

Software as a Service Adoption: Impact on IT Workers and Functions of IT Department

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Abstract

Software as a Service (SaaS), a type of cloud computing is based on information technology (IT) capabilities in a utility model that enhances the reliability and scalability at relatively low costs as compared to on-premise IT systems. Other benefits SaaS provides to customers include: no upfront investment cost required, elasticity of computing resources, vendor support and upgrades, agile response to markets, usage metered as utility, resource pooling the ability to add computing resources as needed. Consequently, organisations may decide to adopt SaaS model based on these potential benefits. However, these benefits may have some implications on the roles of IT workers and functions of IT department. These implications include: changing IT workers' skill sets requirements, widespread of layoffs of hardware IT workers, and IT department loses control of IT-Servers, and focuses more on data security, vendor management, as IT system support moves to cloud service provider. Similarly, IT workers believe that turning IT resource and support to a cloud service provider poses significant risks to their own jobs [1]. There is a lack of research conducted on the implications of SaaS model on IT department and associated human resource management. Thus, this paper seeks to fill this gap by examining how SaaS adoption may change IT workers' roles and tasks, and functions of IT department. Drawing on adaptive structuration theory, a modified framework is constructed to support the change dynamics from SaaS adoption. Using examples of functions of IT department in tertiary institutions, we explored sources of structures from advanced IT and the ways in which organisational and human interactions have an impact on how SaaS is appropriated and institutionalised into business processes, and brings about changes in an organisation. This paper contributes to the theory by examining the way emergent and new structures are formulated at the macro and group level of the organisational structure. Implications for researchers and practitioners are provided.

Keywords: Adaptive structuration theory, Cloud computing, IT outsourcing, IT workers, Organisational change, Software as a service.

1 Introduction

Cloud computing has the potential to transform the Information Technology (IT) industry, making software as a service (SaaS) and shaping the way IT hardware is designed and purchased [1-2]. Cloud computing refers to both applications delivered as services over the Internet and infrastructure in data centres that enable these services. The hardware and software in the data centre accessed via the Internet is referred to as a cloud [1]. There are four types of cloud service levels, that is, hardware as a Service (HaaS), Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and SaaS [3]. In particular, SaaS has the potential to change the way software is acquired and used. Through SaaS, customers no longer need to purchase software licenses. Instead, they only need to subscribe and access to software via an Internet connection. As a result, SaaS adoption pushes software providers to change their business model from product-based to on-demand service-based provision models [2]. SaaS model has evolved from an application service provision (ASP) model. Examples of ASP include traditional enterprise resource planning (ERP) systems from SAP, Oracle, and Great Plains. ASP models have three critical features. First, customers rent access to commercially customised software from a service provider; second, customers face no up-front capital costs as the price is based upon usage; and third, a customer-specific instance of an application is located offsite and delivered over the network. However, customers could still customise their instance of the application on the vendor's server to some extent. A key issue surrounding ASP adoption has become the degree of customisation desired by the customer and the resulting efficiency loss by the vendor. Recently, the ASP model was reinvented into the SaaS model, which is supported and adopted by many organisations and relies on a different architecture [2]. The SaaS model has four important features. First, it constrains customers' options for customisation of the main functionality; second, it gives more control over future development to the service vendor; third, SaaS has the ability to support service-oriented multi-tenancy; and fourth, SaaS allows for the separation of maintenance responsibilities between the SaaS service vendor and the customer. As a result, SaaS model requires nearly no customer-specific investment

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by the vendor. Other benefits SaaS provides to customers include: no upfront investment cost required-but rather organisations subscribe to SaaS services and switch-on instantly; elasticity of computing resources, SaaS service vendor support and upgrades, agile response to markets, usage metered as utility, resource pooling-the ability to add computing resources as needed. In particular, organisations adopt SaaS based on these promised benefits. Examples of SaaS applications range from office and collaboration (e.g., Google Apps, Microsoft Office 365) to customer relation management (e.g., Sales-force.com) and ERP, such as SAP's Business ByDesign [1].

