ERP INSTITUTIONALISATION- A QUANTITATIVE DATA ANALYSIS USING THE INTEGRATIVE FRAMEWORK OF IS THEORIES

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ABSTRACT

There is a wide agreement that IT projects have disappointing success rates and often generate less value than originally promised. In the context of ERP systems, the same statistical reports exist which demonstrate an overwhelming number of failures in ERP implementations. A thorough review of IS literature, however, leads us to believe that organisations that broadly deploy and routinise IT (in particular, ERPs) into their day-to-day work procedures realise the greatest productivity benefit and business values, and in return perceive to be more successful. The stage wherein ERP is fully assimilated, widely accepted and routinised is also referred to as institutionalised ERP in the extant IS literature of institutional theory. As a result, the authors of this paper believe that studying the influence of various social, environmental, technological and organisational factors on ERP institutionalisation has significant potential in improving the chance of successful ERP projects. In doing so, this paper introduces an integrative framework of IS theories based on an in-depth review of IS literature. The survey instrument is developed to gather data on possible impacts of factors derived from each theory on ERP institutionalisation. The gathered data is then analysed using quantitative data analysis methods to shape the final hypothetical inferences. Finally, based on the data analysis results, this paper proposed valuable suggestions to business and IT managers to improve the chance of ERP success in their organisations.

Keywords: Enterprise Resource Planning (ERP) System, ERP Institutionalisation, Information Systems (IS) Theories, Critical Success Factors

INTRODUCTION

Enterprise resource planning (ERP) system allows for streamlined processing of business data and cross-functional integration among a wide range of software products supporting day-to-day business operations and decision-making tasks (Bajwa et al. 2004; Dezdar and Sulaiman 2009). ERP systems have emerged as an enabling technology about two decades ago and still are very important elements for modern business organisations. Nevertheless, the extent IS literature shed light on the fact that despite the critical role of ERP and its related activities in bringing value to the business, there is no doubt that many organisations are still struggling with it (Chatterjee et al. 2002; Xue et al. 2004; Dezdar and Sulaiman 2009; Gartner 2014). This justifies the importance of studying various factors which are influencing successful ERP implementation and use.

At the same time, the extensive review of information system (IS) literature suggests that researchers typically study the process of technology adoption, implementation and assimilation, and thus, little attention has been given to study technology institutionalisation process. This process is the result of fully assimilated and integrated technology which occurs when technology usage becomes stable, routinised and embedded within the organisation's work processes and its value chain activities. Studying technology institutionalisation, therefore, is value worthy for two reasons. First, it is a recent phenomenon in IS domain. Second, a thorough analysis of IS literature suggests that the significant effects of information technologies (IT) on productivity of organisations will only be realised if, and when, they are widely spread, utilised and institutionalised in the organisation (Purvis et al. 2001; Liang et al. 2007; Baptista 2009). Nevertheless, institutionalisation of complex technologies (like ERPs) is never easy and a myriad of environmental, social, organisational, and technological elements blend together to influence how potential adopters make sense out of technology, assimilate its use, and finally institutionalise it (Soh et al. 2000; Purvis et al. 2001; Xue et al. 2004; Pollock and Williams 2008).

This paper aims to study the effect of most cited theories in technology adoption, implementation, and assimilation on IT/IS (in particular, ERP) institutionalisation. For this purpose, first, various theoretical/empirical literatures were searched and systematically organised. These activities lead us to propose an integrative framework of IS theories for studying ERP institutionalisation. The validity of this framework is then tested using quantitative data analysis methods (i.e., factor analysis and regression) on the gathered survey/questionnaire data. This analysis leads us to shape the final quantitative hypothetical inferences of this paper.

LITERATURE REVIEW

This section reviews the extant information system literature in order to develop an understanding of the conceptual basis and theoretical background of IT/IS implementation, assimilation and institutionalisation in contemporary business organisations. In so doing, the effort was made to engage critically with literature to realise, analyse and critique the current state of knowledge in finding the reasons which can be associated with high failure rate of ERP implementations in today's organisations. Through this process, first, the ERP assimilation process and its various stages are explained followed by reviewing the current state of theoretical knowledge of IT/IS planning, adoption and use. This review is both crucial and conductive, since each of the explained theoretical lenses opens up new ways of looking at ERP assimilation process and its success/failure within organisation. The review of IS theories has directed this research to the understanding of institutionalisation process as one of the core elements of institutional theory. This understanding further leads the authors to critique the extent IS literature because of its disproportionate attention to studying IT/IS planning, implementation, and assimilation process comparing to its institutionalisation. The literature review section finally has concluded with the definition of the process of institutionalising IT/IS (in particular, ERPs).

ERP Assimilation

Most of the researchers to a large extent agree that technology assimilation process extends from initial awareness to full utilisation and usage of the technology within organisation (see for example, Cooper and Zmud 1990; Chatterjee et al. 2002; Rogers 2003; Bajwa et al. 2004; Zhu et al. 2006; Liang et al. 2007). This research concurs with Zhu et al. (2006) who suggest initiation, adoption, and routinisation as the core elements of IT assimilation process. These three steps embody the pre-implementation, implementation, and post-implementation stages of ERP assimilation, and thus, provide a more comprehensive foundation for this process. Looking at the temporal relationship of these stages, implementation (physical installation) takes between one to three years (21 months on average), with benefits starting to accrue in an average of 31 months (post-implementation stage) (Chatterjee et al. 2002; Liang et al. 2007; Saraf et al. 2013). Later in the literature review section, ERP institutionalisation is introduced as a result of fully assimilated ERP system (it takes about five to six years for an ERP module to become completely ingrained, routinised, and institutionalised).

Theoretical Background Used in Development of the Survey Instrument

Many theories have been developed and used in IS research (Larsen et al. 2014). The theoretical focus of this research, however, is on theories about technology adoption, implementation, and assimilation. In this section, the most cited IS theories such as social shaping of technology (Mackenzie and Wajcman 1985), socio-technical theory (Latour 2005), diffusion of innovation (Rogers 2003), task-technology fit theory (Goodhue and Thompson 1995), technology-organisation-environment framework (Tornatzky and Fleischer 1990), and institutional theory (DiMaggio and Powell 1983) are reviewed. These theories shape the main pillars of survey instrument developed for doing this research. In the elaboration of each theory, the details of predictors (or indicators) used to study the effect of that theory on ERP institutionalisation also have been discussed. These predictors describe various initiation, adoption, and routinisation stages of ERP assimilation. For example, the push from government, suppliers or customers of an organisation in decision to adopt ERP is a coercive mechanism through initiation stage, however, the same pressures in using ERP is related to routinisation stage. Finally, the extensive review of IS theories is concluded with a subsection on the definition of ERP institutionalisation.

According to socio-technical theory, information systems are social systems and their use and acceptance in the organisation is fashioned by the human interpretation of technology. Assimilation and performance of technology can, therefore, only be attained if the social and technical subsystems are brought together and treated as interdependent aspects of a work system (Orlikowski 2007). In fact, organisations need to find the fit between their technical and social sub-institutions in order to build an integrated harmonised organisation. In line with socio-technical theory, the theory of social shaping of technology (Mackenzie and Wajcman 1985; Latour 2005) also explores the effects of social and cultural factors on the content of technology and the processes involved in introduction, implementation and use of technological innovations. It views IT/IS as a socially constructed product shaped by the social and cultural environment of its creation and use (Soh et al. 2000). Technological and social contexts, therefore, cannot be treated as separate phenomena; rather the definition of technology must become embedded within the social arrangements. For example, Orlikowski (2007), viewed organisational practices as 'sociomaterial' and suggests the perspective of constitutive entanglement, i.e., inextricable relationship between humans and technology in organisations. She provided a practical example of information search in Google to show how the resulting sociomaterial assemblage that delivers search results to a researcher (through temporarily binding a heterogeneous assembly of distributed agencies together) is both emergent and contingent. In this research, the influence of theories such as socio-technical theory and social shaping of technology were assessed through three categories in the developed survey instrument comprising of user competency and support mechanism, cultural acceptance, and cultural barrier [refer to table 1].

