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Critical Success Factors for Institutionalisation of Information Systems

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Abstract

Information systems institutionalisation is a process through which technology becomes aligned with the organizational environment and, thus, becomes an integral part of the organization. Technology implementation in contemporary business organizations should not be viewed as one off endorsement of technology. Instead it is an important ingredient in the ongoing process of organizational evolution through which the business maintains its legitimacy, power, and social and economic fitness. For successful information systems institutionalisation, organizations need to consider technical, organizational, social, environmental, cultural, political, and other institutional aspects. It is important to emphasize these factors because they not only shape technology, but also help in its assimilation and routinization within the organizational context. This paper establishes that an organization as an institution consists of various sub-institutions, where the mutual complementary interaction of these sub-institutions gives legitimacy and social and economic power to the organization. It presents a framework for information systems institutionalisation which explores the character, shaping, and use of technology through continuous interfacing with technical, contextual, social, cultural, environmental, and other sub-institutions. This research particularly highlights the critical success factors for institutionalisation of information systems at each stage from their assimilation to deinstitutionalisation and reinstitutionalisation.

Keywords

Critical Success Factors, Technology Assimilation, Technology Institutionalisation, Technology Lifecycle Management.

1. Introduction

Technology lifecycle management process is a dynamic and nonlinear cyclic process of technology evolution within organization through which technology introduces to the organization, starts to use, becomes dominant, and then erodes or disappears from the organization. The information systems (IS) are a subset of organizational technological infrastructure. During the past four decades, a number of researches have attempted to resolve issues relating to this process from a variety of angles and in an assortment of contexts and operational settings. However, there are some gaps in the existing literature which require more

attention from business and academic researchers to be studied and resolved. These gaps are first; mostly concepts like institutional theory, institutional pressures and institutional change are used in political and social studies. However, there is an urgent need to study the effects of these concepts on technology implementation, as technology is one of the sub-institutions of an organization. Second, most of the studies focused on one or two aspects of technology implementation/ assimilation such as social, technical, organizational, environmental, cultural, political and competitive dimensions. However, technology implementation in business organizations cannot be viewed as uni-dimensional objective process. Thirdly, researchers mainly pay attention to the first two phases of technology lifecycle management and thus, fail to consider the importance of post-implementation stage. As a way to bridge up this gap, this study suggests a framework which considers pre-implementation, implementation and post-implementation stages of the technology lifecycle management. Fourth, existing research has mostly studied the process of institutionalisation, and little attention has been given to effects of institutional change, deinstitutionalisation, and reinstitutionalisation. Finally, technology is a social product and is affected by the social context in which it is operated; however, little attention has been given to this social shaping of technology in organizations.

This research investigates the impacts and interrelationships of different external and internal factors and sub factors on various stages of technology lifecycle management which will guide organizations to implement, assimilate, and institutionalise IS technological innovations more efficiently and transfer successfully from one stage to another. This study is among the first studies of technology implementation/ assimilation which integrates the effects and ideas proposed by a number of well-defined and well-known theories in this area into a unified and integrated structure. The suggested framework emphasizes the character, shaping, and use of technology through continuous interfacing with organizational, social, cultural, environmental, political, and other institutional factors. Moreover, one of the main theoretical contributions of this research is that it considers the theories related to institutional change, and deinstitutionalisation as well, therefore, provides a more comprehensive view to IS institutionalisation and technology lifecycle management process.

The remainder of this paper will flow as follows: literature review and theoretical background, an explanation of institutional pressures, and IS institutionalisation, deinstitutionalisation and reinstitutionalisation, suggested research framework and questions, research methodology, and then discussion and conclusions.

2. Tracing the Research Background

This section is structured into three subsections. The first subsection reviews IS assimilation process and its various stages. The structural model of technology which mainly emphasizes the process of social shaping of technology is then elaborated in the second subsection. The third subsection provides an overview of theories relevant to technology lifecycle management and the factors contributing to its success.

2.1 IS Assimilation Process

Contemporary IS research on technology implementation primarily focuses on factors influencing its organizational adoption. However, adoption is just one part of technology assimilation process which cannot insure that technology can be successfully deployed and utilized in the organization. IS assimilation refers to the diffusion of technology usage across

organizational business processes and the routinization of activities within these processes. In the literature of this area, various authors have explained the same process in different ways. However, this research concurs with Zhu *et al.* (2006a) who suggest initiation, adoption, and routinization as the core elements of technology assimilation process. These three steps embody the pre-implementation, implementation, and post-implementation phases of technology assimilation, and thus, provide a more comprehensive foundation.

