systems. The utilization of a specific system for a single, defined task depends on precursors of utilization such as beliefs about the consequences of use, affect toward use, facilitating conditions, usefulness etc which would lead to the individual's decision to use or not use the system (Goodhue and Thompson, 1995). Utilization represents the action of the individual using the technology to complete his or her tasks. It is important to note that in this context, utilization is a measure of whether a system is used, not a measure of duration. Since utilization is a complex outcome, based on many other factors besides fit (such as habit, social norms, and other situational factors), the fit model can benefit from the addition of this richer understanding of utilization and its impact on performance. Utilization is an additional predictor of performance, along with TTF (Goodhue and Thompson, 1995). Utilization would be influenced, in part, by user evaluation of TTF through the related concepts of perceived usefulness (Davis et al., 1989), relative value (Moore and Benbasat, 1992), or expected consequences of utilization (Fishbein and Ajzen, 1975). At any given level of utilization greater than zero, a technology with higher TTF will give better performance. Therefore performance will be a function of both utilization and TTF.

Performance impact in this context relates to the accomplishment of a portfolio of tasks by an individual. Higher performance implies some mix of improved efficiency, improved effectiveness, and/or higher quality. High TTF increase the likelihood of utilization, but it also increases the performance impact of the system regardless of why it is utilized. At any given level of utilization, a system with higher TTF will lead to better performance since it more closely meets the task needs of the individual. Performance impact measured by asking individuals to self report on the perceived impact of computer systems and services on their effectiveness, productivity and performance in their job (Goodhue and Thompson, 1995).

Application of TTF model

Gebauer and Ginsburg (2009) applied the concept of TTF to mobile information systems by considering idiosyncrasies of use context and of evolving technological developments. They suggested that a situation of good fit between task, technology, and use context should be reflected in an overall high rating and positive evaluation of the technology by the use. They performed a content analysis of online user reviews of four mobile technology products namely a smart cell phone, two competing personal digital assistant (PDA) devices, and an ultra-light laptop, that were posted on www.cnet.com, an online media website.

Qiu,M. and Xu,Y. (2010) suggested that TTF theoretical model can be adopted to ensure that the appropriate technologies are employed to improve online teaching/ learning. The contributions of their study include identify the opportunities and challenges regarding current and perspective online students, open source course management systems, and Web 2.0 and social media services/tools. They described the major features of the adopted TTF model which reflects the common practice in distance education. The limitation of their paper is that the proposed adopted TTF model has not been empirically tested.

Robles-Flores and Roussinov (2012) proposed that a fully automated question-answering (QA) system should be a better fit for a task involving fusion. By using Task Technology Fit (TTF) theory, they had been able to explain why online question-answering (QA) technology has not been so far demonstrated to be superior to traditional keyword search (KW). They suggested that, when the task does not require fusion (finding answers on the Web or aggregation of information from multiple sources), QA offers little benefit in addition to KW.

D'Ambra, Wilson and Akter (2013) used TTF model to explore the interrelationships of e-books, the affordances offered by smart readers, the information needs of academics, and the "fit" of technology to tasks as well as performance. The study used content analysis and an online survey, administered to the faculty in Medicine, Science and Engineering at the University of New South Wales, to identify the attributes of a TTF construct of e-books in academic settings. The findings of their study confirmed that the task of academics, technology characteristics, and individual characteristics significantly influence e-books TTF, which again influences an academic's use of e-books and overall performance.

Aiken, Gu and Wang (2013) argued that virtual teams' knowledge sharing, effectiveness, and satisfaction can be mediated by task-technology fit. In their study TTF theory was applied to projects completed by virtual teams using Web Course Tools (WebCT) which is a web-based learning management system, used by the students to facilitate their group projects. With this system, students were able to exchange information via discussion boards, email, and live chatting and it has been used.

Research Framework and Methodology

As per the literature reports as discussed in the earlier sections, various constructs have been identified and related in the context of individual performance in the organization through usage of CCT. Accordingly a conceptual research model, as shown in Figure 1 has been developed. The constructs of task technology fit, individual characteristics, utilization and performance impacts as described by Goodhue (1995) have been utilized in the model. The construct of precursors of utilization reported by Thompson, Higgins and Howell (1991) is also used. Constructs of task characteristics and cloud technology characteristics along with individual characteristics are related to task technology fit for cloud computing in an organization. Precursors of utilization, beliefs, affect and other behavioral attitudes of employees related to usage influence the utilization of cloud computing. Since proper

TTF for cloud computing inculcates interest in the minds of users, it is related to precursors of utilization. Both TTF and utilization of cloud computing impact the performance of the individual user in the organization.