Construct	Indicator	Stage	Description
User Competency and Support Mechanism	UserComp1	Initiation	Prior to ERP implementation, our employees had extensive experience in using computer based applications
	UserComp2	Routinisation	It is well known who can help in solving the problems associated with the ERP package
	UserComp3	Routinisation	Our organisation can provide adequate technical support for using ERP system
	UserComp4	Routinisation	Our organisation provides ERP training opportunities to employees on regular basis
	UserComp5	Routinisation	IT people are competent in maintaining, updating and supporting the ERP users
	UserComp6	Adoption	Preparing people strategies (i.e., gaining support from future users of the system, training them how to use the technical aspects of system, familiarising them with how jobs and processes will change after implementation) have been considered before ERP goes-live
	UserComp7	Routinisation	Lack of appropriate training resulted in experiencing difficulty
	UserComp8	Routinisation	Training employees and end-users has influenced ERP assimilation and its success
Cultural Acceptance	Culture1	Routinisation	The ERP users and employees are eager to use the system without direct social control or sanctioning process
	Culture2	Routinisation	The ERP users and employees are eager to use the system because they perceive more rewards in using it
	Culture4	Routinisation	We learn how to work with ERP system by creating teams and team working
Cultural Barrier	Culture3	Routinisation	The ERP users and employees were not eager to switch from legacy system to ERP and they resist to accept this change
	Culture5	Routinisation	We have experienced employee's resistance to ERP technology after adapting to it
	Culture6	Routinisation	Limited knowledge of the users about ERPs' advantage and its different functionalities resulted in experiencing difficulty

Table 1. Factors Influencing ERP Institutionalisation- Theory of Social Shaping of Technology

Task-technology fit (TTF) theory was initially originated from the technology-to-performance chain (TPC) model suggested by Goodhue and Thompson (1995). It suggests that an explanation of IS success can be recognised by both the task for which technology is used and the fit between task and technology. This model gives a more accurate picture of the way in which technologies, user tasks, and utilisation relate to changes in performance and helps users and organisations to understand and make more effective use of information technologies. TTF theory, therefore, holds that if the capabilities and features of technology match the needs of tasks performed by users, the probability of achieving performance in technology adoption and assimilation is higher (Goodhue and Thompson 1995; Zigurs and Khazanchi 2008; Seddon et al. 2010). TTF theory combines insights from research on user attitudes as predictors of use or utilisation with the notion of task-technology fit as a predictor of performance. The literature related to this theory proposes that information systems (including e.g., technology, policies, and staffs) have a positive impact on performance only when there is correspondence between their functionality and the task requirements of users. Moreover, at the organisational level the 'fit' between task characteristics and IT innovations has been linked with IS adoption, utilisation, and usage by various researchers. In this research, the influence of TTF theory on ERP institutionalisation in developed survey instrument was measured through thirteen factors divided in to three categories, i.e., TTF initiation (e.g., identifying suitable technology options in alignment with strategic information needs and establishing processes for linking IS strategy to business needs), TTF adoption difficulty

(e.g., configuration issues, functionality gaps, and lack of documentation), and TTF routinisation (e.g., strategic alignment between ERP and each business unit and ERP system's alignment with organisation's overall business strategy) [refer to table 2].

Construct	Indicator	Stage	Description
TTF Initiation	TTF1	Initiation	There is an established process for linking information systems strategy to business needs
	TTF2	Initiation	Some IT development resources are positioned in business units
	TTF3	Initiation	The introduction of, or experimentation with, new technologies takes place at the business unit level under business unit control
	TTF7	Initiation	Identifying suitable technology options in alignment with strategic information needs was considered through pre-evaluation process
	TTF8	Initiation	Reconfiguration of ERP to ensure it fits with operating environment was considered through pre-evaluation process
	TTF9	Initiation	Business process reengineering is considered before implementing ERP (i.e., analysing current processes, identifying non-value adding activities and redesigning the process to create value for customers before implementing ERP, and then developing in-house applications or modifying an ERP package to suit the organisations requirements)
TTF Adoption Difficulty	TTF10	Adoption	ERP configurations (i.e., mapping the ERP to the business and vice versa) resulted in experiencing difficulty in implementing it
	TTF11	Adoption	Functionality gaps after configuration and customisation of ERP resulted in experiencing difficulty in implementing it
	TTF12	Adoption	Lack of documentation about system configuration to support the evolving business needs resulted in adoption difficulties
TTF Routinisation	TTF4	Routinisation	The strategic alignment between ERP system and each business unit has influenced smooth assimilation of ERP in organisation
	TTF5	Routinisation	ERP is aligned with organisation's overall business strategy
	TTF13	Routinisation	The fit between ERP system and the organisation's work design and business processes has influenced ERP assimilation and its success

Table 2. Factors Influencing ERP Institutionalisation- Task-Technology Fit Theory

The literature on theory of diffusion of innovations (DOI) has been broadly defined as the study of how, why, and at what rate technological innovations spread through a population of potential adopters over time (Rogers 2003). DOI theory sees IT innovations as predominantly a process of communication through which potential adopters learn about IT innovations and become persuaded to adopt them. According to Rogers (2003), there are different categories of people with different levels of motivation to accept technology within the organisation, i.e., innovators, early adopters, early majority, late majority, laggards. The higher proportion of users, however, lies in the early and late majority area. The success of technology assimilation, therefore, depends upon how sooner individuals in the early majority and late majority accept technology and provide the same level of productivity as innovators and early adopters. Various factors influence the willingness of adoption of a specific innovation across an entire population. Rogers (2003) reviewed hundreds of diffusion studies and identified five generic attributes of an innovation that influence rates of adoption, i.e., relative advantage (like economic advantage, social prestige, and convenience), compatibility (e.g., with values, skills, work practices, and needs of users), complexity (the degree to which an innovation is perceived as difficult to understand and use), trialability (the degree to which an innovation can be experimented with a limited basis), and observability (the extent that the results of an innovation are visible to others). Higher values of all these attributes (except for complexity) are favourable to easier implementation within a given organisation. Rogers's synthesis, however, is mainly based on studies of adoptions by individuals (e.g.,

of consumer goods). Nevertheless, innovation attributes also play an important role in adoption of IS technologies by organisations (Cooper and Zmud 1990; Zhu et al. 2006). In this research, the influence of DOI theory on ERP institutionalisation was measured through the survey instrument comprising of three attributes; automation capability, compatibility, and ease of use [refer to table 3].