Large organisations, where IT system is not their competitive functional system, such as tertiary institutions have embraced the use of SaaS model. This is because in these institutions, migrating to SaaS models affords them the ability to provide improved real-time collaboration and research capabilities, and an opportunity to cut IT costs while providing better levels of computing services. Exaggerated by the need to cut overhead costs at a time when public and private institutions are coping with significant budget shortfalls, SaaS model allows institutions to not just use the resources of commercial cloud service providers -- many of which are available to them either for free or at reduced costs [4]. With the SaaS model, students and faculty staff can take advantage of the ability to work and communicate from anywhere and on any device using SaaS applications. For example, Google offers Google Apps for Education for free or low costs compared to on-premise IT systems. By switching to Gmail, University of Notre Dame reports that it saved US\$1.5 million in storage and costs of technical support, and their students' satisfaction with the campus's email rose by over a third. Likewise, institutions (e.g., Arizona State and Washington State) are consistently reporting at least six figure annual savings from switching to Google or Microsoft SaaS model systems [4]. Tertiary institutions adopting SaaS models hosted by Google Apps and Microsoft 365 are over four thousand colleges and universities in over 80 countries worldwide and numbers are still growing [4].

SaaS model is regarded as a disruptive innovation [5-6]. Because it changes not only certain aspects of a software business model, like a new pricing model, but the entire business model is expected to change. Disruptive innovations challenge existing models and processes and ask for existing knowledge to be re-evaluated and adapted to the new setting [7]. SaaS challenges software business model on how software is delivered, accessed, purchased, supported and governed by an adopting organisation [5]. These challenges expose the organisation to additional cost, technical, security, privacy, human resource and organisational changes that are not normally associated

with ASP or on-premise IT systems and infrastructure [8]. The on-premise IT system is referred as a "software service model in which customers purchase permanent licenses of the commercially available software," and their IT workers maintain the application and the infrastructure associated with it [9]. According to Gartner, sales of SaaS applications were over \$14.5 billion in 2012, an increase of 17.9% from 2011 [10]. Thus, there is a need for research that examines the implications of the SaaS adoption on functions of IT department and associated human resource management.

Numerous information systems (IS) studies have discussed cost analysis of SaaS [5][11]; technical, security & privacy issues [1]; and drivers of SaaS adoption [12-13]. Whereas the existing findings on the changing IT workers skill sets associated with cloud computing adoption such as Ross [14] is rather generic in that, there is a scarcity of in-depth conceptual and empirical analyses to ascertain how these implications are associated with SaaS adoption in particular. Puzzled by lack of clarity in IS literature, practitioners and managers may fail to understand the implications of adopting SaaS business model [15]. An in-depth analysis is however necessary to develop a deeper understanding on these implications. These implications include changes in roles and tasks of IT workers that may trigger associated changes in functions of IT department [1]. Researchers have called for more studies on these implications, and on associated human resource management issues [14][16]. Thus, this study aims to fill this gap in literature by examining, how SaaS adoption in an organisation may change its IT-workers' roles and tasks, and the impact of this on IT department.

We construct a conceptual model to further investigate the dynamics of IT and organisational change through theoretical analysis. One strand of research dealing with IT and organisational change is Adaptive Structuration Theory (AST), posited by DeSanctis and Poole [17]. AST is useful because it provides dynamic explanations of how IT influences socio-technical changes in organisations [18-19]. Furthermore, AST provides a dynamic model that helps us understand the change process in technology adoption and organisational environment. This paper extends these underlying arguments from AST to theorise the implications on IT-workers' roles and tasks, and the subsequent impact on IT department, when an organisation moves its IT system from on-premise IT system to a SaaS environment [17].

This paper is structured as follows: First, we provide some background concept of cloud computing and specific technical characteristics of SaaS business model. Thereafter, we review the relevant literature on disruptive innovations and IT outsourcing that suggest a set of implications on IT adoption and organisational change [8]

[20-21]. Subsequently, we construct a conceptual model based on the structures that emerge in human action as people interact with IT, through lenses of AST. The paper concludes with a discussion of theoretical and practical contributions of our work and future research directions.

2 Literature Review

2.1 Concept of Cloud Computing

Cloud computing is a “model for enabling ever-present, convenient, on-demand network access to a shared pool of configurable computing resources (such as networks, servers, storage, applications, and services) that can be rapidly accessed and released with minimal service provider interaction” [3]. There are two main cloud computing models -- public and private, and four main cloud computing service levels. A public cloud is cloud computing service made available to the general public. In addition, a private cloud refers to proprietary internal data centres of an organisation and is not available to the general public [1]. See Table 1 below for definitions of cloud computing service levels.