Task characteristics related to cloud computing are automation, resource sharing, multitenancy, internal expertise and remote implementation. Some of the important characteristics of cloud computing which assists an organization to complete the tasks are free maintenance and management, on-demand self-service, broad network access, rapid elasticity, resource pooling, virtualization, service-oriented architecture are the characteristics of cloud computing which assists the organizations to complete the tasks.

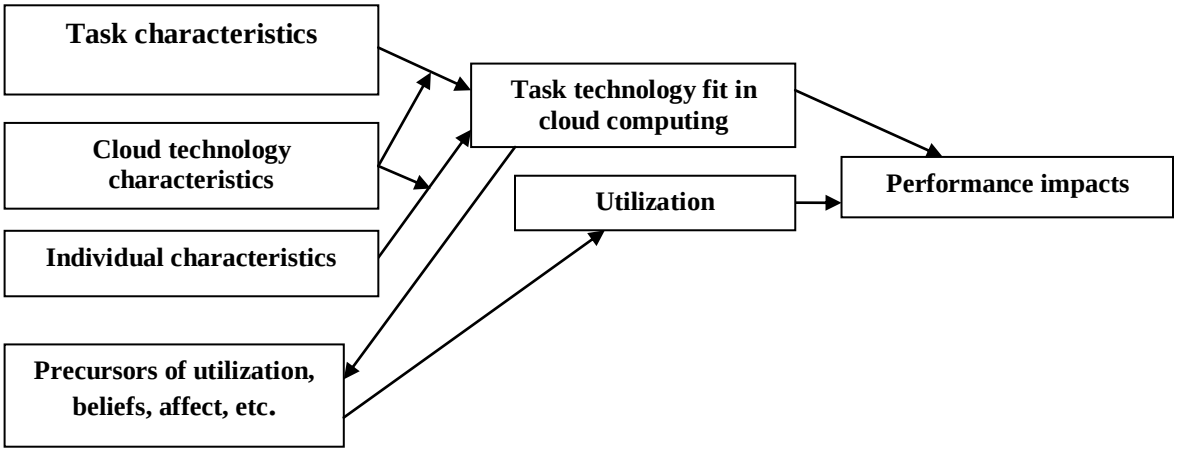

Figure 1: Research Framework

Since, cloud computing is new and this research is exploratory in nature, the multi-case approach has been taken up to demonstrate the application of TTF model to CCT in organizations, especially, IT firms. After an extensive search, four large multi-national companies (MNCs) of IT sector are selected for evaluation of research model. To maintain confidentiality, the names of the four big IT firms are disguised and here after referred to as A, B, C, and D. Each of them has implemented and adopted CCT for more than one year. Face to face interviews and email communications were held with senior project managers and users dealing with cloud applications. Valuable feedback has been collected through a questionnaire and in-depth analysis carried out to understand the impact of cloud technology on the individual job performance of the users. By drawing upon multiple streams of theory building as reported in the literature, the paper is able to develop a set of measurement instruments in the questionnaire to assess the individual performance and fit in adopting cloud computing in organizations. For measuring all items of the constructs - task characteristics, technology characteristics, task technology fit, utilization, precursors of utilization and performance impacts, a five-point Likert-scale (1=strongly disagree and 5=strongly agree) has been used. The task and technology characteristics, fit and performance impact in cloud computing aspects were assessed.

The key informants in the study include operating managers (users of technology), project managers and senior managers of the companies. Some useful details of the four companies like nature of firm, number of employees, annual revenue, duration of implementation of cloud computing, service and deployment models of cloud computing are given in Table 1.

