



No. **108/ 2015-16**

Working Paper Series

Centralization and the success of ERP implementation

By

Madhavi Latha Nandi

Assistant Professor,
T. A. PAI Management Institute (TAPMI),



**Centralization and the success of
ERP implementation**

By

Madhavi Latha Nandi

Assistant Professor,

T. A. PAI Management Institute (TAPMI),
Manipal 576104, Karnataka, INDIA

Ph: 91 0820- 2701079; Email: madhavi@tapmi.edu.in

Ajith Kumar J

Professor,

T. A. PAI Management Institute (TAPMI),
Manipal 576104, Karnataka, INDIA

Ph: 91 0820 2701028 Email: ajith@tapmi.edu.in

TAPMI Working Paper No. TWP 108/2015-16



**T. A. PAI Management Institute
Manipal – 576104, Karnataka**

**Centralization and the success of
ERP implementation**

by

Madhavi Latha Nandi,

*Assistant Professor,
T.A Pai Management Institute,
Manipal-576104, Karnataka, India
Phone: 0820- 2701079, email: madhavi@tapmi.edu.in*

Ajith Kumar J.

*Professor,
T.A Pai Management Institute,
Manipal-576104, Karnataka, India
Phone: 0820- 2701028, email: ajith@tapmi.edu.in*

Abstract: Enterprise Resource Planning (ERP) systems have steadily attracted research and practitioner interest over the last two decades. We examine the association between centralization ó a component of organization structure ó and the success of ERP implementation in organizations. We treat ERP implementation as a form of organizational innovation. Our study is motivated by the presence of contrasting findings on the association between centralization and innovation. Drawing upon pertinent literature, we build a theoretical model that links centralization with the success of ERP implementation and do a PLS path analysis to test it, using data from a sample of 51 organizations in India. We find that policy-related centralization negatively influences the acceptance of ERP by users, but has no influence on the extent of use of the ERP system. In contrast, work-related centralization positively influences acceptance and negatively influences use. Further analyses show that the negative association between policy-level centralization and acceptance is more in larger organizations. The contributions of this study lie in presenting and discussing the realization that overall, decentralization is favourable to the success of ERP implementation.

Keywords: policy-related centralization; work-related centralization; ERP use; ERP user acceptance; organizational innovation; ERP implementation success

Introduction

In recent times, implementing enterprise resource planning (ERP) systems has become a trend across the globe and organizations are investing vast resources on it. ERP implementations are associated with a promise of benefits from automation and integration but they also carry the risk of failure. Some of the biggest failures were seen at Foxmeyer, Hershey Foods, and more recently, Avon Products (Bingi, Sharma, and Godla 1999; Kepes 2013; Koch 2002). It has been suggested that new information systems (IS) often fail due to implementation weaknesses rather than technology shortcomings (Kemp and Low 2008; Klein and Sorra 1991). Accordingly, issues pertaining to the implementation of ERP in organizations have become an important subject for academic research.

ERP implementation is essentially a form of organizational innovation. Numerous studies have touched upon the role that organizational factors play in it (Boersma and Kingma 2005; Bradford and Florin 2003; Nandhakumar, Rossi, and Talvinen 2005; Somers and Nelson 2001; Dong, 2011). However, little research ó with the exception of Ifinedo (2007) ó has explored the influence that organization structure has on ERP implementation. In this paper, we make an incremental contribution by examining the association between a component of organization structure, centralization, and the success of ERP implementation.

Centralization refers to the distribution of decision-making power within organizations. We invoke Hage and Aiken (1967) to conceptualize centralization in a way that distinguishes power distribution pertaining to policy related decision-making from that pertaining to work related decision-making. Drawing upon previous research, we construct a theoretical model to propose relationships between centralization and ERP implementation success. We represent implementation success in terms of users' acceptance and use of the implemented ERP. Our findings suggest that on whole, a less centralized setup is more favorable to the success of an ERP implementation and that the relationship is more prominent in larger organizations.

In the following section, we present the conceptual background of this paper by first describing ERP implementation in general and then, as organizational innovation. We then touch upon the literature on success factors in ERP and highlight the research gap. After that, we develop the study's constructs and hypotheses. Subsequently, we discuss the methodology used to collect

data and the partial least squares (PLS) path model built to analyze it. Finally, we explore the findings, discuss their implications, and offer suggestions for future research.

Conceptual Background

An ERP system is an IS and the approach to its development and implementation combines aspects of the three traditional approaches to IS development: the application software package approach, the waterfall approach and the prototyping approach (Ahituv, Neumann, and Zviran 2002). As in the application software package approach, an ERP package available in the market is selected that best suits the requirements on hand. Then, as in the waterfall approach, the integration requirements and implementation scope are defined. Finally, the requirements for each business process are precisely defined, configured and tested, as done in the prototyping approach.

ERP implementations usually span prolonged time periods that can be as long as even five years (Nah, Lau, and Kuang 2001; Worthen 2002). They can involve large investments of financial resources by the organization and take active inputs and effort from various stakeholders (Kemp and Low 2008). Stakeholders typically include the senior management, functional managers and users, members from the IT function, ERP package vendors, implementing partners, and in some cases, even suppliers and customers.