When an organisation moves the on-premise IT system to the cloud service such as PaaS, IaaS or HaaS, it might still need some IT workers such as security specialists, hardware and software engineers to manage remote hardware and to install software applications. However, when an organisation opts for SaaS as its cloud strategy—that is a “set of decisions required to create and deploy a network-based IS delivery strategy that results in both cost saving and organisational agility” [22], a number of IT responsibilities on hardware and software are shifted to the cloud service vendor. As a result, an organisation might need fewer IT workers mainly to configure user access rights in using the applications. Unlike PaaS and IaaS, SaaS will likely have greater implications on the roles and tasks

of IT workers and may dictate changes in functions of IT department. Hence, SaaS can be viewed as an IT service business model that involves external service vendors.

2.2 Characteristics of SaaS Business Model

Carraro and Chong [2] view SaaS as an IT business model in the software industry offering Internet-based software application programs to customers through the Internet channels. SaaS business model (i.e., pay-per-use charging) is centred on its multi-tenant architecture. In order to provide efficient and effective services to the clients, the SaaS service vendors need to design their application architecture as scalable, multi-tenant-efficient, and configurable [2].

Application scalability refers to the ability of a system to dynamically acquire or release compute resources on-demand. This allows SaaS vendors to exploit concurrency of their services and to utilise application resources by scaling up or down as per clients’ demand. The concept of multi-tenant efficiency requires application architecture to maximise resource sharing among tenants; at the same time, be able to separate clients’ data from each other. The application configuration is an important task for SaaS technology since a hosted application will be accessed by multiple users or clients. The best SaaS architecture should bear the capability of making the task of application configuration simple and easy among distinct users or clients [2]. As a result, organisations adopt SaaS business model based on these benefits. However, adopting SaaS business model possess some risks and challenges.

2.3 SaaS Adoption-Risks and Challenges

Risks and challenges associated with SaaS go beyond those encountered with the use of ASP models [23]. First, similar to ASP, SaaS involves major changes in organisational IT governance. This often renders

Table 1 Definitions and Examples of Cloud Computing Service Levels

Types of Cloud Computing Service Levels	Definition	Examples	Reference
Software as a Service (SaaS)	Applications such as those that offer traditional desktop functionality are hosted and delivered online via a web browser.	Google Docs, Gmail, MYOB and SAP	[2]
Platform as a Service (PaaS)	Software platform for system deployment.	Google App Engine, Salesforce.com	[1]
Infrastructure as a Service (IaaS)	A set of virtualised computing resources, such as storage and computing capacity hosted in the cloud; customers deploy and run their own software stacks to obtain services.	Amazon EC2, Salesforce.com	[1]
Hardware as a Service (HaaS)	Cloud provides access to dedicated firmware via the Internet.	XEN and virtual machine ware (VMware)	[2]

employee unrest and resistance. Second, also like ASP, the organisation becomes more heavily dependent on a vendor, which is particularly worrying when core applications are at stake. Third, SaaS model entails moving organisational applications and data outside the customer's boundaries to the vendor's data centres, from where it can be accessed over the Internet. This arrangement exposes organisation's data to various risks ranging from privacy, data protection, ownership, location and lack of reliable audit standard to data security procedure. Prior research has identified this last aspect of SaaS as a major impediment to its adoption [24]. Aforementioned risks and challenges may force organisations that adopt SaaS to change IT workers roles to support business units, "brokering" roles [25], or develop new skills sets for managing SaaS security issues and integration with on-premise IT systems.

Furthermore SaaS business model can be disruptive technologies for an adopting organisation in many ways.

2.4 SaaS Business Model as a Disruptive Technology

IS literature regard SaaS as a disruptive innovation in the enterprise application market [5][8], because the concept fulfils the characteristics of disruptive innovations defined by Christensen [7][26]. Part of the disruption comes from the way SaaS business model is delivered, accessed, purchased, supported and governed by adopting organisation [8].

SaaS is delivered as a utility model (pay per use) instead of renewable licenses and can be deployed at the global scale. Unlike, ASP systems, SaaS applications can be accessed over the browser via the Internet on any mobile and desktop devices. Moreover, procurement of SaaS services is no longer tied to IT department. Rather, any business unit can trial and subscribe to SaaS services. Finally within SaaS business, software support model has changed. Instead of support by IT workers of adopting organisation, SaaS vendors support the customers from data centres (Cloud), rendering some IT workers jobless [1]. Moreover, this has an implication on the governance of the IT department. These implications include changes in the roles and tasks of IT-workers, CIOs, CTOs, et al., and might change roles and functions of IT department. IS scholars have referred SaaS as a form of outsourcing software applications to cloud service vendor [14][27-28]. And IS studies have linked outsourcing to organisational change [29-30].