In the initiation stage of this process, the technology needs and problems of the organization are identified and prioritized. Then the organization's environment is searched for the suitable technology that addresses the problem. At this stage, the focus of introducing technology to organization is on improving organizational performance (Rogers 2003; Zhu *et al.* 2006a). The second stage of assimilation process is adoption wherein the decision to use the technology is made (Rogers 2003), and the resources required for general deployment of technology are allocated based on the level and scope of adoption decision. This facilitates the widespread usage of technology. After technology implemented, it requires to be accepted, adapted, and routinized within the organization (Cooper and Zmud 1990). Fichman and Kemerer (1999) introduce a new concept, i.e., 'assimilation gap' as the lag between widespread usage of technology and the adoption decision. This lag occurs because of the insufficient knowledge of the organization and its members to leverage the system. As a result, technology is not aligned with the user's environment, so it fails to be deployed completely throughout the organization. As a way to bridge up this gap, routinization emerges as the last stage of this process by which technology is widely used as the integral part of the organization.

2.2 Structural Model of Technology

Orlikowski (1992) argues technology is physically adopted and socially constructed by actors in a given social context and affected by their actions. His structural model of technology comprises three components, i.e., human agents (such as decision makers, users, and technology designers), technology (any artifacts mediating task execution in the workplace), and institutional properties of organizations that constitutes organizational dimensions (such as business strategies, culture, structural arrangements, and control mechanisms) as well as environmental pressures like competitive forces, vendor strategies, professional norms, and etc. In general, institutional conditions influence the way people interact with technology, and the way technology is embedded within social context of organization (Elle *et al.* 2010).

2.3 Theoretical Background

Once an IS technical innovation has been introduced into the organization, it must be examined how people, technology and organization adapt to the institutions and the broader operating environment of the business. There is significant theoretical support available at this level. The rest of this section reviews the theoretical foundation for the suggested research framework.

2.3.1 Diffusion of Innovation Theory (DOI)

DOI (Rogers 2003) is a process in which an innovation is communicated through certain channels over time and within a particular social system. The proportion of the population adopting technology is approximately distributed normally over time as individuals possess various degrees of willingness to adopt innovations. Rogers (2003) argues that people judge an innovation and decide to adopt or reject it based on their perceptions of five attributes of it, i.e., relative advantage, compatibility, complexity, trialability, and observability. These five attributes

identify success factors to be addressed when introducing and assimilating a technological innovation within an organization.

2.3.2 Task-Technology Fit Theory (TTF)

TTF (Goodhue and Thompson 1995) explains how technology leads to performance, if the capabilities of it match the tasks performed by user. According to this theory, the technology must be utilized and fit perfectly with the tasks it supports to ascertain successful IS implementation and high performance (Goodhue and Thompson 1995; Angolano 2008).

2.3.3 Technology Acceptance Model (TAM)

TAM, theory of reasoned action, and unified theory of acceptance and use of technology (UTAUT) all study behavioural elements affecting individual's intention to use a system, and actual system use. User attitude towards the technology (beliefs, habits, affect), along with social norms, and other situational factors lead to increased utilization and performance of system usage (Davis *et al.* 1989; Wixom and Todd 2005).

In general, TTF and TAM are two main models of information technology utilization behaviour which provide theoretical basis for exploring the factors affecting technology utilization and its link with user performance. Although these two models have overlapping perspectives on utilization behaviour, they offer two various views on technology implementation (Pagani 2006). Matching between user task needs and the available functionality of the IT is mainly the focus of TTF. However, user's attitudes toward a particular technology based on their perceived usefulness and ease of use comprises the determinants of TAM.

2.3.4 Technology-Organization-Environment Framework (TOE Framework)

TOE framework explores how technology assimilation process is influenced by the technological, organizational, and environmental context (Tornatzky and Fleisher 1990). The technological context consists of both internal/external technologies such as equipment and processes. The organizational context embodies characteristics and resources of the organization, like managerial structure, managerial obstacles, and firm's size. The environmental context is the arena in which the organization conducts its business and concerns the size and structure of the industry, such as the macroeconomic context, the firm's competitors, and the regulatory environment. In summary, the way an organization sees the need for, searches for, and adopts technology is influenced by these three elements (Zhu *et al.* 2006b; Li *et al.* 2010).