Table 1: The Profile of Firms

Firm	A	B	C	D
Nature of firm	A global information technology, consulting and outsourcing company	A multinational Independent software corporation	An American privately held application performance management (APM) company	An American multinational technology and consulting corporation
Founded	1945	1976	April 2008	1911
Total no of employees	147,452	13,200 (2014)	4000	435,000 worldwide
Annual revenue (US$) billion	$7.3 billion for the financial year ended Mar 31, 2014	US$ 4.515 billion (2014)	$1.2 billion	$16.4 billion
Implementation (months) duration of cloud computing	48	48	24	36
Service model	SaaS, PaaS	SaaS	SaaS	SaaS, PaaS, IaaS
Deployment model	Hybrid cloud, Private Cloud	Private cloud	Private cloud	Private cloud, hybrid cloud

Results and Discussions

The feedback data collected on all the items related to all the constructs involved in the research model has been analyzed. The means of the feedback data collected on each and every item under each construct have been computed and listed in Table 2. For the construct of task characteristics firm D attributed highest score (4.6), meaning that cloud technology has been fully adopted in the firm to handle various tasks. In this regard firm D is followed by firm C and A. In the case of technology characteristics, firm B followed by C and A gained high score, meaning that the users are satisfied with the technological features of cloud computing. For the construct of individual characteristics firm B, immediately followed by firms D and C achieved high score. This means each individual user is capable enough to adopt to cloud technology. For the construct of precursors of utilization firm D attributed the highest score (4.4), whereas firm B achieved the lowest score (2.8). Firm D is followed by firms C and A. From this result, it can be interpreted that firm B is poorly utilizing the cloud technology, whereas firm D is utilizing at the highest level followed by C and

A. Finally, regarding the construct of performance impacts, again firm D achieved the highest score (4.5) when compared with other three firms, and firm A attributed the lowest score (3.25). Firm D is followed by firms C and B. It can be envisaged from this result that there is good improvement in the efficiency and overall effectiveness of the individual in those firms.

Table 2: Summary of Feedback on Adoption of Cloud Computing

Construct	**A**	**B**	**C**	**D**
Task characteristics	3.9	3.4	4	4.6
Technology characteristics	4.1	4.5	4.3	3.6
Individual characteristics	3.6	4.6	4.3	4.4
Precursors of Utilization	3.5	2.8	3.8	4.4
Task technology fit				
1. Data quality	3	1.5	2.5	4
2. Locatability	3	2	2.5	4.5
3. Authorization	4	3	4	5
4. Compatability	4	4	2	5
5. Production timeliness	4	4	2	4
6. Reliability	4	4	4	5
7. Ease of use/Training	4	4.5	3	4
8. Relationship with users	3.6	1.8	3	4.4
Performance impacts	3.25	4	4	4.5

In addition, the following observations have been made item-wise under each construct followed by firm-wise overall interpretations.

Item-wise observations under each construct

From Table 2, it is observed that different items of different constructs received the feedback on their importance differently.

Task characteristics related to cloud computing

Out of the four firms, two companies namely A and C disagreed with the statement that internal expertise of cloud computing is necessary to handle the tasks assigned. They felt that ICT usage in their firms is so strong by having different sophisticated software and technology other than cloud computing to handle the task. Most of the firms agreed with the statement that automation of tasks is possible through CCT at anytime and anywhere by paying for the service as per the usage. Firm A and C agreed that the task frequently needs to use the cloud computing for information or decision making, whereas firm B disagreed with this and firm D became neutral . All the four firms agreed that cloud computing supports multi-tasking, provides remote implementation of tasks and sharing of resources to perform them, and supports task as a frequent activity of the organization.

Technology characteristics related to cloud computing
Except Firm D all the firms agreed with the statement that CCT is flexible and saves physical (floor) space. Firms B and C disagree with the statement that CCT deliver proper application through a proper medium. All the four firms agreed that free maintenance and management is possible through CCT and virtualization is necessary for this. In addition there is concurrency among the four firms that cloud computing provides scalable resources on demand, its maturity is important for making considerable investment in acquiring the expertise internally and service oriented architecture (SOA) is necessary for cloud computing.

Individual characteristics
All the firms concurred that the IS department must know the business process well enough to implement the cloud computing and the IS personnel must be experienced in system development and maintenance. They also agreed that the project leader must have prior experience in cloud applications and the user should have adequate knowledge of IT and cloud computing and also have a high intention of accepting new technology. In addition, they all agreed that top management support is necessary to use CCT. Except firm A which was neutral, the other three firms agreed that user should have high efficacy in using cloud computing.