ERP Implementation as Organizational Innovation

In its essence, ERP implementation is a form of organizational innovation. Organizational innovation involves the generation, acceptance and implementation of new processes, products, or services for the first time within an organizational setting with an intention of bringing in changes in the organizational processes, for better outcomes (Thompson 1965, Pierce and Delbecq 1977, West 2000). In other words, organizational innovation implies a given organization's strategic effort at doing something new and relevant, regardless of whether other industries or organizations have already proceeded through that process.

The implementation of ERP in an organization fits this notion of innovation for multiple reasons. First, setting up an ERP infuses significant newness into the organization as it involves the introduction of a new integrated IS that impacts the organization's sub-units. Second, it usually

drives massive organizational change resulting from shifting existing business processes to those that represent best practices implicit within the ERP system (Bingi, Sharma, and Godla 1999; Davenport, 1998). Such changes encompass many principal areas including strategy, technology, culture, management systems, human resources and structure (Al-Mashari, 2003). Organizations generally do not have the technical capability to configure an ERP system by themselves and they require the external assistance of vendors and implementation partners (Wang et al., 2007). The synergic effort of the project team, top management, implementation partners, vendors, end-users, and other employees is critical for the success of the implementation. Thus, the introduction of ERP in an organization needs a strategically managed implementation process (Kemp & Low, 2008). Finally, ERP implementation is intended to drive better outcomes as with any organizational innovation.

Organizational innovation can be thought of as having three phases, namely, initiation, adoption, and implementation (Pierce and Delbecq 1977; Rogers 1983; Thompson 1965; Zmud 1982). The first two phases involve conceptualizing a change idea and then enacting the decision-making processes that provide the mandate and resources for change. The final phase, implementation, involves installing the adopted idea into a sustained recognizable behavior pattern within the organization (Pierce and Delbecq 1977). The current study's focus is on the implementation phase of ERP.

Success Factors in Organizational Innovation

Having accepted ERP implementation as innovation, we now turn to factors that influence its success. Cooper (1999) pointed out that there are two sets of success factors for innovation. The first set, which deals with 'doing the right projects' is primarily driven by external environmental characteristics. In relation to ERP, this pertains to the initiation and adoption stages. The second set, which is about 'doing projects right' is mainly driven by internal organizational characteristics. With regard to ERP, this involves factors that influence its installation and assimilation in organizational processes. Indeed, over the years, studies on ERP have identified a number of critical success factors (CSFs). For example, Ram and Corkindale (2014) listed 46 CSFs under four broad categories: organizational, technological/ERP related, project related and individual related. Shaul and Tauber (2013), drawing from a detailed review of over 300 research articles,

identified 94 CSFs and classified them under 15 distinct constructs.

Despite the substantial body of research on critical organizational factors, we could not locate a work, barring Ifinedo (2007), which has studied the role of organization structure in ERP success. Based on a study of 44 organizations in Finland and Estonia, Ifinedo found a significant relationship between structure and ERP system success. Ifinedo noted that structure has three major components, centralization, specialization and formalization; yet he treated structure as a single construct in his empirical examination and did not seek out the distinct influences of the individual components.

Our study is particularly focused on the association between one of the structural components ó centralization ó and ERP implementation success. Centralization is the degree to which power and control in a system are concentrated in the hands of relatively few individuals (Rogers 1983). It reflects the organization's internal power distribution with respect to decision-making mechanisms. A greater degree of centralization indicates pronounced hierarchical structures in the organization, while a lower degree indicates a greater level of dispersion of decision-making processes (John and Martin, 1984). What makes centralization interesting in a study on organizational innovation is the insight that the nature of the association between the two depends on the stage and type of innovation (Zmud 1982; Damanpour 1991).

Centralization and Organizational Innovation

Centralization has been discussed as an important determinant of organizational innovativeness including technological innovation (Damanpour 1991; Pierce and Delbecq 1977; Rogers 1983) and has been addressed in innovation studies that have adopted a structuralist perspective (Slappendel 1996). According to one view, centralization can be a deterrent to organizational innovation in the initiation stage (Slappendel 1996). People with power can block attempts to introduce change in organizations since such a change can cause a shift in their power. As a result, opportunities for circulation of ideas and emergence of conflict that can stimulate change are limited in a centralized set-up. Consistent with this, Grover and Goslar (1993) found a negative association between centralization and the number of distinct telecommunication technologies being evaluated by business firms in the U.S. However, not all research concurs on this. For example, Zmud (1982) reported a positive association between centralization and the initiation of

modern software practices pertaining to the management of software applications in educational institutions and hospitals. The software practices aligned with the objectives of the administrative core more than the technical core of the organization.