Construct	Indicator	Stage	Description
Diffusion of Innovation	DOI1	Routinisation	Automation capabilities of ERP system has influenced ERP assimilation and its success
	DOI2	Routinisation	The compatibility of ERP system with all aspects of organisations' work has influenced ERP assimilation success
	DOI3	Routinisation	Ease of use of ERP has influenced its successful assimilation

Table 3. Factors Influencing ERP Institutionalisation- Theory of Diffusion of Innovation

The technology-organisation-environment (TOE) framework suggests that adoption, implementation, and assimilation of technological innovations are influenced by the technological, organisational, and environmental context of the organisation (Tornatzky and Fleischer 1990). This framework makes Rogers' innovation diffusion theory (2003) better able to explain intra-organisation innovation diffusion, since it emphasises individual characteristics along with other characteristics of organisation as drivers for organisational innovativeness. At the same time, it goes further and includes another critical component, i.e., environmental context comprising of external elements, constraints and opportunities such as industry norms, regulatory regimes, suppliers support, and customers' needs. In this research, the influence of TOE framework on ERP institutionalisation was measured through two separated groups, i.e., technological and organisational. The technological aspect was quantified using eighteen predictors distributed in three categories, such as legacy system shortcomings (e.g., data redundancy, data reformatting, lack of decision quality, and lack of information ownership), technology pre-evaluation criteria (e.g., financial feasibility of technology and technology compatibility), adoption technical difficulties (e.g., the cost of software license and installation, data standardisation and conversion issues, lack of support documentation, data inconsistency, and unreliable hardware) [refer to table 4].

Construct	Indicator	Stage	Description
Legacy System Shortcomings	LegacySho3	Initiation	Each functional area had its own legacy system which was not integrated with other organisational information systems
	LegacySho4	Initiation	Working with legacy infrastructure led to data redundancy
	LegacySho5	Initiation	Working with legacy IS infrastructure, we had to reformat data from one system to use it in another
	LegacyShot6	Initiation	We had difficulties in sending/receiving real time information to/from other information systems
	LegacySho7	Initiation	Legacy infrastructure did not provide quality decision support
	LegacySho8	Initiation	Working with legacy information systems, there was lack of information ownership
	LegacySho9	Initiation	The data in the legacy information systems lacked quality
Technology Pre-Evaluation	PreEval10	Initiation	A pre-implementation evaluation procedure to evaluate financial feasibility of adopting ERP was conducted
	PreEval11	Initiation	A pre-implementation evaluation procedure to evaluate technology standardisation and compatibility was conducted
	PreEval12	Initiation	The technical system was prepared (i.e., converting data from the legacy systems to the required formats, installing the ERP software, and testing the ERP software)
Adoption Technical Difficulties	AdopTech13	Adoption	The cost of software license and installation resulted in experiencing difficulty in ERP implementation
	AdopTech14	Adoption	Data standardisation and conversion issues (i.e., cleaning, matching, reformatting, and updating information from legacy system to ERP) resulted in ERP implementation difficulty
	AdopTech15	Adoption	Lack of support documentation resulted in experiencing difficulty in ERP implementation
	AdopTech16	Adoption	Data inconsistency resulted in ERP adoption difficulties
	AdopTech17	Adoption	Unreliable hardware resulted in in ERP adoption difficulties

Table 4. Factors Influencing ERP Institutionalisation- Technological Aspect of TOE Framework

The organisational context of TOE framework had been measured using twenty five predictors distributed in four categories [depicted in table 5], such as organisational adoption success driver (e.g., top management leadership and support, adequate training and education, financial and non-financial incentives to employee, and competency and expertise of IT support), organisational pre-evaluation (e.g., organisational information need, cultural issues, and establishing appropriate deadlines/milestone), organisational routinisation success driver (e.g., employee's involvement, regular operational budget and resource allocation plans, and suitable change management program), and organisational adoption difficulties (e.g. poor understanding of change management process and lack of required resources for maintenance and improvement of ERP).

Construct	Indicator	Stage	Description
Organisational Adoption Success Driver	AdoptSuc3	Adoption	Top management leadership and support has influenced smooth implementation of ERP in the organisation
	AdoptSuc4	Adoption	Adequate training and education has influenced smooth implementation of ERP in the organisation
	AdoptSuc5	Adoption	Financial and non-financial incentives to employees has influenced smooth implementation of ERP
	AdoptSuc6	Adoption	Competency and expertise of IT support has influenced smooth implementation of ERP in the organisation
Organisational Pre-Evaluation	OrgPreEv1	Initiation	Top management perceives that future exploitation of IT is of strategic importance
	OrgPreEv2	Initiation	There is a regular procedure for maintenance and improvement of IT infrastructure in the organisation
	OrgPreEv7	Initiation	A pre-implementation evaluation procedure to evaluate organisational information needs was conducted
	OrgPreEv8	Initiation	A pre-implementation evaluation procedure to evaluate cultural issues that may impact ERP was conducted
	OrgPreE9	Initiation	Appropriate deadlines/milestones (i.e., what to achieve by what date) was established
	OrgPreEv10	Initiation	Appropriate implementation strategy (such as pilot study, gradual phase-in or revolutionary method) was decided
	OrgPreEv11	Initiation	A long term strategic relationship between the vendor and/or the consultant and the organisation to upgrade system was created
Organisational Routinisation Success Driver	AssSuc15	Routinisation	Top management participation and support influenced ERP assimilation and its success
	AssSuc16	Routinisation	Top management belief (the extent to which the senior managers believed in the potential of ERP to realise operational and strategic benefits and creating a competitive arena for organisation) influenced ERP assimilation success
	AssSuc17	Routinisation	Employee's involvement influenced assimilation success
	AssSuc18	Routinisation	Employee's competency and IT skills influenced ERP assimilation and its success
	AssSuc19	Routinisation	The support of ERP vendor(s) influenced ERP assimilation and its success
	AssSuc20	Routinisation	Open and honest communication among the stakeholders influenced ERP assimilation and its success
	AssSuc21	Routinisation	Consultant effectiveness influenced assimilation success
	AssSuc22	Routinisation	Monitoring and evaluation procedures regarding ERP implementation influenced ERP assimilation success
	AssSuc23	Routinisation	Regular operational budgets for maintenance and improvement of ERP influenced assimilation success
	AssSuc24	Routinisation	Regular resource allocation plans for ERP maintenance and enhancement influenced its assimilation success
	AssSuc25	Routinisation	Suitable change management programs influenced ERP assimilation and its success

Organisational Adoption Difficulties	OrgAdDif12	Adoption	Lack of change management programs (such as technology impact assessment, potential barriers to implementation, and organisational resistance) resulted in in ERP implementation difficulties
	OrgAdDif13	Adoption	Poor understanding of change management process resulted in in ERP implementation difficulties
	OrgAdDif14	Adoption	Lack of required resources for maintenance and improvement of ERP system resulted in in its implementation difficulties

Table 5. Factors Influencing ERP Institutionalisation- Organisational Aspect of TOE Framework

Finally, the environmental dimension of TOE framework was measured using institutional theory which comprises of two elements: institutional effects and institutionalisation process (Mignerat and Rivard 2009). Institutional effects are processes in which institutions affect other institutions, organisations or organisational entities. According to institutional effects, the relationship of an organisation within its institutional environment causes some set of organisations to become more similar over time through resemblance of a focal organisation to other organisations in its environment (DiMaggio and Powell 1983; Scott 2001; Mignerat and Rivard 2009). DiMaggio and Powell (1983) introduced three sources of institutional effects to explain how archetypes become similar over time, i.e., coercive, normative, and mimetic. Coercive mechanisms arise from the legal environment of the organisation. It occurs through the formal and informal pressures which can be imposed by structures upon which the focal organisation is dependent such as governmental agencies or headquarters. Normative mechanisms mostly concern the moral and pragmatic aspects of legitimacy by assessing whether the organisation plays its role correctly and in a desirable way. Finally, mimetic mechanisms can be defined as rational or ritualistic imitation of a superior organisation. Organisations pursue mimetic behaviour to achieve legitimacy, maintain competitive parity or limit rivalry. In this research, the influence of environmental factors on ERP institutionalisation is measured through studying the impact of the institutional effects [as shown in table 6].

