

Factors in ERP adoption : A conceptual research model

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ABSTRACT

Enterprise resource planning (ERP) has become the solution that supports and automates the business processes. Adoption of complex, off-the-shelf packages by different industrial vector, its suitability and realization of benefits is a challenge. ERP adoption decision is not driven by a single dominant factor, the benefits. Cost and risks of the technology rival the potential pay-offs. However, the benefit and cost analysis in ERP adoption can be moderated by external institutional forces and the business complexity. The textile industry that is prominent in the western part of Tamilnadu has a complex processes and require real-time interaction with the buyers and suppliers in domestic and export operations. The reaction to ERP adoption by this industry has been mixed. This article presents a conceptual framework to understand the reasons for intention to adopt or not-adopt by the industry. The framework proposes that benefits and risk envisaged is altered when there is institutional isomorphic pressure. Similarly, the value of benefit and degree of risk depends on the complexity of the business. The eight step Dubin's (1978) theory development method is used for the design and validation of the conceptual research model.

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Introduction

The level of ICT and e-business in the textile and clothing industry is small compared to other manufacturing sectors as measured by e-business survey (Enterprise & Industry DG, The European Commission, July 2005). The textile and clothing industry is dominated by small and medium enterprises. Though large companies have fairly adopted ICT infrastructure, small and micro enterprises are still to reduce the gap.

The textile sector has a high value addition and innovation in raw material, process and design resulting in new products in terms of fashion. The kind of innovation is highly human capital oriented than the support from ICT. However, ICT supported technology and process are gaining prominence in managing the intensive cross function process oriented activity in a textile industry. Nah, Lau and Kuang (2001) define ERP system as a packaged business software system that enables a company to manage the efficient and effective use of resources by providing a total integrated solution for the organization's information processing needs, through a process-oriented view standardized across the enterprise.

Many organizations invest vast amounts of resources on ICT solution like Enterprise resource planning (ERP) without analyzing the linkage to competitive advantage. The question arise is if

the organizations are aware of the benefits and risk involved in the adoption of ERP and what forces them beyond this context to decide on ERP?

This paper proposes a conceptual framework to understand the motives or the driving forces by which the enterprises choose to go in for an ERP system. The theoretical background of the ERP adoption and the conceptual theory building process is explained in the following section. The methodology of the conceptual research model building is explained in the next section, which is followed by identifying the units of the theory and then proposing the law of interaction, the boundary and the system state. The final model then proposes the conceptual framework for decision making in ERP adoption. Finally, we describe how the model was verified empirically and conclude the paper with the implications of the model.

Theoretical background

With regard to ERP research agendas, Esteves & Pastor (2001) proposes a six-stage ERP lifecycle starting with the adoption decision, then acquisition, implementation, use and maintenance, evolution and finally retirement. Al-Mashari, (2003) gives three dimensions of research agenda as ERP adoption, technical aspects of ERP, and ERP in information systems curricula. Oliver & Romm (1999) express concerns for more research on the first stage, that of adoption decision.

Decision-making is a multiple attribute-based approach that helps in selecting over a finite set of available alternatives or courses of action characterised by multiple, potentially conflicting attributes (Yoon & Hwang, 1995). Attributes are weighted by criteria framed out of certain goals or motives. It is necessary to understand the motives because of the difficulty in understanding the complex factors involved in ERP adoption decision, such as scope and impact of the decision, the concept of value and its multi-dimensional facets, natures of IS, benefits and costs, associated risks, strategy alignment, human and organisational mechanics or political issues.

Boudreau and Robey (1999), in their meta-theoretical framework for the ERP adoption in SMEs proposes a three dimensional model with motor of change, the form of change and the theoretical content. The theories Boudreau and Robey (1999) identified in ERP adoption are diffusion of innovation, organizational change, neo-institutional and complexity theory. Researchers also frame on technology acceptance model (TAM) of Davis (1989) for understanding the ERP adoption (Amoako-Gyampah and Salam, 2004).

Rahim, M., Shanks, G., Johnston, R. and Sarker, P (2007) propose an Inter-organisational system motivation model (IMM) that incorporates the notion of 'motivation scenarios'. Organisational motivations are classified along two dimensions:

locus of motivation and type of motivation, leading to four distinct motivation scenarios. The four types of motivation scenarios recognise the existence of various types of organisational motives (e.g. coercive force, normative relations, economic gains, gaining status) and the source (e.g. internal or external) from which such motives may originate. IMM also lists the eight key activities that constitute adoption process, such as preparing an implementation plan, initiating a cost-benefit analysis, performing a post-implementation review of system, integrating with back-end IT systems, introducing changes in the business practices, organising training, applying pressure on business partners, and marketing IS concepts to business partners.