In the adoption stage, organizational innovation can be favoured by centralization. A decentralized set-up fosters the existence of many reference groups, sometimes high-power groups. This can act as an impediment to reaching consensus in decision-making by consuming significant amounts of effort and thereby, deterring the innovation process (Hage and Dewar 1973; Pierce and Delbecq 1977; Wilson 1966). In such situations, greater centralization can help maintain a consistent policy that will reduce the discretionary authority of lower level employees, and enhance employee focus on the innovation activity (Pugh 1968; John and Martin 1984). Consistent with this, Subramanian and Nilakanta (1996) found that banks with a centralized set-up were more consistent with the adoption of administrative innovations. Likewise, Jaskyte (2011) found a positive association between centralization and adoption of select human resource practices in U. S. based non-profit organizations. A greater employee compliance to the organizational mandate is favourable. However, such compliance is more likely when work execution is observable, can be easily monitored, and sanctions for deviations can be easily addressed (John and Martin 1984). Such conditions can also prevail when the scope and newness of the technology being implemented are limited and there is less uncertainty regarding the requisites to achieve intended outcomes (Jansen, Van Den Bosch, and Volberda 2006).

The influence of centralization on the implementation stage of innovation is marked by a lack of consensus. Centralization can be thought of as having the potential to facilitate implementation by reducing role conflict and ambiguity (Zaltman, Duncan, and Holbek 1973; Slappendel 1996), but we could not locate empirical evidence of a positive association between the two. On the other hand, Jansen, Van den Bosch, and Volberda (2006) found that centralization has a negative impact on the implementation of process innovations that are associated with radical change in European financial firms. Earlier research has also suggested that the range of new ideas in an organization would be restricted when a few central leaders dominate the scene (Rogers 1983) and impede the much needed creative dialectic that facilitates implementation processes (Hage and Dewar 1973).

Increased centralization can reduce the quality and quantity of ideas as well as the free flow of knowledge necessary for problem-solving. It can inhibit and impair the information processing potential needed for decision-making (Zmud 1982; Jansen, Van Den Bosch, and Volberda 2006). The opportunity for circulation of ideas and emergence of conflict that can stimulate change, will thereby, be limited in a centralized set-up. As a result, centralization limits the non-routine problem solving potential of organizational members and their likelihood to seek or accept innovative solutions.

These discussions reveal that research over the last four to five decades relating centralization and organizational innovation, though abundant, has mixed findings. Further, we could not locate any ERP-based study that has studied the role of centralization in ERP implementation in particular. Motivated by this gap, we ask: how does centralization influence the success of ERP implementation in organizations? In the following section, we begin addressing this question by first characterizing each of centralization and ERP implementation in terms of two sub-constructs.

Study Constructs

Centralization

Hage and Aiken (1967) observed that centralization could be characterized in two parallel ways, and later studies have adopted this classification (Andrews et al. 2009; Glisson and Martin 1980; Krasman 2011; Allen and LaFollette 1977; Carter and Cullen 1984, Dewar, Whetten, and Boje 1980). The first, *participation in decision-making* represents how much the occupants of various organizational positions participate in organization-wide decisions such as the hiring and promotion of personnel, the adoption of new policies and the institution of new services. Broadly speaking, these are decisions about the allocation of organizational resources such as manpower and money and are among the most basic kinds of decisions an organization makes. Such decisions affect the organization as a whole and are essentially related to the organization's policies. Hence, we term it *policy related centralization (PRC)*. Greater the level of PRC, lesser is the level of participation in decision-making of members across organizational ranks.

Hage and Aiken (1967) termed the second way in which centralization happens, ‘hierarchy of authority’. This pertains to decisions involving the work associated with organizational positions. If employees are allowed to make their own work decisions, then there is little reliance upon super-ordinates and thereby, a low reliance on a hierarchy of authority for social control. In contrast, if all work decisions must be referred to the occupant of the position immediately superior in the chain of command, there is a great hierarchy of authority. In sum, hierarchy of authority measures the degree of freedom in work-related decisions (Hage and Aiken, 1967) and we term it *work related centralization* (WRC). In short, we conceptualize centralization in terms of PRC and WRC (Figure 1).