Institutionalisation process as another element examined in institutional theory has directed this research to define ERP institutionalisation phenomenon. The next section provides more detailed description of this process as well as the factors used in the survey instrument to measure it. The literature review section is then followed by an introduction of the primary research framework developed for doing this study.

Construct	Indicator	Stage	Description
Coercive Initiation	Coercive4	Initiation	We decided to implement ERP after receiving formal or informal pressures exerted on our organisation by other organisations /industries upon which we are dependent
	Coercive5	Initiation	With regard to suppliers that have adopted ERP, my organisation's well-being depends on their resources
	Coercive6	Initiation	With regard to suppliers that have adopted ERP, my organisation cannot easily switch away from them
	Coercive7	Initiation	With regard to suppliers that have adopted ERP, my organisation MUST maintain good relationships with them
	Coercive8	Initiation	With regard to suppliers that have adopted ERP, they are core suppliers in concentrated industry
	Coercive9	Initiation	With regard to customers that have adopted ERP, my organisation's well-being depends on their purchase
	Coercive10	Initiation	There exist set of regulations that unambiguously define the responsibilities of our organisation with respect to our data on cloud
Coercive Routinisation	Coercive1	Routinisation	The government requires our organisation to use ERP system and its upgrading modules
	Coercive2	Routinisation	The industry association requires our organisation to use ERP system and its upgrading modules
	Coercive3	Routinisation	The competitive conditions requires our organisation to use ERP system and its upgrading modules
Normative	Normative1	Initiation	Almost all business partners of our organisation have adopted ERP before we embarked on implementing it
	Normative2	Initiation	Almost all customers of our organisation have adopted ERP before we embark on implementing it
	Normative3	Routinisation	The governments' promotion of information technology has significantly influenced our organisation to use ERP
	Normative4	Initiation	The necessity for backward and forward integration has forced our organisation to adopt ERP
	Normative5	Initiation	Our business partners have outsourced some functions/ modules of ERP to third party/ cloud service provider
Mimetic	Mimetic1	Initiation	Almost all competitors of our business have adopted ERP
	Mimetic2	Initiation	ERP have greatly benefited our competitors
	Mimetic3	Initiation	Our competitors who have adopted ERP are favourably perceived by other businesses in the same industry
	Mimetic4	Initiation	Our competitors who have adopted ERP are favourably perceived by their suppliers and customers
	Mimetic5	Initiation	We decided to implement ERP after we realised the benefits our competitors achieved by adopting it

Table 6. Factors Influencing ERP Institutionalisation- Institutional Theory (Environmental Aspect of TOE)

ERP Institutionalisation

Institutionalisation process argues that institutions (such as technological innovations) do not emerge in a vacuum; instead they are created, sustained, and reproduced by individuals through their everyday activities in various social settings (Scott 2001; Orlikowski 2007; Mignerat and Rivard 2009). Most researchers agree that institutionalisation process occurs along some S-shaped curve that characterises most diffusion paths. This S-shaped curve is defined by a relatively fixed sequence that involves a period of time in which an innovation emerges and is diffused, and then a period in which the innovation

remains institutionalised (Tolbert and Zucker 1999; Rogers 2003; Jennings and Greenwood 2003; Baptista 2009). Since researchers typically study the process of technology adoption, implementation and assimilation, technology institutionalisation is a recent phenomenon. It is the result of fully assimilated and integrated technology which occurs when technology usage becomes stable, routinised and embedded within the organisation's work processes and its value chain activities. It is similar to institutionalisation stage of the institutionalisation process suggested by Jennings and Greenwood (2003) or sedimentation stage suggested by Tolbert and Zucker (1999). Institutionalised technology becomes ingrained and absorbed into the work life of the organisation which influences the realisation of the higher productivity benefit, business values, and success (Purvis et al. 2001; Chatterjee et al. 2002; Liang et al. 2007; Peppard et al. 2007). To conclude, in the normal progression of events, ERP technology is first implemented, then assimilated, and once its usage becomes routinised and embedded within the organisations' work processes and value chain activities, its use will be taken for granted by various system stakeholders and users (Tolbert and Zucker 1999; Rogers 2003; Teo et al. 2003; Baptista 2009; Maheshwari et al. 2010; Saraf et al. 2013). This taken-for-grantedness represents the institutionalisation of ERP.

In this research, ERP institutionalisation was measured by the extent to which this technology is widely used (fully assimilated or widely adopted within the organisation) and become part of everyday life of its users (the extent of ERP acceptance). These factors as illustrated in table 7.

Construct	Indicator	Stage	Description
Fully Assimilation	Institution11	Routinisation	In general, ERP system is widely adopted and used
	Institutiona2	Routinisation	Level of integration between ERP system and other applications such as legacy systems, e-commerce sites, and CRM applications is high
ERP Acceptance	EA1	Routinisation	It wouldn't bother me if ERP was discontinued
	EA2	Routinisation	I am familiar with the functionality of the ERP system
	EA3	Routinisation	The ERP system is important to me
	EA4	Routinisation	Overall, I think the ERP project is very well run
	EA5	Routinisation	I like the way the ERP system is designed
	EA6	Routinisation	A lot of improvement should be made in the way the ERP is run
	EA7	Routinisation	In general, acquisition, communication, and management has been good on ERP system
	EA8	Routinisation	I do not require further functional support for doing my tasks
	EA9	Routinisation	I could employ ERP features effectively in my routine activities
	EA10	Routinisation	The proportion of the employees who uses ERP on the regular basis has increased

Table 7. Factors Used to Measure ERP Institutionalisation

ERP INSTITUTIONALISATION FRAMEWORK

In the previous section, a thorough review of ERP assimilation and institutionalisation process and the various indicators derived from IS theories which may influence this process was presented. It has been argued that the main goal of this paper is to study the influence of discussed IS theories on ERP institutionalisation, since it has a significant potential in improving the chance of successful ERP implementation projects. The literature review has directed this study to propose a research framework, i.e., illustrated in figure 1. The most inner layer of this framework is ERP assimilation process. As explained before, the three-stage IT/IS assimilation process (comprising of initiation, adoption, and routinisation stages) proposed by Zhu et al. (2006) is used here. The second layer of the suggested framework is the IS theories used in ERP assimilation. At this stage, organisations need to ascertain that ERP is shaped properly through its interactions with the various social, organisational, cultural,

and technological contexts of the organisation (considering all different pre-implementation, implementation and post-implementation stages of ERP assimilation process).