2.3.5 Theory of Social Shaping of Technology

The theory of social shaping of technology (Mackenzie and Wajcman 2001; Law 2004; Latour 2005) explores the effects of social, organizational, and cultural factors on the content of technology and the processes involved in introduction of technology to an organization. It views technology as a socially constructed product shaped by the social and cultural environment of its creation and use (Orlikowski 2007; Law 2004; Elle *et al.* 2010; Venters 2010).

2.3.6 Actor Network Theory (ANT)

This sociological theory explores the social dynamics of technology dominance (Callon 1986; Munir and Jones 2004) and studies the interactions of actors including people, objects (e.g., computer software, hardware, and technical standards), and organization in a heterogeneous network (Latour 2005). Stabilizing and reproducing interactions and the resistance against them constitute the main components of this theory.

2.3.7 Organizational Institutional Theory

This theory is one of the prevailing theories utilized in organizational analysis. It mainly focuses on the environmental factors, and offers explanation for social actions, social structure, and cultural persistence through a process by which social schemas, rules, norms, routines, and typifications (cultural beliefs and scripts) become established as authoritative guidelines for organizational behaviour (Powel and DiMaggio 1991; Greenwood 2008; Abrutyn and Turner 2011). Organizations as institutions are viewed as independent variables influenced not only by direct consequences of individuals' attributes and stakeholders motives, but also by cognitive and cultural explanations which are continuously reproduced through the socialization process.

3 IS Institutionalisation/Deinstitutionalisation/Reinstitutionalisation

Institutions are social structures composed of cultural-cognitive, normative, and regulative elements that, together with resources and associated activities, bring stability and meaning to social life (Scott 2001; Greenwood 2008). The organizational legitimacy achieved through social acceptability, credibility, and cultural support derives the institution (Delmestri 2007; Weerakkody *et al.* 2009; Baptista 2009). Institutionalisation process, thus, embodies both objectification (i.e., the articulation of ideals, discourses and techniques), and subjectification (i.e., individuals' enactment through role development), whereby organizational routines shape and are shaped by its sub-institutions (Powel and DiMaggio 1991; Scott 2001; Delmestri 2007).

Institutions are also subject to incremental and discontinuous change processes. Change is natural, almost inevitable and progressive. It takes decades for the need for change to be endorsed (Greenwood *et al.* 2002; Clegg and Bailey 2008). The introduction of new technology calls the attention of organizations to adopt it and thus, make required changes to the current technical infrastructure of their business. Deinstitutionalisation facilitates unlearning in the organization to learn new facts, realities, and concepts. Through the process of deinstitutionalisation, institutions weaken and disappear because of new beliefs and practices (Scott 2001; Dambrin *et al.* 2007). Oliver (1992) introduces three main sources of pressures that can lead to the erosion of legitimacy or the taken-for-grantedness which characterise institutions, i.e., functional, political, and social pressures. Finally, reinstitutionalisation refers to departing from one institutionalisation and arriving into another institutional form and practices which are organized around different principle and rules (Greenwood 2008; Currie 2011).

3.1 Three Institutional Isomorphic Pressures

Institutional isomorphism is a process in which organizations try to excel in their practice of social rules, ideals, and practices by aligning themselves with the environmental conditions. The interpretation of intention to adopt technology and the prevailing context of the organization is affected by its perception of these pressures. Coercive, normative and mimetic are three isomorphic mechanisms which influence organizations in gaining operational efficiency, similarity with peers, and success (Powel and DiMaggio 1991; Greenwood 2008). The coercive isomorphism occurs by organizational desire to conform to laws, rules, and sanctions established by institutional actors or sources. This similarity results in gaining legitimacy and external validation that improves the organization's access to resources. Usually, the powerful organization can exert coercive pressure on their dependent partners by raising requirements such as conforming to a security standard as a condition for customer requirements. The