2.5 IT Outsourcing and Organisational Change

The identification of SaaS business model as an emerging disruptive technology helps explaining its overall implications on the organisation sourcing SaaS services. According to Keller and Hüsigg [8], IT outsourcing is "the significant contribution by external vendors of the

physical and/or human resources associated with the entire or specific component of the IT infrastructure in the user organisation." Using IS literature, we compare the implications of traditional IT outsourcing and SaaS business model on organisational change. Past IT outsourcing research shows that organisations outsource for reasons other than cost reduction including to improve IT effectiveness and responsiveness to market needs [29][31].

Jayatilaka and Hirschheim [31] report that IT outsourcing strategies based on cost cutting aimed at meeting short-term stock performance goals rather than improvement of IT performance ignoring the IT capabilities. Consequently the inability to identify IT organisational requirements due to a lack of an IT-driven goals, resulted in loose IT outsourcing contracts, which are associated with failures. Conversely, IT driven goals of IT outsourcing strategies aimed at improving IT effectiveness, responsiveness and the development of IT capabilities in order to meet business' IT need. However, blind adherence to IT-driven goals without considering institutional needs of cost cutting measures can also lead to dissatisfaction by decision makers and stakeholders. Studies show that organisations that ignore institutional needs are likely to fail. Eventually, organisation had to change their IT outsourcing strategies due to failure to meet expected results, attributed by poor vendor performance, and other emergent needs. Many organisations changed the strategy by bringing IT system back on-premise or changing poor performing vendors [31].

Similarly, traditional outsourcing strategies have been associated with downsizing [29]. Downsizing is an intentionally instituted set of activities designed to improve organisational efficiency and performance which affect the size of the organisation's workforce, costs and work processes [28], and has a significant impact on human resources management [29]. The benefits of downsizing include lower labour costs and overheads, less bureaucracy, faster decision making and increases in productivity. However, expected benefits of downsizing were often not achieved [29].

Contrary to traditional IT outsourcing strategies, SaaS business model meets both IT-driven and organisational goals, because SaaS model is centred on the scalability of IT resources and the economics of computing capabilities [4]. SaaS model is a revolutionary IT-driven concept, due to an unprecedented elasticity of resources made possible by the cloud architecture. In computing terms, elasticity refers to the ability of a system to dynamically acquire or release compute resources on-demand. Under the SaaS model, organisations that need more computing power have the ability to scale-up resources on-demand, without having to pay a premium for that ability. Thus, an organisation can run computing operations far faster than previously and at

no additional costs, since using 1,000 servers for one hour costs no more than using one server for 1,000 hours [32]. This unprecedented scalability attribute of SaaS business model allows for computational needs to be addressed far faster and far cheaper than in the traditional outsourcing strategies [4]. The economics of SaaS computing capabilities, offers free pricing for some products and services, such as email, storage, hosting, and applications that are at the forefront of cloud computing (e.g., Google Apps). Due to the cost and operational benefits of cloud computing, more organisations may outsource most -- if not all -- of their IT systems to SaaS service providers, creating what has been termed as “serverless organisations” [4].

This paper introduces a conceptual model to further investigate the dynamics of IT and organisational change through theoretical analysis. One strand of research dealing with IT and organisational change is Adaptive Structuration Theory (AST), posited by DeSanctis and Poole [17]. AST is useful because it provides dynamic explanations of how IT influences socio-technical changes in organisations [18-19]. Furthermore, AST provides a dynamic model that helps us understand the change process in technology adoption and organisational environment. This study extends these underlying arguments from AST to theorise the implications on IT-workers’ roles and tasks, and the subsequent impact on IT department, when an organisation moves its IT system from on-premise IT system to a SaaS environment [17]. More specifically, this research examines the implications on IT-workers’ roles and tasks, and the succeeding impact on IT department [17].