Theory and Conceptual model Building

Bacharach (1989) defines theory as a statement of relationships between units observed or approximated in the empirical world. Campbel (1990) defines theory as a collection of assertions that identifies what variables are important in the context and specifies how they are interrelated and why, and identifies the conditions under which they should be related or not related.

Organizational theories propose scientific investigation for an effective decision-making and problem solving. The distinguishing characteristics of scientific research are a good theoretical base and a sound methodological design. Conclusions

drawn from an investigation that lacks a good theoretical foundation and methodological sophistication would be unscientific (Uma Sekaran, 2003).

Theory forms the important link between real life information and phenomenon with the knowledge. Theory explains the critical questions such as *why*, *when* and *how* a phenomenon has been observed and its likeliness to be observed again. Research not based on theory yields to confusion and when guided by theory or that develops theory creates understanding and excitement.

Conceptual models are intermediate theory that has the potential to connect to all aspects of inquiry like problem definition, purpose, literature review, methodology, data collection and analysis. Conceptual model acts like a map that gives coherence to empirical inquiry (Shields and Tajalli, 2006).

Methodology

Gioia and Pitre (1990) and Lynham, (2000) describe theory building as the process or cycle by which representation are generated, tested and refined. The logical development of relationship between factors are deduced by various ways such as introspection of researchers own experience, from what is directly observed or by conceptual modeling which posits the idea of relationship as a mental model. This mental model is represented as a framework that traces a path of influence and connects the factors or variables. The conceptual

framework is usually developed on the researchers understanding of the research phenomenon where the constructs and relationships are expresses on the researcher perspective. The conceptual framework that is developed initially is tested and the revisions are incorporated and recommended for further research.

Dubin (1978), Eight-step theory Building.

There have been many theory-building methods adopted in the research process and is found in the literature. In this article, we take up the Dubin's (1978) theory development method because it has simple sequential steps that is better understood and is most suitable for conceptual theory development. The other theory development methods have cyclic process that is helpful in developing a continuing theory. The following are the steps of theory building research model (Fig. 1):

Defining the concept, units or constructs that interact with each other, (2) Defining the laws of interaction among the units, (3) Defining the boundaries within which the relationships holds true, (4) Define the different system states that exist in the real world, (5) Defining the propositions given by the theory (6) Defining the empirical indicators the propositions need to have, (7) Obtaining a testable hypothesis from the theory, and (8) To find the continuous application of the theory (e.g., continual research).