normative mechanism mostly concerns the moral and pragmatic aspect of legitimacy by assessing whether the organization plays its role correctly and in a desirable way, such as, ATM service is a standard service offering by retail banks, and banks who are not offering this service are more in the risk of damaging their legitimacy in the view of their industry and other institutions. The mimetic isomorphism is a cause of organizational tendency to remain similar to its peers in order to get a positive evaluation from the organizational environment. This mechanism results in reducing uncertainty, improving predictability, and benchmarking organizations who are performing at or near optimum level. In general, when an organization starts adopting and implementing a technology, other competitors from the same industry becomes aware of it and considers adopting it (Scott 2001; Liang *et al.* 2007; Jei and Sia 2011; Currie 2011; Katsumata 2011). These mechanisms need to work in concert with each other in order to bring higher degrees of isomorphism.

4. IS Institutionalisation Framework and Research Questions

The main question of this research is 'How information technologies in general and information systems in particular should be assimilated, legitimized, maintained, improved, and retired within organizations?' In the rest of this section, the IS institutionalisation framework (figure 1) and the sub-questions arise from each layer of it will be elaborated and discussed.

The most inner layer of this framework is IS assimilation process. As explained in section 2.1, the three-stage technology assimilation process (initiation, adoption, and routinization) proposed by Zhu *et al.* (2006a) is used here. These three steps embody the pre-implementation, implementation, and post-implementation phases of technology and, thus, provide a more comprehensive foundation for IS assimilation (Bartunek *et al.* 2007; Jei and Sia 2011). The fundamental question at this stage is 'How IS innovations are assimilated within organizations?' The second layer of the suggested research framework is technology lifecycle management success factors. At this stage, organization needs to ascertain how IS are shaped with the social, organizational, and technical contexts of the organization. Therefore, the social construction of technology should be considered as a critical phenomenon for IS assimilation and lifecycle management success. At this stage, the interactions between technical, organizational, social, cultural, and competitive aspects become institutionalised within the organization environment provide for the success factors of technology lifecycle management process. Here the question arise is 'What are the critical success factors (CSFs) in various stages of IS institutionalisation and technology lifecycle management?'

IS institutionalisation/ deinstitutionalisation/ reinstitutionalisation is the third layer of suggested research framework. When an IS technological innovation is institutionalised, it is taken for granted by actors of social system and they even may not recognize that their behaviour is controlled by an institution. At this stage, acting in compliance with the institution is viewed as logical by those who share the institution (Baptista 2009). Coercive, normative, and mimetic mechanisms [described in section 3.1] make technology to be legally sanctioned, morally governed, and culturally supported (Scott 2001). When these institutional pressures increase, the institutionalisation process emerges, reversely when they decrease, deinstitutionalisation process originates which is a result of institutional change, erosion of existing institutions and creation of new ones (Dambrin *et al.* 2007; Seal 2003). There is yet another state, i.e., reinstitutionalisation, which refers to departing from one institutionalisation and arriving into another institutional form and practices which are organized around different principle and rules (Currie 2011). Hence,

considering institutional pressures provides new insights into how the behaviours of individuals within an organization are influenced by organizational norms, values, regulations, and culture. On the contrary, how they may result in deinstitutionalisation and reinstitutionalisation of organizational forms and practices. Besides, considering all these influencing factors and their effects, an organization could facilitate its readiness over various stages of IS institutionalisation and technology lifecycle management. The sub-question arise in this stage is, therefore, 'How IS become institutionalised, deinstitutionalised, and reinstitutionalised in organizations?'