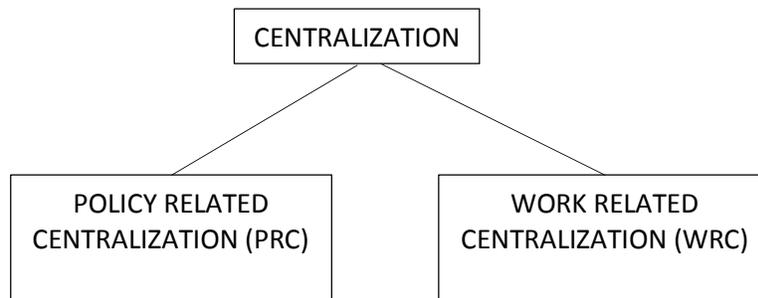


Figure 1: Dimensions of centralization

ERP Implementation Success

Literature reveals considerable variation in the conceptualization of ERP implementation success (Esteves and Pastor 2001; Esteves and Bohorquez 2006; Ram and Corkindale 2014), and such variation is attributable to different theoretical perspectives and models of implementation stages adopted across studies (Esteves and Pastor 2001). Some studies characterized success in terms of benefits derived from implementation (Hong and Kim 2002; Wang et al. 2007). Some others viewed it from the users’ perspective with indicators such as user satisfaction, users’ attitude towards ERP, the intention to use the ERP (Zhang et al. 2005; Bagchi, Kanungo, and Dasgupta 2003) and even actual use of the ERP (Chang et al. 2008; Liang et al. 2007). From a project management perspective, yet other studies have used going live ‘within time’ and ‘within budget’ (Akkermans and Van Helden 2002; Hong and Kim 2002; Bradley 2008). In studies that viewed ERP implementation from a knowledge management perspective (Ko, Kirsch, and King 2005;

Wang et al. 2007), successful knowledge transfer represented implementation success. The impact of the system on individual, organization and work-group, information quality and system quality capture success in a few other studies (Ifinedo and Nahar 2009; Sedera and Gable 2010).

We felt that an important aspect of implementation success is how well users accept the ERP initiative. ERP implementation is a lengthy process and involves several activities once the adoption decision is made, including the preparation of the business process blue print, configuration of the ERP system, and user training. These require the active involvement of employees across departments along with managerial support. User resistance has been one of the major implementation problems discussed in the literature (e.g. Somers and Nelson, 2001; Nah, Lau, and Kuang 2001). If users hold positive views about the need for organizational change and believe that the change is likely to have positive implications for themselves as well as the organization, they tend not to resist the deployment of the ERP system and the change it could bring (Kwahk 2006). Thus, *user acceptance* of the ERP implementation initiative is an indicator of success, in this study.

Use of the ERP system is another important aspect of implementation success. According to Thompson (1965), the implementation stage involves installing the adopted innovation into a sustained recognizable behavior pattern within the organization (Pierce and Delbecq 1977). Previous studies have seen IS implementation as the process of gaining employees' appropriate and committed use of the IS and invoked the same as a proxy for IS success (DeLone and McLean 1992; Klein and Sorra 1991).

What exactly does *use* refer to? Some studies on ERP implementation have conceptualized IS use in terms of the frequency and the intensity of use (Chang et al. 2008; Liang et al. 2007) since that facilitates a more objective measurement of use. However, such conceptualization may not facilitate a consistent measure of implementation success as some organizations might intentionally limit the ERP to certain functions, in accordance with their needs. Despite lower frequency and intensity of use, such organizations may view their ERP implementation as successful since the system has fulfilled the anticipated needs of the organization. Hence in the present study, we conceptualize ERP use in terms of the extent to which the ERP is serving the intended purpose.

In short, we use two constructs ó *user acceptance* (ACP) and *use* (USE) ó of the ERP system, to characterize implementation success (Figure 2). We next develop specific hypotheses on the relationships between centralization and ERP implementation success.

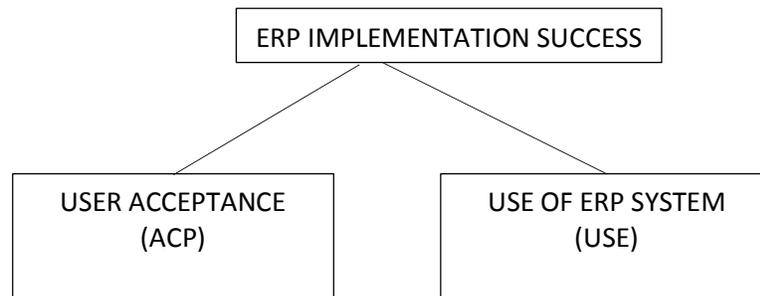


Figure 2: Indicators of implementation success

Hypotheses

Policy Related Centralization (PRC)

We expect PRC to have a negative association with ACP as well as USE. Generally speaking, employees tend to accept the decisions in which they are involved. As discussed earlier, distributed decision making at the policy level can help in better information flows among stakeholders and facilitate better inputs for the implementation. Participants in decision-making can act as liaisons between the senior management and other organizational members at lower levels, and thus, broaden organizational communication channels. Consequently, the levels of awareness on different aspects of implementation are greater when employees' participation in decision making is more (Damanpour 1991).

Greater participation can potentially generate a greater sense of ego-involvement and commitment towards facilitating the processes that drive innovation (Pierce and Delbecq 1977; Jansen, Van Den Bosch, and Volberda 2006). A participatory environment signals to members that their input is valued and welcomed, which can lead to increased openness and flexibility to change that is favorable for successful implementation (Damanpour 1991; Zmud 1982; Jaskyte 2011). Organizational members from lower levels become part of integrative problem-solving

groups rather than resentful onlookers, sharpshooting from the outside (Thompson 1965). Greater levels of employee involvement also tend to foster employees' accountability to the success of the ERP implementation project. Hence, we hypothesize:

H1a: PRC is negatively associated with ACP.

H1b: PRC is negatively associated with USE.