Precursors of utilization
Firm A is neutral about the feature of cloud computing in decrease the time needed for important job responsibilities. Similarly firms A and C are neutral about the feature of cloud computing in significant increase in the quality of job output. All the firms agreed that use of a cloud computing can increase the effectiveness of performing job tasks. The same neutral trend was maintained by firm A in the case of increase the quantity of output for same amount of effort. Firms A and B disagreed that CCT makes work more interesting. But they all agreed that cloud computing is very much appropriate for some jobs and guidance is available to user in the selection of hardware and software in cloud. Firm B disagree with the statement that a specific person (or group) is available for assistance in addressing software difficulties in cloud computing. Except B all the firms agreed that a specific person (or group) is available for assistance in addressing hardware difficulties in cloud computing. Firm B strongly disagreed that use of CCT will increase the level of challenge on job, the opportunity for preferred future job assignments and opportunity to gain job security. Except firm B other three showed their concurrence on the statements that use of CCT would increase the flexibility of changing jobs, level of variety on job and opportunity for more meaningful work.

Utilization of Cloud computing
Firm A stated that in their organization, the intensity level of job-related use of cloud computing is 60 to 90 minutes per day at work and frequency of general usage is several times per day. According to firms B, C and D, the intensity level of job-related use of CCT in the organizations is more than 120 minutes per day at work and frequency of general usage is several times per week. Except D, all the other three

firms strongly agreed that there is diversity of software packages used for work under CCT.

Task Technology Fit for cloud computing

Firms A, B and C opposed the statement that CCT assures maintenance of necessary critical and right data. They also disagreed that meaning of data is easy to find out through CCT. Firm B disagreed that cloud computing assures maintenance of sufficiently detailed data and locatability of data. Except B, all the other three firms supported that CCT assures authorization to access data. Regarding assurance of data compatibility, ease of use and production timeliness by cloud computing, except C, the remaining three firms supported well. All firms agreed that CCT requires proper training and assures system reliability. Only firm D agreed that understanding of business with users is possible with CCT, which also assures interest and dedication to users. Firms A and D supported the statement that CCT assures proper responsiveness, and technical and business planning assistance to users. This statement was opposed by firm B and C became neutral. Except C, all the three firms agreed that CCT delivers agreed-upon solutions to users.

Performance impact of cloud computing

All the firms agreed that use of cloud computing can increase the effectiveness of performing job tasks of users. Except C other three firms agreed that use of cloud computing can significantly increase the quality of job output and decrease the time needed for important job responsibilities. This means there is a perceived impact of cloud computing on the productivity and performance of users in their job. Except C, other three firms agreed that the user has a positive attitude toward cloud computing system.

Firm-wise observations

From Table 2, it can be observed that different items of different constructs received the feedback on their importance differently among the four firms. Following sub-sections discuss the results firm-wise.

Firm A

Firm A has been using CCT mostly for storing and maintaining huge data. There, task handling by cloud computing is not a frequent activity and it is not used for information or decision making. The firm agreed that cloud computing is used for multitasking, automation and remote implementation and it requires sharing of resources to perform tasks. The firm agreed that features of cloud computing are service oriented architecture (SOA), virtualization, scalability, flexibility and free maintenance and management. The firm agreed that use of a cloud computing can increase the effectiveness of performing job tasks, but opposed the assurance of maintenance of right data and its location. CCT assures authorization to access data and compatibility of data, that is, data from different sources can be consolidated or compared without inconsistencies. According to this firm, CCT also assures production timeliness and ease of use, but not gives assurance of system reliability.

That is, CCT meets pre-defined production turnaround schedules, but does not give assurance of dependability and consistency of access and uptime of systems. Cloud computing assures proper responsiveness to users by providing agreed-upon solutions, technical and business planning assistance to users.

Firm B

Usage of CCT for handling tasks is a frequent activity of firm B, which asserts that internal expertise of CCT is necessary to handle tasks. It opposes the possibility of automation of tasks through CCT and the frequent need of CCT by tasks for information or decision making. The firm expressed that the use of CCT can decrease the time needed for important job responsibilities and can significantly increase the quality of job output job and effectiveness of performing job tasks. It opposed that CCT assures maintenance of right data, locatability of data and authorization to access data. According to firm B, CCT assures compatibility of data. CCT requires proper training and assures ease of use, production timeliness and system reliability. It provides agreed-upon solutions to users. Firm B opposed that cloud computing assures technical and business planning assistance to users and understanding of business with users is possible with CCT.