3 Adaptive Structuration Model

AST is an “approach for studying the role of advanced IT in organisation change” [17]. DeSanctis and Poole [17] examined change process from two perspectives: (1) the type of structures (which are specific types of rules and resources that serve as templates for planning and achieving tasks) that are applied through the application of advanced IT (AIT) and (2) the structures that emerges in human action as people interact with this technology. In their study of group decision support systems (GDSS), DeSanctis and Poole [17] found that people’s interactions with technology led to changes in the rules, process and procedures that were used in GDSS’s social interactions. Their research, however, focused on a snapshot of a meeting in which GDSS were used to study interaction at an individual level rather than at the institutional level. From their definition, AST can be applied to study changes from a longitudinal perspective [18-19] rather than just an instance in time. For example, Furumo and Melcher [18] analysed a failed transition process from the mainframe system environment

to the distributed ERP environment. They found that the failure was not the result of a poor ERP product but rather related to the organisation’s social structures. Similarly, Goh et al. [19] studied the interplay between Health IT (HIT) and patterns of clinical work embodied in work routines. They found that the key to successful implementation of HIT into work routines is to manage the emerging processes between routines and HIT. Thus, as discussed earlier, we use AST because it provides dynamic explanations of how IT influences socio-technical changes in organisations. Additionally, AST can help to understand the longitudinal change process in technology adoption and organisation change based on structures that emerge in human action as people interact with AIT. Thus, this paper encompasses these arguments from AST to examine the implications of the change from on-premise IT system to a SaaS environment [17].

The central concepts of AST, structuration and appropriation, provide a dynamic picture of the process by which people incorporate AIT into their work practices. Structuration is the process by which people create and maintain a social system through the application of rules, tasks, organisational culture, and group norms [17]. Appropriation refers to the manner in which structures are adapted by a decision making team for use through the structuration process. The appropriation of both technological and organisational structures into business processes and tasks could bring about emergent structures. The new structures are formed after the emergent structures are institutionalised into the system [17]. Thus adaptive structuration process includes some recursive processes and feedback loop that integrates all the structures, in which the organisation continues to adjust between technological and social structures as well as structural changes until all emergent structures are fully integrated into tasks and business processes to form a stable socio-technical system [18]. Unlike unidirectional forms of AST’s constructs [17], we propose bi-directional links and a feedback loop to incorporate the recursive and cyclic nature of technology application process, thereby providing dynamic longitudinal perspective of the technology application process. This recursive nature happens when there are misalignments between emergent structures or tasks with business processes [27][33-34].

This proposed conceptual model brings a different method of analysis than the original [17] model in which independent and dependent variables are identified and studied at one point in time. Thus, our model is developed and used as a guide or sensitising device [35] to explain how SaaS adoption may change IT workers’ roles and tasks, and structure of IT department. The proposed model is presented in Figure 1.