Work Related Centralization (WRC)

Unlike PRC, we expect that WRC has a positive association with ACP since employees would tend to accept the decision to implement ERP for the sake of conformance to senior management. Yet, like PRC, we expect WRC to have a negative association with USE, since WRC, which constrains participants' sense of control over their work, can inhibit their capabilities to utilize the ERP in their work. A greater hierarchy of authority can reduce the non-routine problem solving capabilities of employees and the likelihood that they will seek innovative and new exploratory solutions (Atuahene-Gima 2003) using the ERP. When WRC is high, employees are more likely to *accept* the ERP system out of compulsion from seniors, but at the same time, not freely *use* the system to its full potential. This leads us to hypothesize:

H2a: WRC is positively associated with ACP.

H2b: WRC is negatively associated with USE.

Moderating Effect of Organization Size

We expect organization size (SIZE) to moderate the relationship between PRC and ACP. As an organization becomes larger, its complexity and the administrative burden on the top management increase. Costs pertaining to information gathering and communication also increase (Moch 1976). In this situation, having less centralization at the policy level by having more and diverse people participate in the decision making can be favorable. When more people across the organization participate actively in decision making, they can act as information agents to other organizational members, thus facilitating a better acceptance of the ERP initiative (Moch 1976). In contrast, if the organization does not encourage greater employee participation in implementation decisions as it grows larger, users' acceptance of the ERP implementation can

become more difficult to achieve. Hence:

H3a: The negative association between PRC and ACP, is stronger in larger organizations.

Figure 3 depicts the study's research model, with the hypothesized relationships. The model also depicts two other associations. The first is an association between PRC and WRC. Hage and Aiken (1967) found and discussed a correlation between them and hence we included this link in our model. The second is a link between ACP and USE. Though we did not have arguments to hypothesize the presence or absence of a relationship between them, we wished to detect one if it exists.

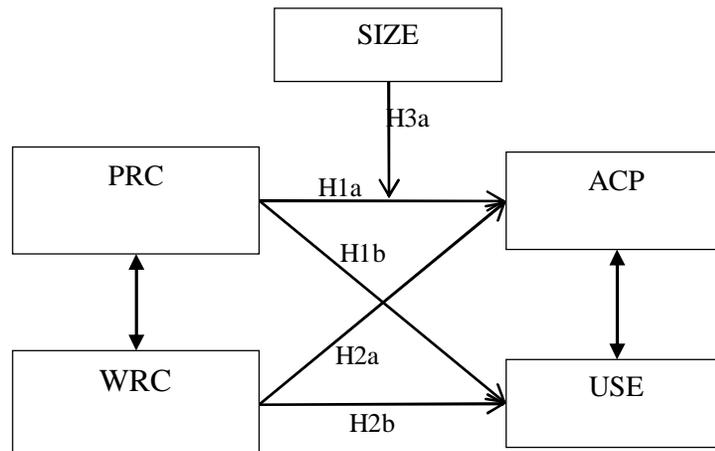


Figure 3: Research model

Methodology

We tested the research model using data collected with a structured questionnaire that was part of a larger study. We used a combination of items from the previous studies and new items developed with the inputs of a four-member expert committee comprising one project manager of an ERP implementation project, one ERP consultant and two professors in the information systems and management strategy areas of a business school in India. PRC and WRC are measured using items derived from Hage and Aiken (1967). Several studies in the past have used these items to measure

the components of centralization and have indicated their robustness in terms of reliability and validity (Dewar, Whetten, and Boje 1980; Jansen, Van Den Bosch, and Volberda 2006; Grover and Goslar 1993). We developed items for ACP and USE using inputs from the expert committee.

The argument for the moderating effect of organizational size, essentially refers to the complexity induced with growing organizational size. Therefore, we measured SIZE by the number of employees present at the time of ERP project implementation. This is in line with earlier studies that have operationalized size in terms of number of employees (Gopalakrishnan and Bierly 2006; Smith, Collins and Clark 2005; Tanriverdi 2005). All other items used a five-point Likert scale, anchoring from "strongly disagree" to "strongly agree" (Appendix A1).

We defined the population as consisting of organizations that have implemented ERP and used it for at least two years and identified suitable respondents as senior managers that were involved with the implementation projects in their respective organizations. Subsequently, we gathered contact details of 100 organizations from various sources and sent the questionnaires to them either through an e-mail containing the link to the questionnaire's online version, through post, or by personal hand-delivery.

We received a total of 53 responses. Two questionnaires were partially filled and were therefore, not considered for the study. The usable sample had 51 responses, and represented a diversity of firms from eight different sectors (Table 1).