Firm C

Like in firm B, in firm C, task handling by CCT is a frequent activity and the task frequently needs to use CCT for information or decision making. Cloud computing is used for multitasking, automation and remote implementation. According to firm C features of cloud computing are SOA, virtualization, scalability, flexibility and free maintenance and management. Use of cloud computing can decrease the time needed for important job responsibilities and can increase the effectiveness of performing job tasks by producing the good quantity of output for same amount of effort. This firm opposed that CCT assures maintenance of right data and locatability of data, production timeliness and data compatibility and ease of use. It agreed that there is possibility of obtaining authorization to access data necessary to do the job through CCT. CCT requires proper training and assures system reliability. The firm became neutral on the relationship of CCT with users in context of proper responsiveness and provision of agreed-upon solutions to users by technical and business planning assistance to users.

Firm D

Like firms B and C, firm D has the environment wherein handling of tasks by CCT is a frequent activity with multitasking, automation and remote implementation. Here cloud computing provides sharing of resources to perform tasks, supports free maintenance and management, SOA, virtualization, scalability and flexibility. Use of cloud computing can decrease the time needed for important job responsibilities and can significantly increase the quality of output of job, the effectiveness of performing job tasks and the quantity of output for same amount of effort. According to this firm, CCT assures maintenance of right data, right level of detail of data and locatability of data, ease of use, production timeliness and system reliability. It provides data

compatibility and authorization to access data. But it requires proper training. It also assures proper responsiveness by providing agreed-upon solutions and technical and business planning assistance to users.

Conclusions

The purpose of this paper is to present a framework for assessing the individual job performance through the use of CCT in organizations. Based on the seminal work of Goodhue and Thompson (1995) the application of TTF model is applied in context of CCT. A multi-case analysis is then performed to explore the application of the TTF model in CCT. The results of the surveys performed among four MNCs show empirical support of TPC model in assessing individual performance by evaluating different factors of task technology fit and utilization through precursors of utilization. All the firms agreed that use of a cloud computing can increase the effectiveness of performing job tasks and guidance is available to user in the selection of hardware and software in cloud. The TTF factors of data locatability, maintenance of right data and relationship with users did not receive good attention from the surveys. Whereas, production timeliness, system reliability, ease of use, authorization to access data, automation and training are found as positive factors that influence individual performance through the use of CCT in organizations. The results show that TPC is a useful model in evaluating the adoption of CCT.

Managerial and Theoretical implications

The paper has some limitations, foremost is the sample size and next is the analysis of data. Since the study is exploratory in nature, it needs in-depth surveys and analyses for confirmation of the findings. There may be more items that need to be examined when we evaluate the task technology fit and performance impacts. Next, the propositions mentioned previously would be thoroughly investigated in future research.

Limitations

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Propositions for future study

The data obtained from the case studies also allow us to derive the following six propositions for future study:

P1. Task has a positive impact on TTF in cloud computing

In this exploratory study, task is constructed as the activities which cloud technology perform in the organization. If the tasks become more demanding or the cloud

computing offers less functionality, users' evaluation of TTF in cloud computing will decrease.

P2: Technology has a positive impact on TTF in cloud computing.
The TTF model considers the importance of fitting the functionality and attributes of technology used to the demands imposed by individual needs. If the characteristics of CCT satisfies the user's task needs, evaluation of TTF in cloud computing will increase.

P3: An individual's attributes have a positive impact on TTF in cloud computing.
User prior experience and adequate knowledge of the technology is important in the evaluation of the fit of a technology.

P4: TTF in cloud computing has a positive impact on individual performance.
High TTF increases the performance impact of the system. CCT is used for automation, resource sharing, data storage and remote implementation. Companies are using cloud mainly for cost reduction and for its features like scalability and flexibility. The results showed that CCT assures production timeliness, system reliability, ease of use, data compatibility and authorization to access data which in turn increases the individual job performance in the organization.

P5: TTF in cloud computing has a positive impact on using CCT.

P6: Utilization of cloud computing has a positive impact on an individual's performance.
As per the literature, TTF should be one determinate of beliefs about the usefulness and importance of a system and the advantages gained from using a system. In the current research, utilization is the use of CCT by users in the organization. The better the fit between the capabilities of cloud computing, the task, and the individual, the more positive the expected consequences and the higher the user's affect toward using CCT. At any given level of utilization greater than zero, a technology with higher TTF will give a better performance. Therefore, performance will be a function of both utilization and TTF. Firm D has the best performance impact of cloud computing on individual job performance because it utilizes cloud computing at its best level as well as it has a highest degree of fit among the other firms. Whereas Firm A has moderate utilization of the technology as well as moderate degree of fit so performance impact of CCT in firm A is also moderate.

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