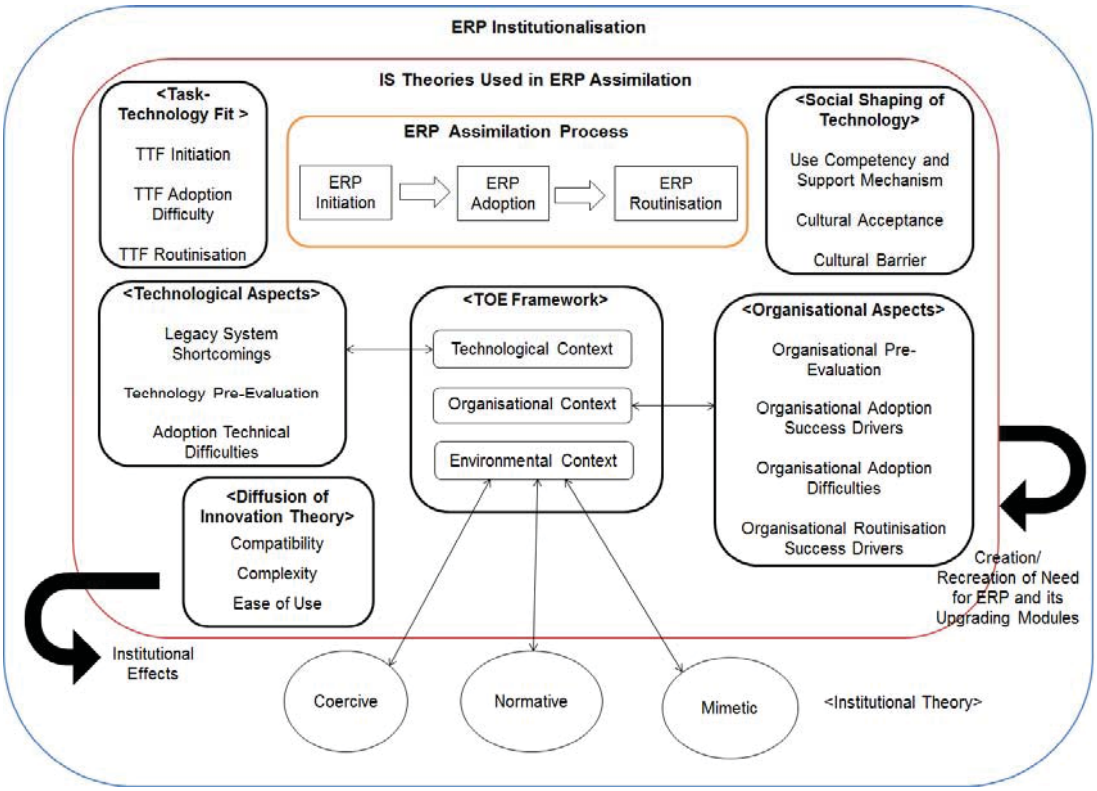

Figure 1. Integrative ERP Institutionalisation Framework

Diffusion of innovation, task-technology fit, social shaping of technology, technology-organisation-environment framework, and institutional theory are the set of theories used to form this layer (the various constructs and indicators in the analysis of each theory were explicated thoroughly in the literature review section. As explained before, these indicators can be related to initiation, adoption, or routinisation stages of ERP assimilation process). At this stage, the interactions between various technical, organisational, social, and cultural indicators derived from these theories influence ERP system to become widely accepted and/or institutionalised in the organisation. ERP institutionalisation is the third layer of the suggested research framework as well as one of the cornerstone elements of institutional theory. As discussed earlier, this process is one of the core elements of the institutional theory (DiMaggio and Powell 1983; Mignerat and Rivard 2009). When ERP is institutionalised, it will be taken for granted by various organisational members, and therefore, the chance of its success will be increased. The main reason for this success is that ERP users become comfortable with this technology and can employ its features effectively in their routine activities without requiring functional consultant or coach support. At this stage also acting in compliance with the institutional effects is viewed as logical by those who share ERP technology (Baptista 2009; Seddon et al. 2010; Maheshwari et al. 2010). In fact, coercive, normative and mimetic mechanisms make ERP systems to be legally sanctioned, morally governed, and culturally supported (Scott 2001; Teo et al. 2003; Saraf et al. 2013). In response to these institutional effects, however, the need for ERP and its upgrading modules will be created (or recreated), which affects the successful assimilation and institutionalisation of this technology within the organisation.

RESEARCH METHODOLOGY

This paper adopts a quantitative positivist approach. The research framework explained in previous section was validated using statistical techniques, i.e., factor analysis and regression methods. For this purpose, a survey instrument was initially developed and distributed (either electronically or in person) in four Australian ERP-adopting organisations who have embarked on ERP implementation at least five to six years ago and have both success and failure stories to share (the organisational type includes private utility distributor, privatised public telecommunication, public energy provider, and governmental state based public health care organisation). The questionnaire/survey comprises of four sections which each section aims to study particular measures derived from IS theories regarding ERP institutionalisation. Furthermore, the pilot study was mastered to ensure that content of questionnaire is understandable to target respondents prior to gathering data.

A total of 78 surveys were distributed wherein only 30 respondents were returned answered. The response rate was approximately 40% and the sample size used for this study was thirty. Various tests was conducted to make sure that despite the relatively small sample size utilised in this study, it is acceptable for drawing preliminary conclusions. The results confirmed that variables under study did not violate normality (the variables derived from factor analysis had acceptable skewness value of between positive and negative 1 or the result of dividing skewness value by std. error of skewness is between positive and negative 1.96), regression models were normally distributed (the histograms of relationship between dependent and independent variable were normally distributed), and factors retrieved through factor analysis had high level of communality (greater than 0.7). The respondents also were chosen from various system users. The demographic of interviewees are including chief/head information/technology officer (10%), IT/business/knowledge manager/director/specialist (33%), enterprise/solution architect (20%), business/corporate strategy developer/consultant (10%), system/business support/service manager (10%), and project manager/director (17%).

QUANTITATIVE DATA ANALYSIS RESULTS

This section aims to discuss the results of quantitative data analysis conducted in this study based on the suggested research framework. As discussed earlier, various IS theories shape the main pillars of developed survey instrument for doing this research [the details of predictors/indicators have been explained in the study of each theory]. The goal of this section is to find emerging themes in explaining ERP institutionalisation (i.e., dependent variable) using well known theories such as institutional theory, social shaping of technology, TOE framework, diffusion of innovation, and task technology fit (as independent variables). Towards this goal (quantitative data analysis), the following steps have been taken,

1. Factor analysis to select the items (by reducing the number of variables- statistical conclusion validity)
2. Cronbach alpha to confirm inter-correlation among test items which shows internal consistency or reliability- also called internal validity.
3. Average the items and regress the average against the applicable dependent variable. This helps us to understand how the typical value of the dependent variable (i.e., ERP institutionalisation) varies when any one of the independent variables is changing.

The results of step one and two for all IS theories (independent variables) and ERP institutionalisation (dependent variable) are demonstrated in table 8 and 9.