Table 1: Sector-wise composition of data

S. No.	Sector	No. of responses
1	Oil & Gas (Oil & gas producers, Services, Distribution and so on.)	3
2	Basic Materials (chemicals, industrial metals, mining, and so on)	9
3	Industrials(Construction & Materials, Aerospace & Defense, General Industrials, Electronic & Electrical Equipment, and so on)	20
4	Consumer goods (Automobile & Parts, Food Producers, Household goods, Tobacco, Personal goods, and so on)	7
5	Healthcare (Health Care Equipment & Services, Pharmaceuticals & Biotechnology, Food & Drug Retailers, General Retailers)	4
6	Consumer services (Media, Travel & Leisure, Telecommunications, and so on)	3

7	Utilities (Electricity, Water, Gas, and so on)	4
8	Technology (Software & Computer Services, Technology Hardware, and so on)	1
	Total	51

Analysis and Findings

We used partial least squares structure equation modeling (PLS-SEM) to validate the hypothesized relationships keeping in mind the moderate sample size (Chin 2010; Gefen, Rigdon, and Straub 2011). Achieving a larger sample proved difficult for certain reasons. Our unit of analysis was the organization, vis-à-vis the team or the individual wherein larger sample sizes are more easily attainable. Further, the size of the population that was accessible in India was also not very large, apart from other resource constraints. However, this did not really constrain us since the usable size of 51 that we achieved, met the minimum requirement of ten-times the largest number of predictors for any dependent latent variable in the model (Urbach and Ahlemann 2010; Gefen, Straub, and Boudreau 2000). Further, we examined all necessary psychometrics pertaining to the variables and the structural paths, to ensure the validity of the results based on the guidelines offered by Chin (1998), Chin (2010), and Ringle, Sarstedt, and Straub (2012).

Common Method Bias

Common-method bias occurs when a significant amount of covariance shared among variables is attributable to the common method used for collecting data (Malhotra, Gosain, and Sawy 2005; Urbach and Ahlemann 2010). To assess this, we performed Harman's one factor test on SPSS version 16.0. The maximum covariance explained by a factor is approximately 22%, indicating the presence of multiple factors and therefore, the absence of significant common-method bias (Table 2).

Table 2: Harman's one factor test

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.504	22.763	22.763	2.504	22.763	22.763
2	2.055	18.683	41.446			
3	1.563	14.210	55.656			
4	1.212	11.014	66.670			
5	1.012	9.199	75.869			
6	.751	6.829	82.698			
7	.603	5.485	88.183			
8	.408	3.713	91.896			
9	.388	3.526	95.423			
10	.289	2.625	98.048			
11	.215	1.952	100.000			

Extraction Method: Principal Component Analysis.

PLS Path Analysis

We addressed both stages of PLS path analysis, namely, measurement model validation and structural model validation, using SmartPLS version 2.0.

Measurement Model Validation

This involves assessing the item reliability, internal consistency, convergent validity and discriminant validity of the latent constructs. Table 3 presents the complete set of item loadings on the respective constructs, which we note, are all greater than 0.5 (Hair et al. 2014). This

indicates item reliability. Internal consistency is assessed using composite reliability scores of the latent constructs. These are 0.7 and above for all the latent constructs (Table 4) indicating adequate internal consistency.

Convergent validity is evaluated using the average variance extracted (AVE) of each latent construct, which indicates the variance of the indicators captured by the construct, relative to the total amount of variance (Goetz, Liehr-Gobbers, and Krafft 2010). Values greater than 0.5 indicate sufficient convergent validity (Bagozzi and Yi 1988; Hair et al. 2014) and the same is observed in Table 4 for all constructs.

Discriminant validity refers to the extent of dissimilarity in a tool's measurement of different constructs. Two approaches are used to evaluate it: a) examine the cross-loadings of all indicators on all constructs and b) apply the Fornell and Larckers criterion. The loadings in Table 3 reveal that the items loaded much better onto their corresponding constructs than onto other constructs. Fornell and Larcker's criterion requires the AVE to be greater than the common variances of the latent variable with any other construct in the model. Further, the shared variance between a given latent variable and its indicators should be larger than the variance it shares with other latent variables. These conditions were also met (Table 5), thus indicating adequate discriminant validity.

Table 3: Indicator Loadings

Indicator/ Construct	WRC	PRC	ACP	USE
WRC1	0.6815(3.797**)	-0.1862	-0.0014	-0.1982
WRC2	0.9009(6.649**)	-0.1549	0.2120	-0.3274
PRC1	0.0756	0.7698(4.886**)	-0.2169	-0.1016
PRC2	0.2281	0.8563(5.655**)	-0.1325	-0.0813
PRC3	0.1659	0.7282(5.161**)	-0.1973	-0.0790
ACP1	0.0756	-0.0760	0.7160(6.509**)	0.1760
ACP2	0.1715	-0.2572	0.9603(33.455**)	0.4022

USE1	-0.2618	0.0267	0.3090	0.7178(7.935**)
USE2	-0.25047	-0.0342	0.0465	0.6668(7.127**)
USE3	-0.2124	-0.2188	0.3462	0.7224(6.92**)
** - Significant at p=0.01 Bootstrapping n=1000				

Table 4: General statistics of measurement model

Latent Construct	Items	CR	AVE
PRC	3	0.8289	0.6187
WRC	2	0.7758	0.6381
ACP	2	0.8326	0.7174
USE	3	0.7451	0.5012