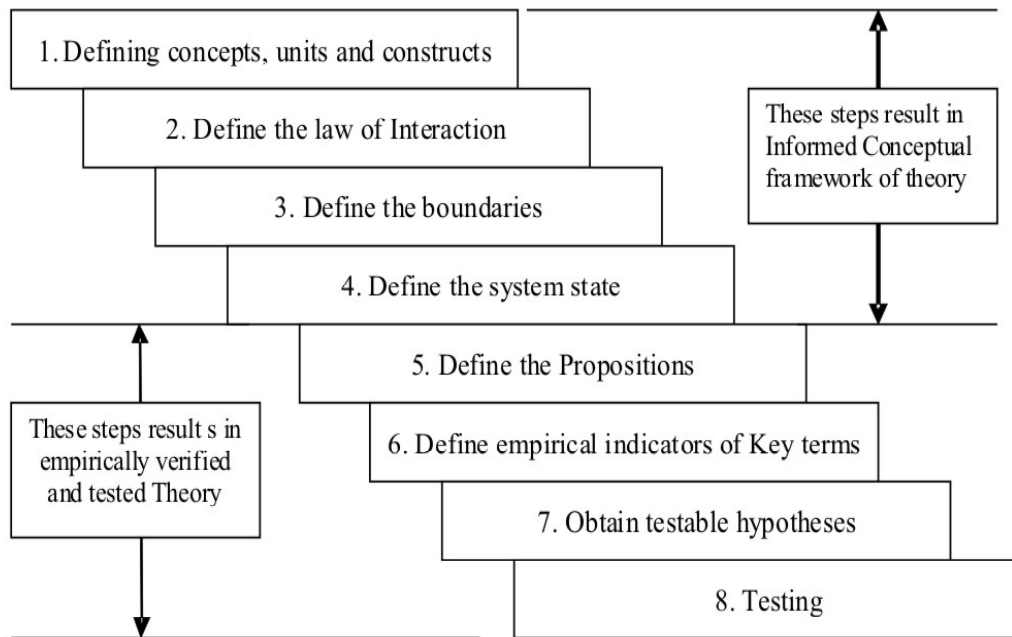


Figure 1 : Dubin's Eight-Step Theory-Research Cycle of Theory Building Method

Conceptual Development of the Research Framework

Motives are the driving force produced by the pressure of the needs and wants. The decision to fulfill the goals or needs is moderated by the benefits and the risk associated with the acquisition of a product, which is often evaluated from the knowledge of previous learning or cognitive process.

Developing conceptual research model step one: Developing Units

To identify these units, from the literature we begin to understand which of the constructs influences

the outcome. A construct is the concept that is common among observed phenomena.

We identify the following units for our study.

- (1) Benefits of ERP adoption. (2) Challenges of ERP adoption. (3) Institutional pressure in ERP adoption. (4) Organizational Complexity (5) ERP Adoption.

Unit one: Benefits of ERP adoption

Organizations are often attracted by the benefits of ERP that are characterized by integration,

flexibility and scaling attributing to the solution to the various requirements.

We propose to synthesize the benefits listed by Bernroider (2008), Elbashir et al. (2008), Kamhawi (2008), Murphy and Simon (2002), Singla (2005), Saatçyođlu (2007), and categorize them on the comprehensive framework for classifying benefits of ERP system of Shang and Seddon (2004).

Unit two: Challenges in ERP adoption

ERP implementation projects are risky undertaking and can impinge on the cost and time expectation. The firm is put into trouble during and after implementation. The resistance and training requirement stand across the successful adoption. The main challenge of ERP adoption is the failure to properly assess and understand the risks.

We propose to synthesize the barriers listed by Saatçyođlu (2007) and Kamhawi (2008). We use the categories such as Resources, Technical, Project management and change management. We renamed the "change management" as "people" for a broader meaning of their characteristics.

Units Three: Institutional Pressure in ERP Adoption

Institutional theory emphasizes the role of social and cultural pressures imposed on organizations that influence organizational practices and

structures. DiMaggio and Powell (1983) argue that managerial decisions are strongly influenced by three institutional mechanisms—coercive, mimetic, and normative isomorphism—that create and diffuse a common set of values, norms, and rules to produce similar practices and structures across organizations that share a common organizational field.

Unit Four: Organizational Complexity.

Many studies have found that the organizational characteristics are also significant determinants of organizational IT adoption. Literatures in particular to organization characteristics and ERP adoption are also found. The organizational characteristics frequently found in the prior studies include organizational size (Buonanno et al. 2005; Ju Pan and Yuh Jang, 2008; Liang et al 2007; Teo et al. 2003).

Unit Five: ERP Adoption.

ERP adoption is the behavioral outcome that is understood as having adopted the ERP system or not adopted the ERP system. As predictable variable the ERP adoption is also measured as the intention to adopt or not-adopt ERP system, which is as in, TAM will be an indication to the overt action of adopting an ERP system.

Developing conceptual research model step two: Developing the Laws of Interaction

The laws of interaction are the statements of relationship between the units of the theory. In our conceptual research model on the motives of ERP adoption, the organizational needs are attractively addressed by the benefits of the ERP systems and some time terrorises the organizations with the risk involved in implementing. We can also understand that beyond the taste of benefits and risks organizations are forced to adopt ERP systems.

Developing conceptual research model step three: Developing Boundaries of the Theory

The conceptual research model proposes a theory that predicts the motives that will drive the ERP adoption among the non-adopters, but the non-adopters will include a significant population and we have to limit to the distinctive organizations, which requires ERP system but not adopted one. To identify the potential organizations, which will require ERP system, we apply the business and organizational characteristics as a qualifying factor. The business firms with this qualifying factors form the area within which our theory holds good (Fig. 2)

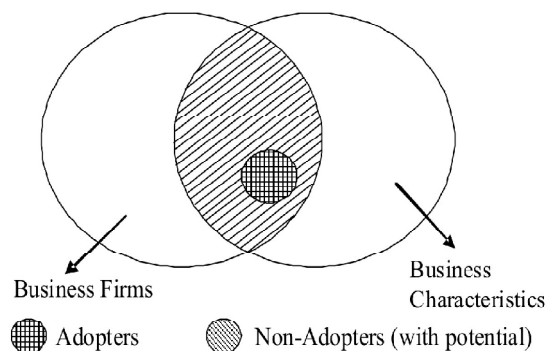


Figure 2: Boundary of the theory

Developing conceptual research model step four: Defining System States of the theory.