Construct		Indicator	Stage	Mean	SD	Factor Loading	Cronbach Alpha
Social Shaping of Technology	User Competency and Support Mechanism	UserComp2	Routinisation	4.5667	1.47819	.903	.787
		UserComp3	Routinisation	4.7000	1.41787	.736	
		UserComp5	Routinisation	5.0000	1.14470	.763	
	Cultural Barrier	Culture3	Routinisation	4.6333	1.29943	.888	.809
		Culture5	Routinisation	5.0333	1.51960	.879	
	Cultural Acceptance	Culture1	Routinisation	4.3000	1.29055	.927	.833
		Culture2	Routinisation	3.9333	1.25762	.916	
Diffusion of Innovation		DOI1	Routinisation	5.3333	.92227	.815	.753
		DOI2	Routinisation	5.2333	1.27802	.878	
		DOI3	Routinisation	4.8333	1.26173	.775	
Task Technology Fit	TTF Initiation	TTF1	Initiation	4.7000	1.36836	.711	.739
		TTF7	Initiation	5.4333	1.16511	.799	
		TTF9	Initiation	4.8333	1.59921	.835	
	TTF Adoption Difficulty	TTF11	Adoption	4.3667	1.37674	.835	.706
		TTF12	Adoption	3.8667	1.79527	.844	
	TTF Routinisation	TTF4	Routinisation	4.3000	1.23596	.760	.712
		TTF5	Routinisation	5.1000	1.26899	.767	
		TTF13	Routinisation	4.7000	1.36836	.859	
Technology Aspect (TOE Framework)	Legacy System Shortcomings	LegacySho4	Initiation	4.8667	1.59164	.801	.905
		LegacySho5	Initiation	5.2667	1.55216	.876	
		LegacySho6	Initiation	4.8667	1.45586	.802	
		LegacySho7	Initiation	4.9333	1.48401	.804	
		LegacySho8	Initiation	4.6333	1.54213	.763	
		LegacySho9	Initiation	5.1667	1.59921	.869	
	Technology Pre-Evaluation	PreEval10	Initiation	5.8333	1.26173	.930	.901
		PreEval11	Initiation	5.6333	1.27261	.932	
	Adoption Technical Difficulties	AdopTech15	Adoption	3.6667	1.39786	.736	.721
		AdopTech16	Adoption	4.1667	1.74363	.806	
		AdopTech17	Adoption	2.3667	1.32570	.758	
Organisation Aspect (TOE Framework)	Organisational Adoption Success Driver	AdoptSuc3	Adoption	5.8000	1.24291	.726	.713
		AdoptSuc5	Adoption	3.3000	1.41787	.803	
		AdoptSuc6	Adoption	4.8000	1.42393	.782	
	Organisational Pre-Evaluation	OrgPreEv1	Initiation	5.7000	1.48904	.704	.712
		OrgPreEv7	Initiation	5.5667	1.45468	.792	
		OrgPreEv10	Initiation	5.4667	1.47936	.777	
	Organisational Routinisation Success Driver	AssSuc17	Routinisation	5.2333	1.04000	.754	.835
		AssSuc20	Routinisation	5.0333	1.42595	.751	
		AssSuc24	Routinisation	5.0333	1.37674	.726	
		AssSuc25	Routinisation	4.6333	1.58622	.917	
	Organisational Adoption Difficulties	OrgAdDif12	Adoption	4.4667	1.30604	.934	.850
		OrgAdDif13	Adoption	4.6667	1.53877	.936	

Environment Aspect (TOE Framework)-Institutional Effects	Coercive Initiation	Coercive5	Initiation	3.6333	1.71169	.788	.860
		Coercive6	Initiation	3.6667	1.60459	.905	
		Coercive7	Initiation	4.1000	1.76850	.873	
		Coercive9	Initiation	3.5667	1.99453	.751	
	Normative	Normative1	Initiation	4.3000	1.80325	.801	.787
		Normative2	Initiation	3.5333	2.02967	.855	
		Normative5	Initiation	4.0000	1.66091	.820	
	Mimetic	Mimetic2	Initiation	5.5333	1.19578	.886	.856
		Mimetic3	Initiation	5.2667	1.36289	.878	
		Mimetic4	Initiation	5.0333	1.12903	.819	
	Coercive Routinisation	Coercive1	Routinisation	3.5667	1.90613	.906	.823
		Coercive2	Routinisation	3.6667	1.88155	.876	

Table 8. Loadings of Key Independent Variables (Indicators Derived from IS Theories)

Construct	Indicator	Stage	Mean	SD	Factor Loading	Cronbach Alpha
ERP Institutionalisation	ERP Acceptance Mean	Routinisation	5.0417	.96954	.889	.725
	Fully Assimilation Mean	Routinisation	5.1167	1.18673	.889	

Table 9. Loadings of Key Dependent Variable (ERP Institutionalisation)

As discussed before, step 3 of the process of quantitative data analysis involves applying regression method to understand how the typical value of the dependent variable (ERP institutionalisation) varies when any one of the independent variables are changing (various IS theories). For doing this step, a set of research hypotheses was initially defined. Then, the regression was applied to find whether the research hypothesis is supported or not. The analysis of regression models also confirm that the sample under study is normally distributed. The rest of this section discusses the final results of quantitative data analysis for each theory. These quantitative inferences further can be utilised as managerial guidelines which aim at improving the organisational readiness over various stages of ERP assimilation and its institutionalisation, i.e., when an ERP introduces, starts to use, becomes dominant, maintained and improved within organisation. The next section concludes the key remarking points of this paper and suggests four major managerial principles for enhancing the chance of ERP success in the modern business organisations.

Social Shaping of Technology

The quantitative inferences in regards to this theory (shown in table 10) shed light to the fact that the competencies of users through initiation stage (e.g., previous expertise in using legacy systems) do not necessarily influence the success of ERP institutionalisation positively, whereas preparing people through adoption stage (e.g., by training them how to use ERP and familiarising them with how jobs and processes are going to be changed after implementation) and supporting them through ERP routinisation (e.g., by providing users with adequate technical support or using competent IT team in maintaining, updating and supporting ERP needs) have positive influence on successful institutionalisation of this technology. The practical managerial guideline for this theory, therefore, suggests that organisations who invest in improving user competencies through adoption and routinisation stages have more chance of institutionalising ERP than those who mainly rely on recruiting competent IS users prior to ERP implementation. Moreover, the data analysis results regarding cultural aspects of ERP implementation infer that some cultural barriers like employee's resistance to new technological changes (like ERP usage) are natural and inevitable, and hence, are not

critical determinants in assessing the success of ERP project. On the other hands, cultural acceptance of this technology is required for successful ERP institutionalisation. Therefore, managers need to constantly assess the capabilities of ERP users in using this technology without direct social control or sanctioning process as well as their capabilities in taking maximum advantage of ERP's suggested features in order to achieve more successful efficient results.

Hypothesis	Finding	Description
H5a: Higher levels of user competency and support through routinisation will lead to a more institutionalised ERP	Supported (p-value =0.036<0.05)	For every unit increase in user competency (through routinisation stage), a 0.326 unit increase in institutionalisation is predicted
H5b: Preparing people through adoption stage will lead to a higher level of ERP institutionalisation	Supported (p-value =0.008<0.05)	For every unit increase in prepared people through adoption stage (only one predictor-UserComp6), a 0.317 unit increase in ERP institutionalisation is predicted
H5c: Higher levels of user competency through initiation stage will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.206>0.05)	Independent variable (only one predictor-UserComp1) does not show a statistically significant relationship with the dependent variable (ERP institutionalisation)
H6a: Higher levels of cultural barriers will lead to a lower level of ERP institutionalisation	Not supported (p-value = 0.064>0.05)	Independent variable (mean of cultural barriers predictors) does not show a statistically significant relationship with the dependent variable (ERP institutionalisation)
H6b: Higher levels of cultural acceptance will lead to a higher level of ERP institutionalisation	Supported (p-value =0.021<0.05)	For every unit increase in cultural acceptance, a 0.340 unit increase in ERP institutionalisation is predicted

Table 10. Hypothesis Testing (Social Shaping of Technology)

Technology-Organisation-Environment Framework

The results in regards to the TOE framework (demonstrated in table 11) indicate that the success of ERP institutionalisation is both a technological and organisational challenge. Nevertheless, these challenges grow with the evolution of ERP in the organisation. For example, our results shed light to the fact that considering technological (e.g., assessing technical compatibility of ERP and putting in place strategies for preparing technical infrastructure like converting data and other technical pre-test activities) and organisational (e.g., managements' beliefs in importance of IT initiatives, planning for appropriate implementation strategy, and assessing organisational information needs) aspects through pre-implementation evaluation procedure do not necessarily result in experiencing successful outcomes through post-implementation and institutionalisation of ERP system. Instead these technological and organisational aspects become more an issue through ERP adoption wherein physical implementation of this technology takes place. Top management, therefore, need to master appropriate strategies for handling these technological (e.g., data inconsistencies issues, lack of support documentation, and unreliable hardware) and organisational (e.g., lack of understanding change requirements and defining suitable programs to manage it) adoption difficulties to reduce the possibility of ERP institutionalisation failure. Moreover, business and IT managers need to consider an aggregated ongoing profile of these TOE aspects through routinisation stage (e.g., top management leadership and support, expertise of IT support team, user involvement, and mastering regular resource allocation plans for ERP maintenance) as well in order to achieve successful fully institutionalised ERP system.