Table 5: Cross correlation matrix (Square root of AVE shown in the diagonal)

Latent construct	Acceptance	Use	WRC	PRC
ACP	(0.847)			
USE	0.3791	(0.708)		
WRC	0.1618	-0.341	(0.7988)	
PRC	-0.2307	-0.1105	0.2033	(0.7866)

Structural Model Validation

Validating the structural model involves assessing the relationships between the latent constructs. While doing PLS-SEM, the structural model is evaluated by means of the coefficient of determination (R^2), the path coefficients and their levels significance, and the Stone-Geisser test criterion (Q^2), also referred to as the Q-statistic. PLS does not provide goodness-of-fit measures, since it is a variance-based method unlike other SEM methods that are covariance based (Barroso,

Carrion, and Roldan 2010). For validating the moderation (or interaction) effect of size, we used the PLS product indicator (PLS-PI) method.

The results of the structural model validation are presented in Figure 4, Table 6 and Table 7. R^2 reflects the proportion of the dependent variable's total variance explained by the predictor variables. The R^2 values for ACP and USE are 0.099 and 0.319 respectively (Figure 4), indicating that PRC and WRC together explain 9.9% and 31.9 % of the variance in these constructs respectively. Re-sampling using bootstrapping helped us obtain the t-statistics; they indicate that all the hypotheses, except H1b are supported. Further, we note that PRC and WRC are significantly positively associated with each other, consistent with the findings of Hage and Aiken (1967). ACP and USE are also positively associated, perhaps suggesting that better acceptance by users drives greater use of the ERP.

The predictive relevance of the model, which indicates how well the model can be reconstructed with the help of the model parameters, is assessed with the Stone-Geisser statistic (Q^2). The Q^2 value is calculated using a blindfolding procedure. In SmartPLS, the Q^2 -statistic for exogenous constructs is represented by the 'cross-validated communality' measure and that for endogenous constructs is represented by 'cross-validated redundancy' (Tenenhaus et al. 2005). A model has predictive relevance if Q^2 is greater than 0 for all the latent constructs. The present model fulfills this condition (Table 7).

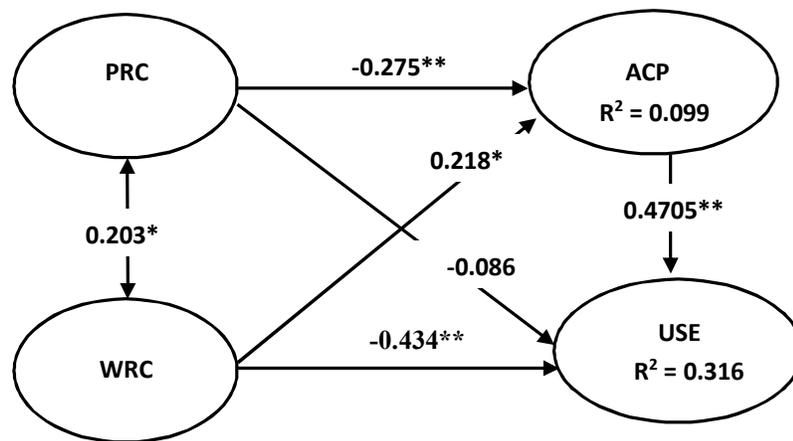


Figure 4: Main effects of the PLS model

Table 6: Path coefficients and t-statistics for main model

Path	Path Coefficient	T Statistics (O/STERR)
PRC -> ACP	-0.2750	2.327**
PRC -> USE	-0.0861	1.087
WRC -> ACP	0.2177	1.830*
WRC -> USE	-0.4344	4.420**
ACP -> USE	0.4692	5.695**
PRC -> WRC	0.203	2.046*
* - Significant at p=0.05		
** - Significant at p=0.01		
Bootstrapping n=1000		

Table 7: Stone-Geisser Statistic (Q^2)

Latent construct	Q^2
USE	0.163
ACP	0.138
PRC	0.607
WRC	0.638

Moderating Effect of Size

The size of the organization in the sample ranged from a low of 43 employees to a high of about 70,000 employees. Hence, we entered SIZE in the model as the natural logarithm of the number of employees, as done by earlier researchers (Gopalakrishnan and Bierly 2006; Smith, Collins and Clark 2005; Tanriverdi 2005).

To test moderating effect in PLS, effect size (f^2) is calculated using the formula:

$$f^2 = \frac{R_{AB}^2 - R_A^2}{1 - R_{AB}^2}$$

where R_{AB}^2 is the R^2 of the model with moderator, R_A^2 is the R^2 of the model without moderator.

The results are presented in Figure 5, Table 8, and Table 9. We note that the R^2 of ACP has increased from 0.099 to 0.227 in the presence of size, indicating a medium effect. The path coefficient and t -statistic of the product term support H3a.