Defining a system state is that representing the condition in which the units of the theory interact differently. In our conceptual research model, the organizational characteristics are taken as one of the inputs and the institutional pressure as the other input. The process of decision-making is done by cost-benefit analysis by looking the benefits of ERP adoption and the barriers in ERP adoption. The outcome of this model is the ERP Adoption, which is measured as a discrete factor whether the organization has adopted or not adopted the ERP system. The system state depicting the input, process and output is shown in the Figure 3.

Developing conceptual research model step five: Defining Propositions.

The next step in conceptual research model building is the process of developing the propositions. The propositions are logically developed from the units, laws of interaction, boundaries and the system states. Propositions are important for the empirical testing of the model (Holton and Lowe, 2007). An important objective of any conceptual research model is to generate predictions from the empirical information available. The prediction is usually in the form of the proposition. Dubin (1978) identifies three classes of proposition. 1) The prediction of the value

of a single unit in the model from the value of the other units in the model. 2). The prediction is about the continuity of the model by finding the conjoined values of all units in the system. 3). Predict the system state when the system is dynamic.

Theory Evaluation and modification

The conceptual research model is evaluated for its relevance to the theory and practice by scholars. To obtain theoretical perspective academicians were asked to evaluate the model. The concepts of cost benefit analysis as criteria for adoption decision under the economics context were well accepted. The relationship between the institutional pressure and business complexity were accepted theoretically to interact with the adoption decision either directly or indirectly by moderating the benefits and risks in ERP project.

To obtain practitioner perspective, consultants and users were asked to validate the model. The users' evaluating the model were able to recollect the business cases on institutional pressure in which customers forced them to adopt even small time software for their supply chain integration. When scholars suggest a modification, it should be verified with further review of concerned literature. When a modification is justified, the initial conceptual model can be modified. (Holton and Lowe, 2007). All feedback was considered and critically evaluated before a theory modification was made.

Conceptual research model

Drawing upon the Dubin's (1978) conceptual theory building process, we arrive at a conceptual model as shown in the figure 3.

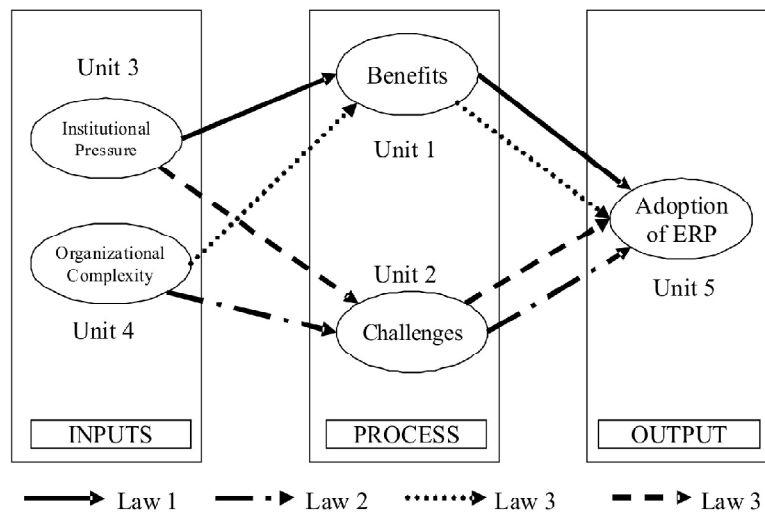


Figure 3. Conceptual research model on Motives that drive the ERP adoption

Conclusion

The objective of the study was to develop a conceptual research model on the factors that motivates the ERP adoption in the organizations. Using Dubin's (1978) theory building method, we identified the units of analysis and the laws of interaction between the constructs. The boundary and the system state of the theory are also identified. We then validated the theory by empirical test with experts in various levels in industry, consulting and academia. The proposed conceptual model will throw light on how organizations react to the institutional pressure to adopt ERP system though they are attracted by tangible and intangible benefits of adopting such system. This model will also observe how the risks and barriers that challenge the ERP adoption will respond to the institutional pressure.

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