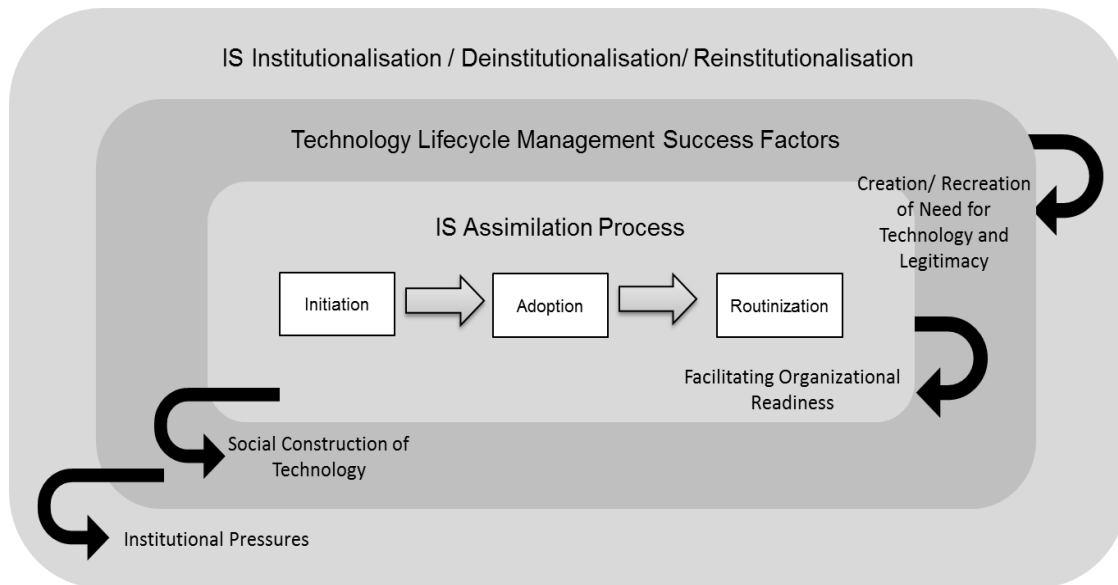


Figure 1: IS Institutionalisation Framework

5. Research Approach

This research applies a qualitative interpretive approach with an exploratory case study in order to find more in-depth understanding of human and organization behaviour and the reasons govern such behaviour through the process of assimilating and institutionalising IS in the organization. It triangulates data from various sources, such as interviews, personal observations, surveys, and organizational documents. Executive IT managers, R&D member, planners, designers, enterprise architects, solution architects, users, and maintainers who are engaging in various stages of technology assimilation are the best target for interviewing purpose. In particular, they will be selected from various organizational layer, i.e., top, middle, and functional layer, or/ and they may play different roles in the organization. The reason is that technology is physically adopted and socially constructed by actors in a given social context and affected by their actions. Hesse-Biber (2010) suggests a number of other advantages of using this methodology after having analysed several case studies. These include increasing the representativity and generalizability of research, locating a target population or defining a population of interest to study in depth, enhancing the validity and reliability of research findings, addressing inconsistent results, testing the validity of qualitative results, enhancing the understanding of the research problem and research findings, providing convergence in findings, and promoting social transformation.

The qualitative data collected from case study interviews will be verified and analysed using data analysis software, i.e., NVivo to obtain an in-depth description of this distinctive contemporary phenomenon within a real life context (Yin 2009). This software is useful in organizing data according to different themes emerging from the data collected, which allows testing theories or in directing the study to generate new theories. Furthermore, it could be used to form relationships between different themes to bring about cause and effect analysis, tree maps, and cluster analysis, which would help with the within-case analysis as well as cross-case analysis.

6. Conclusion and Summary

An organization as an institution evolves through the mutual interactions of various organizational sub-institutions. Technology works as the binding factor that shapes organizations and gives them their existing form and legitimacy by integrating together these sub-institutions. The form and legitimacy define how organisations evolve their structures, culture, and systems. Moreover, these sub-institutions are interdependent and changes in one will affect whole system (entropy). Thus, changes in the technical infrastructure of an organization will affect whole organization and its operational environment which may result in deinstitutionalisation of current forms and practices and reinstitutionalisation of another IS technological infrastructure.

This paper concludes that IS institutionalisation process is evolutionary and nonlinear and its success depends on a number of contextual, technical, environmental, social, cultural, and other institutional factors and their mutual interactions. These interactions contribute to organizational maturity, legitimacy, and success and define technology implementation, institutionalisation, deinstitutionalisation and reinstitutionalisation in the organization. This study brings together different theoretical perspectives and proposes a coherent IS assimilation/institutionalisation environment. The suggested research framework aims to investigate IS implementation, assimilation and institutionalisation challenges through various stages of technology lifecycle management process considering institutional pressures, institutional change, and other technology implementation/assimilation theories.

Through the next step of this study, the authors will conduct case study interviews and surveys in various Australian organizations who may have different IS implementation and assimilation arrangements such as fully owned IS infrastructure, partly/ fully outsourced/ insourced IS infrastructure, and etc. This would help in better understanding of technology lifecycle success drivers over various stages of it.

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