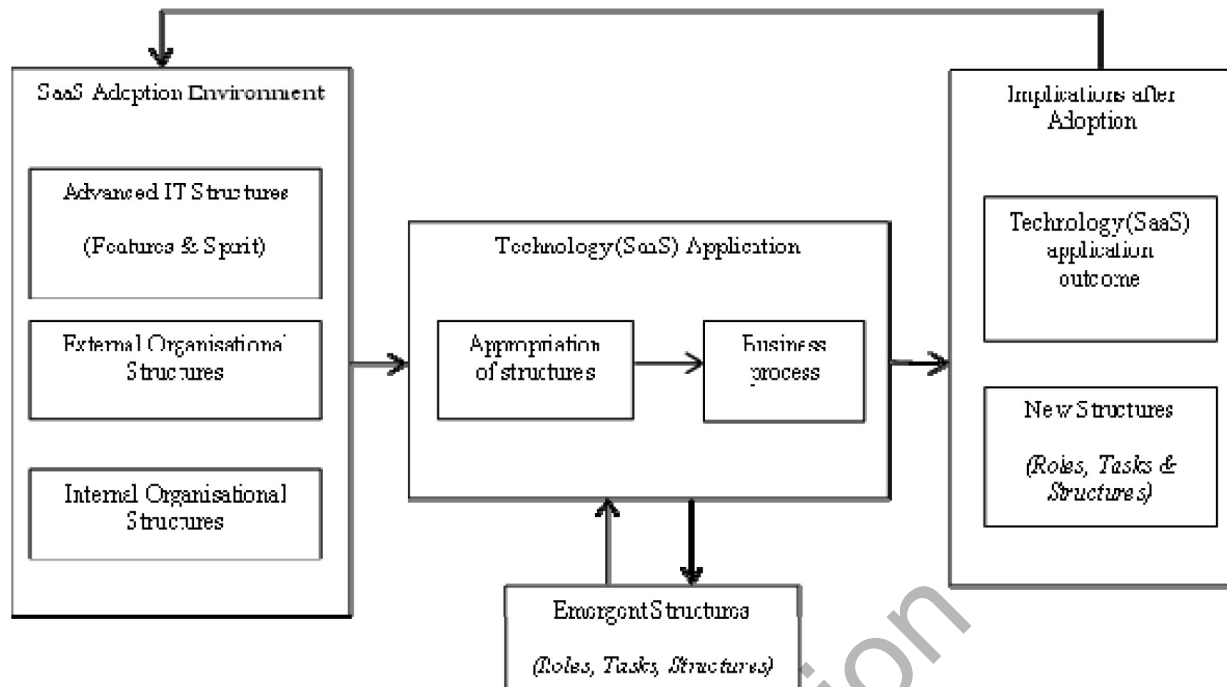


Figure 1 The Conceptual Model-Constructed Based on AST-Adapted from DeSanctis and Poole [17]

3.1 Applying AST into SaaS Adoption Process -- The Example of Higher Education Institution

This paper forms part of ongoing investigations on the implications of SaaS adoption in higher academic institutions or tertiary institutions. The benefit for tertiary institution focuses upon the scalability and the economics of SaaS business model. Scalability refers to the ability of a system to dynamically acquire or release computing resources on-demand, thus bringing supercomputing to the mainstream of research centres. For economic responses in challenging budgetary times, which have been forecasted to persist across the education sector for the next few years, there will likely be even greater pressures on higher academic institutions to replace on-premise IT systems with free or low-cost SaaS alternatives [4]. Additionally, by switching to hosted email and productivity SaaS applications, the job and focus of IT Workers can be changed. For example, as Timothy Chester, CIO for Pepperdine University, which partnered with Google, observed his smaller IT staff can be more productive. He stated: "We want our staff working more with students and faculty and less on the nuts and bolts of delivering technology" [36, p.1]. Furthermore, it has been predicted that organisations will find it beneficial to concentrate on and optimize their business processes by outsourcing the IT function. So, why not "Serverless universities"? By outsourcing almost all of IT and all data storage/handling -- this may be a viable proposition for tertiary institutions particularly as SaaS offerings expand and become more secure and reliable [4].

With above understanding, we now provide a theoretical analysis of ensuing changes from moving a current on-premise IT (e.g., emailing system) to the SaaS model (e.g., Google Apps). Normally, organisations, such as higher academic institutions, follow a series of stages to implement such a transition. In the first stage top management, works with a decision making team, including IT managers, to determine their SaaS goals and then to develop a strategy of moving on-premise IT system to a SaaS environment. The second stage is to create the SaaS delivery model, including a search for a suitable SaaS service vendor. The third stage is to negotiate the SaaS contract with the chosen vendor. The fourth stage is to identify needed service level agreements with the provider. The fifth stage is to arrange and manage the transition in an IT department. The sixth stage is to assign a project manager to work with the SaaS service vendor to maximise the value of IT investment and maintain the harmony of working relationships. The final stage is to assess the outcome of a SaaS project by measuring key performance indicators of the project. These measures can be used to determine whether an institution will continue with the current contract [11].

In this paper, we take a higher academic institution as an example in analysing these stages, including involvement of the decision making team in evaluating Request for Proposals (RFPs) or Tender Bids from vendors.

The next sections discuss how sources of structures from current on-premise advanced IT; organisational and human interactions have an impact on development

of a strategy of moving on-premise IT system to a SaaS environment, the evaluation of the RFPs and how SaaS is appropriated and institutionalised into business processes, and bring about organisational change. More specifically, the sections examine these existing concepts in a SaaS context when institutions move on-premise IT system to SaaS model.

3.1.1 Advanced Information Technology

Decision making team will be influenced by social structures from AIT. AIT is defined as tools, techniques, and knowledge that enable multiparty participation in organisational and inter-organisational activities through sophisticated collection, processing, management, retrieval, transmission, and display of data and knowledge [17]. Examples of AIT include; e-mail systems, GDSS, HIT and ERP. AIT brings social structures that enable and constrain interaction of people at the workplace. AIT social structures are described by structural features and spirit. Structural features are the specific capabilities offered by the system defined by two elements; technology's comprehensiveness and the level of complexity (See examples in Table 2). These features govern how computing resources are accessed, distributed, and controlled [17]. Examples of structural features of an on-premise emailing system include installation of client software on a computer to access database on the organisation's email server within the organisation's network, with limited web-enabled features. The on-premise IT system setup is a structural feature that employs secure access to the organisation's database of sending and receiving emails. On the contrary, SaaS is a web based system, which allows accessibility to resources at anytime, anywhere and on any device via a standard browser. Thus, structural features from both systems constrain and control users differently on how the system is accessed. The spirit of AIT defines appropriate behaviours in using the technology [17]. Examples of features and spirit are summarised in the Table 2.