Hypothesis	Finding	Description
H12: Higher levels of shortcomings of legacy systems will lead to a lower level of ERP institutionalisation	Not supported (p-value = 0.860>0.05)	Independent variables (mean of shortcomings of legacy systems predictors) does not show a statistically significant relationship with the ERP institutionalisation
H13: Higher levels of pre-evaluation (of technology aspects) will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.667>0.05)	Independent variables (mean of technology pre-evaluation predictors in initiation stage) does not show a statistically significant relationship with the ERP institutionalisation
H14: Higher levels of technical difficulties through adoption stage will lead to a lower level of ERP institutionalisation	Supported (p-value =0.034<0.05)	For every unit increase in technical difficulties through adoption stage, a 0.310 unit decrease in ERP institutionalisation is predicted
H15: Higher levels of pre-evaluation (of organisation aspects) will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.060>0.05)	Independent variables (mean of organisational pre-evaluation predictors) does not show a statistically significant relationship with the dependent variable
H16: Higher levels organisational difficulties through adoption stage will lead to a lower level of ERP institutionalisation	Supported (p-value =0.004<0.05)	For every unit increase in organisational difficulties through adoption stage, a 0.706 unit decrease in ERP institutionalisation is predicted
H17: Higher levels organisational success drivers through adoption stage will lead to a higher level of ERP institutionalisation	Supported (p-value =0.028<0.05)	For every unit increase in organisational success drivers through adoption stage, a 0.455 unit increase in ERP institutionalisation is predicted
H18: Higher levels organisational success drivers through routinisation stage will lead to a higher level of ERP institutionalisation	Supported (p-value =0.024<0.05)	For every unit increase in organisational success drivers through routinisation stage, a 0.481 unit increase in ERP institutionalisation is predicted

Table 11. Hypothesis Testing (TOE Framework)

Institutional Theory

The results in regards to the institutional theory (depicted in table 12) infer that coercive forces through initiation stage do not meaningfully influence successful ERP institutionalisation whereas the same forces through routinisation stage have positive influence on this phenomenon. The gathered data do not show any meaningful relationship between normative forces (through ERP initiation and routinisation stage) and ERP institutionalisation. Finally, mimetic mechanism through initiation stage as the last studied institutional effect has positive influence on ERP institutionalisation. These quantitative inferences can be utilised as practical guideline for IT/business managers. For example, an organisation cannot solely follow the professional industry norms and trends for technology planning, design and development and expect to have successful fully assimilated ERP. There also exist other organisational and technological factors (for example, explained under TOE framework) which need to be considered along this journey for achieving efficient results. At the same time, an organisation may initially decides to implement ERP to be conformed to regulative forces, however, this does not means that it will achieve a successful legitimate ERP. In fact, this conformance needs to be on an ongoing basis through other stages of ERP assimilation (particularly, ERP usage) in order to be conducive of success. Finally, interestingly our results infer that organisations that mimic the best practices of other competitors and successful peers through initiation stage have more chance of achieving successful ERP institutionalisation.

Hypothesis	Finding	Description
H1a: Higher levels of coercive forces through initiation stage will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.796>0.05)	Independent variables (mean of coercive forces in initiation stage) does not show a statistically significant relationship with the dependent variable (ERP institutionalisation)
H1b: Higher levels of coercive forces through routinisation stage will lead to a higher level of ERP institutionalisation	Supported (p-value = 0.025<0.05)	For every unit increase in coercive forces (through routinisation stage), a 0.224 unit increase in ERP institutionalisation is predicted
H2a: Higher levels of normative forces through initiation stage will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.930>0.05)	Independent variables (mean of normative forces in initiation stage) does not show a statistically significant relationship with the dependent variable (ERP institutionalisation)
H2b: Higher levels of normative forces through routinisation stage will lead to a higher level of ERP institutionalisation	Not supported (p-value = 0.228>0.05)	Independent variables (only one predictor-Normative3) does not show a statistically significant relationship with the dependent variable (ERP institutionalisation)
H3: Higher levels of mimetic forces through initiation stage will lead to a higher level of institutionalisation	Supported (p-value = 0.027<0.05)	For every unit increase in mimetic forces (through initiation stage), a 0.356 unit increase in ERP institutionalisation is predicted

Table 12. Hypothesis Testing (Institutional Theory)

Task-Technology Fit Theory

The results (shown in table 13) suggest that strategies for aligning business tasks and ERP technology need to be considered constantly through all stages of ERP assimilation (e.g., initiation: identifying suitable technology options in alignment with strategic information needs, adoption: reducing functionality gaps through rational choice of configuration and customisation strategies, and routinisation: an ongoing assessment of the fit between ERP system and the organisation's work design and business processes through ERP usage) in order to achieve an institutionalised IT/IS infrastructure. In fact, ongoing TTF efforts through various stages of ERP assimilation are required to guarantee that this technology is successfully institutionalised within the organisation.

Hypothesis	Finding	Description
H8: Higher levels of fit between tasks and technology through initiation stage will lead to a higher level of ERP institutionalisation	Supported (p-value =0.002<0.05)	For every unit increase in fit between tasks and technology through initiation stage, a 0.455 unit increase in ERP institutionalisation is predicted
H9: Higher levels of difficulties in aligning tasks and technology through adoption stage will lead to a lower level of ERP institutionalisation	Supported (p-value =0.019<0.05)	For every unit increase in difficulties of aligning tasks and ERP through adoption stage, a 0.291 unit decrease in ERP institutionalisation is predicted
H10: Higher levels of fit between tasks and technology through routinisation stage will lead to a higher level of ERP institutionalisation	Supported (p-value =0.001<0.05)	For every unit increase in fit between tasks and technology through routinisation stage, a 0.548 unit increase in ERP institutionalisation is predicted

Table 13. Hypothesis Testing (Task Technology Fit Theory)

Theory of Diffusion of Innovation

The quantitative inferences in regards to this theory (shown in table 14) lead us to believe that positive perceptions of technology attributes (such as relative advantage, ease of use, and compatibility) increase the chance of successful ERP institutionalisation. This result re-emphasises the critical role of attributes of IT innovations in the context of organisational adoption of complex technologies like ERP system. This influence, however, is not only restricted to the initial decision to adopt this technology, but also the ease of going through later stages of adoption such as ERP implementation, adaptation, and routinisation.

Hypothesis	Finding	Description
H11: Higher positive perceptions of technology attributes (such as relative advantage and compatibility) will lead to a higher level of ERP institutionalisation	Supported (p-value =0.006<0.05)	For every unit increase in people's positive perceptions of technology attributes (in routinisation stage), a 0.495 unit increase in ERP institutionalisation is predicted

Table 14. Hypothesis Testing (Diffusion of Innovation)

Through this section, a discussion on quantitative inferences of this study and some of their managerial implications in improving the chance of successful efficient ERP institutionalisation was provided. Our results further emphasise that critical success factors as the key areas where 'things must go right' for the ERP implementation to be successful should not only consider technical aspects but also other institutional and contextual factors, such as internal operational and managerial arrangements around ERP implementation, social/cultural readiness and support, and the wider operating environmental within which ERP is implemented and utilised. Figure 2 depicts all the supported hypothesises of this research at the end of data analysis.