Thus, AIT social structures might influence decision makers in implementing the transition. The aforementioned assumptions imply the proposition below:

P1. SaaS adoption environment provides social structures that can be described in terms structural features

and spirit. The spirit and structural feature sets may influence the decision making team in formulating SaaS delivery model and evaluating the RFPs.

3.1.2 Organisational Structures

A decision making team will be influenced by both external and internal social structures of the organisation. External sources of structures consist of inter-organisational relationships and influence, competitive influence, governmental influence, and influence from vendors. For example, external sources of structures in tertiary institutions may come from students and government policies. Students demand real-time collaborative tools and easily accessible online resources from multiple devices, at anytime and anywhere via the Internet. Similarly, the governments demand tertiary institutions to reduce expenses on non-core systems and do more with fewer resources. Internal sources of structure have two parts, structural and cultural. Structural sources examine specialisation (diversity of specialists) and centralisation (concentration of decision-making activity) aspects within an organisation [18]. For example, team members' speciality, such as Chief IT Officer (CIO) and Chief Financial Officer (CFO) may influence the team differently. CIO may prefer a system on which IT department has more control. CFO, on the other hand, might prefer a more cost-effective system. Cultural sources of structure consist of education, experience and interaction styles of people within an organisation [37]. Members of the decision making team may be influenced by education, knowledge and experience with on-premise IT system and SaaS technologies, including actual, perceived and shared experiences among them. Thus, in this example, influences from external and internal structures may force organisations in tertiary institutions to adopt SaaS-based systems. These assumptions imply the following proposition:

P2. The manner in which SaaS will be selected by decision making team will be influenced by the external and internal organisational structures.

3.1.3 Implications after SaaS Adoption

Implications after SaaS adoption are examined by structures of the new system (SaaS System), new social structure and emergent structures.

Table 2 Examples of Structural Features and Spirit Provided by SaaS & On-Premise Systems

Dimension	Structural Features		Spirit	
	SaaS	On-Premise IT	SaaS	On-Premise IT
Comprehensiveness	On-demand service and elasticity	Licensed with limited capabilities	Turned-up or down as a utility	Rigid and hard to customise
Complexity	Anywhere, any device and anytime through the Internet on a browser	Limited use on the web	Readily available services	Complex and require a lot of training

3.1.4 SaaS System

Technology application is the means by which the SaaS system is formulated. It has two interacting variables, appropriation of structures and application of these structures to business processes. Appropriation of structures is the degree to which members agree on which SaaS structures will be appropriated and used. Greater agreement on appropriation of structures can lead to more consistency in the system's selection patterns [17]. For example, during RFP evaluation, the use of decision making tools and anonymous voting system may help the decision making members to manage conflict and enhance consistency in the selection process of the preferred SaaS system. Business processes determine how SaaS can be implemented within the organisation based on its cloud strategy. For example cloud strategy may include selection of a type of SaaS service to adopt either ad-hoc, defined, managed or a strategic SaaS type [2]. Therefore, members appropriate aspects of structures from advanced IT, and organisational external and internal structures, to business process, and in so doing, create emergent structures and ultimately new social structures. Once emergent structures (that is SaaS structural features and new organisational structures) are used and accepted, they become institutionalised in the organisation [17]. SaaS structural features are described by comprehensiveness, complexity and support properties of the system. The comprehensiveness describes the features and capabilities of the SaaS system offered to users, including configurability, multi-tenancy, scalability, location independence, and rapid elasticity of a SaaS system. The complexity explains the ease of use, accessibility of the application and ease of learning through help tools. We argue that most SaaS systems are relatively easy to use via web browsers and have friendly graphic user interface, including online help screens and documentations. Support explains the customer service and support features provided by a SaaS system. SaaS system provides customer service and support through online help centres; videos and system knowledge base provided on the system dashboard [2]. These assumptions describe the following proposition:

P3. SaaS system emerges when technology has been appropriated to business processes. Appropriation of structures by members is influenced by existing environment of AIT, external and internal social structures.