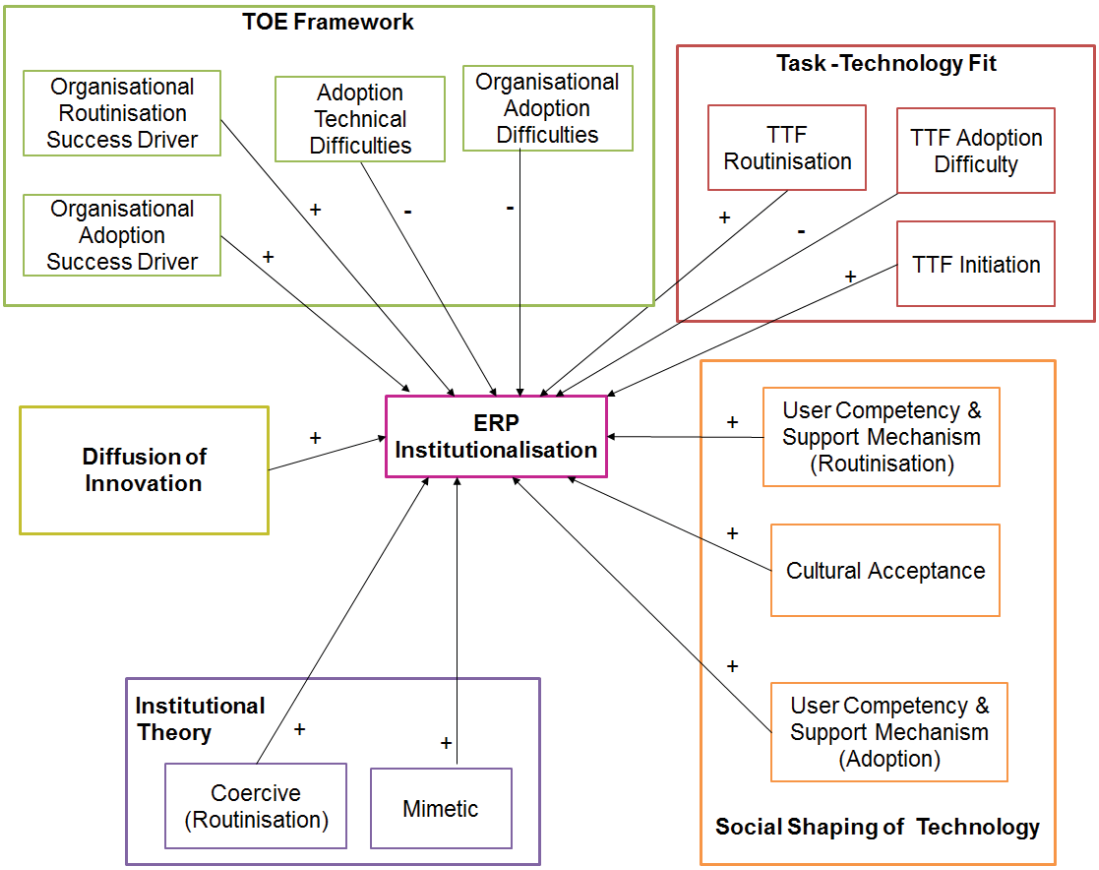

Figure 2. Diagram of Supported Hypotheses (Dependent Variable: ERP Institutionalisation)

CONCLUSIONS

Although successful implementation of ERP systems can bring competitive advantage to organisations, the high failure rate reported in research and practice made significant concerns for organisations who either have already implemented this technology or desire to implement it. At the same time, the definition of ERP success is controversial, since this technology is complex and touches many areas of the business. Therefore, depending on different stakeholders' viewpoint and the unique characteristics of projects, a wide range of factors can influence ERP success (Soh et al. 2000; Seddon et al. 2010). For example, a business user may define success as the extent of alignment between ERP system and tasks required for delivering a particular job or ease of use of working with user interfaces, whereas a project manager may define it through characteristics such as delivery of project within time and budget. Research and practice, however, suggest that business organisations are more concerned about the physical implementation of ERP system (more a technical challenge), rather than the factors and the cause and effects that help shape the use of this technology as an institutional challenge (Peppard et al. 2007; Pollock and Williams 2008; Baptista 2009). That is why it is believed that studying ERP institutionalisation as a recent phenomenon is valuable and critical, since it helps organisational stakeholders and system users to make optimal advantage of ERP and take its use for granted through the mutual interactions of various organisational sub-institutions such as internal culture, social structure, technical attributes, regulatory agencies, and external competitors. As a result, one of the

major goals of this research is to study various factors which are influencing efficient successful ERP institutionalisation.

This research is based in Australian settings where there have been no previous studies of institutionalisation of technology. This paper contributes to the extant technology implementation literature by using a set of well-known IS theories to construct the proposed ERP institutionalisation framework. Diffusion of innovation, task-technology fit, TOE framework, social shaping of technology and institutional theory are the set of theories used to form the suggested research framework. It emphasises the character, shaping, and use of ERP technology through continuous interfacing with technological, organisational, social/cultural, managerial, environmental, and institutional effects. Moreover, this framework embraces the pre-implementation, implementation and post-implementation stages of ERP assimilation into an integrated structure in order to achieve an institutionalised IT infrastructure. Using this framework, the authors studied the influence of various factors derived from IS theories on ERP institutionalisation. Methodologically, this paper adopts a quantitative positivism approach to validate the research framework and to shape the final quantitative inferences/results of the study. These results further direct this paper to conclude a list of managerial principles which can guide them to fully assimilate ERP into their daily working practices as well as to achieve a full realisation of ERP benefits, as are listed below:

- ✓ **ERP success is more a post-live socio-technical challenge**: the major benefits of ERP are available when business managers and users are continuously trained and engaged to support its wide spread usage (mainly through physical implementation of ERP and precisely when it is in use). Besides, the various attributes of ERP (like ease of use and compatibility) show off their major influence in post-live through their mutual interactions with system users. Thus, technical advantages of ERP are more likely to cause efficient results if business people and managers show positive behaviour towards their usage.
- ✓ **Some immediate negative outcomes of ERP implementation are inevitable and should not be considered as hurdle to its success:** ERP success is a long-term goal, wherein some immediate negative outcomes (such as employee's resistance) may appear. These negative outcomes, however, are not always a hurdle to success, since some of them are initially natural and unavoidable and some can be utilised in the process of improving organisational learnings.
- ✓ **A comprehensive task-technology fit assessment plan need to be available on an on-going basis:** TTF efforts need to be started right from initial project kick off (in development of business case) and continues forever to make sure all the initial expected and change benefits have been achieved.
- ✓ **The various technological, organisational, and environmental challenges of ERP implementation are growing with the evolution of this technology in the organisation:** Top management need to constantly master continuous standardised benefit realisation plans to control ERP outcomes and to fully internalise the benefits of this technology. The best technological selection of the first day may finally end up with unmanageable solution which is difficult to control its use (precisely in post-adoption) predominantly because of underestimating the various post-influential aspects of such this decision.

Toward wrapping up the concluding remarks of this paper, the authors suggest that an integrative account of all technological, organisational (including various social, cultural, informational elements) and environmental (e.g., institutional effects) factors through various stages of ERP assimilation (specifically through post-live stage) are required to be considered by business/IT managers to fully assimilate ERP into their daily working practices as well as facilitating making strategic business decisions. The authors also believe that acting in accordance with the suggested four managerial

principles will bring more tangible and intangible implications for all functional, managerial, strategic and organisational areas of contemporary business organisations.

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