3.1.5 New Social Structures

When social structures of the SaaS system are brought into action, they may take on new forms of organisational social structures. The major sources of structure after SaaS adoption include the SaaS system itself, as well as its outputs, the content and constraints of a given task, and the new organisational environment. For example, when an on-premise system is deployed to the cloud, the IT application

may now be accessed through an Internet browser at any time and from anywhere, with relatively low operating costs [1]. As a result, the content and constraints of a given task may change, such as the level of support and maintenance by IT workers would drop as IT infrastructure is moved to the cloud. More specifically, in SaaS organisational environment, CIOs and IT workers will assume new role of liaisons to monitor SLA and support business units to meet their goals. This is described by the following proposition:

P4. New social structure emerges as SaaS social structures are applied into business processes. These structures influence prior on-premise technological and organisational structures, and are influenced by SaaS environmental structures.

3.1.6 Emergent Structures

As technology and social structures are applied during SaaS implementation process; some of their outputs become emergent sources of structure. Once emergent structures are used and accepted, they may become institutionalised and stabilised in the organisation [17]. The change may result in new roles of IT workers and emergent organisational structures in the IT department. In the past, the nature of software deployment put CIOs and their IT workers into the role of gatekeepers who could exercise a veto over any proposed software deployment by simply declaring that they would not host it in the server room. Within SaaS environment, control of the server room does not necessarily equal control over the entire organisation's computing environment. As a result, these gatekeepers may develop fear of a loss of control [2]. More specifically, when on-premise system is moved to the SaaS model, emergent structures emerge. These include a lower need in some technical skill areas and an increasing in need for monitoring cloud providers, liaison and subcontractor project management skills. Thus, the old structures, tasks and responsibilities, such as server room infrastructure, server hardware routine maintenance and updates may become obsolete [14]. These assumptions imply the following proposition:

P5. Emergent sources of structure develop as technology, external and internal social structures are applied during SaaS application; and new structures are formed when emergent structures are institutionalised and stabilised into the system.

The model presented in Figure 1 summarises the relationships discussed in preceding sections. Major implications of P1 through P5 are predictions about how structures of AIT and social structures may be appropriated during SaaS adoption process, resulting in new emerging structures. After the new and emergent structures are institutionalised and stabilised, the shifting of the roles of IT workers and the impact on structure of IT-department may follow, as described in the following proposition:

P6. Appropriation and institutionalisation of social structures from the SaaS system will lead to changes in IT workers roles and this might trigger changes in the organisational structure of an IT-department

4 Conclusion

The conceptual model constructed in this paper is intended to provide a vehicle for analysing dynamic change process in SaaS adoption and organisational change. An increasing number of organisations have adopted or considered adopting SaaS applications to replace on-premise systems. According to Gartner, sales of SaaS applications were over \$14.5 billion in 2012, an increase of 17.9% from 2011 [10]. Due to budget constraints and the power of computing on-demand, IS scholars believe that tertiary institutions will be at the forefront of the shift to using SaaS -based resources. Thus, there is a need for research that examines the implications of the SaaS adoption on organisational change and associated human resource management. More specifically, the model explains how SaaS adoption may change IT workers' roles and tasks, and structure of IT department. The model is important because it explains how the appropriation of both technological and organisational structures into SaaS business processes and tasks could bring about emergent structures, such as the change in IT workers' roles, need for new IT workers' skill sets for supportive roles and managing SLA. The new structures are formed after the emergent structures are institutionalised into the system, which may include rearrangement of the organisational structure of IT department to accommodate the new structures. Unlike past IT outsourcing practices, SaaS systems offer a different kind of inter-organisational arrangements. The disruptive nature of SaaS business model may expose an organisation to additional costs, technical, security, human resource and organisational changes that are not normally associated with the traditional IT outsourcing practices [8]. Thus, this paper provides a preliminary theoretical model to subsequent empirical investigation on the dynamic of changes. Future study can analyse organisational structural changes after the implementation of SaaS applications into business operations to replace the existing on-premise IT system. This research builds on the work of DeSanctis and Poole and extends AST to the study of SaaS implications [17]. Our study can potentially lead the future empirical findings to contribute new knowledge for better understanding of SaaS adoption and its implications to organisation's structure and human resource issues. In addition, the conceptual model could inform managers on potential opportunities, risks and changes to an organisation, so they can prepare appropriate resources to address them.

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