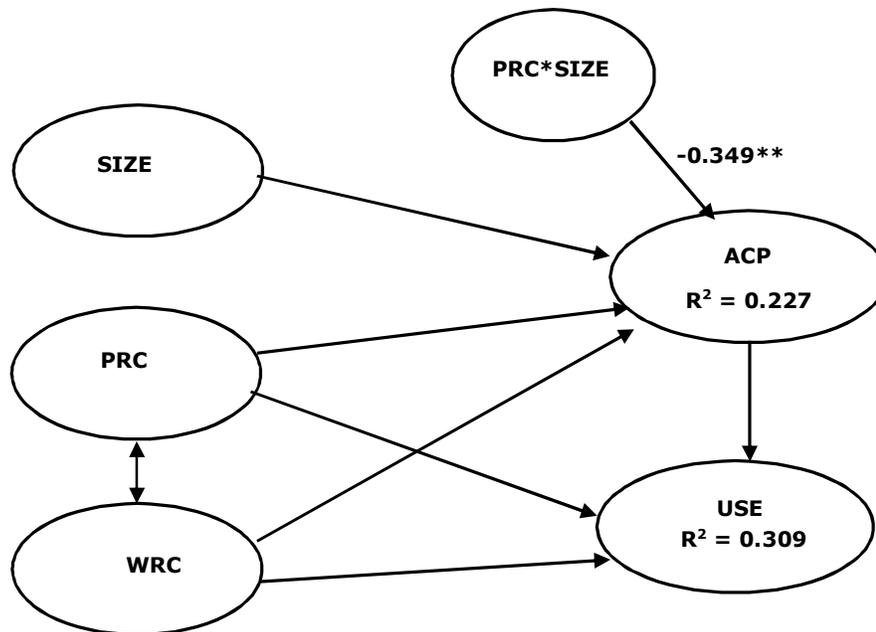


Figure 5: Interacting effects of the PLS model

Table 8: Effect size of moderation

R^2 without moderation	R^2 with moderation	Effect Size (f^2)
0.099	0.227	0.1656 (Medium effect)

Table 9: Path coefficients and t-statistics for interaction model

Path	Path Coefficient	T Statistics (O/STERR)
PRC*SIZE -> ACP	-0.349	3.154**
PRC -> ACP	-0.183	1.927
PRC -> USE	-0.082	1.044
WRC -> ACP	0.207	1.936
WRC -> USE	-0.431	4.654
ACP -> USE	0.459	5.240
PRC -> WRC	0.203	2.017
SIZE -> ACP	-0.066	1.078
* - Significant at p=0.05		
** - Significant at p=0.01		
Bootstrapping n=1000		

Discussion

Support for centralization in organizations comes from the early work of Taylor (1911), who proposed that organizations can be scientifically managed only when decision making is confined to a small set of planners. Aligned with this, other research (see, e.g., Goodsell [1985] and Ouchi [1980]) has suggested that in large bureaucracies centralization promotes efficient and effective functioning. Glisson and Martin (1980) showed that centralization is highly favorable to the performance of human service organizations in the United States and even has a small positive association with efficiency. Indeed, when the focus is on efficiency, centralization has proved beneficial as also found by Andrews et al. (2009) in public service organizations. Andrews et al. (2009) argued that given a potential increase in goal ambiguity, centralization may be particularly conducive to maintaining stable service priorities. They noted that centralization can increase efficiency by reducing the inconsistencies sometimes associated with decentralized decision

making, especially intra-organizational communication and office administration costs.

While centralization can be useful in situations oriented towards efficiency, stability and maintaining the status quo, it may not be as beneficial when there is a drive for change. Andrews et al. (2009) found that in *prospector* organizations, less centralization was better. Prospectors are organizations that almost continually search for market opportunities, and regularly experiment with potential responses to emerging environmental trends. In other words, these are organizations that deal with uncertainty and change more frequently. This resonates with our findings. In the current study, we examined relationships of the two component constructs of centralization namely, PRC and WRC on ERP implementation success represented by ACP and USE. Our findings suggest that, overall, a decentralized organizational set up is favorable for ERP implementation success.

Increasing centralization at the policy level seems to reduce users' acceptance. On the other hand, increasing the participation of employees across departments in decision-making can enable better communication and processing of diverse information and perspectives. In turn, this can favor reaching better consensus (Jansen, Van Den Bosch, and Volberda 2006) with employees responding more favorably to policy level decisions pertaining to ERP implementation. Policy-level centralization however, does not seem to have any significant relationship with the use of the ERP system which, we note, is a work-level phenomenon.

Centralization at the work-level seems to be two-faced. While its positive association with user acceptance makes it favorable for implementation success, its negative association with use seems to counter its facilitating role in achieving the intended benefits from ERP. However, since employees in more decentralized organizations are less burdened with conformance and compliance with their seniors' instructions, they have greater width to explore new ways of performing their work using the ERP system. For this reason, we feel that decreased centralization at the work level would lead to better exploitation of the potential of the ERP system, in the long run.

That WRC has a negative impact on USE, while PRC has no effect on it suggests that decentralization at work level has greater implications for ERP success than decentralization at the policy level. The stronger impact of centralization at the work level supports the suggestion of Blauner (1964) that operation-level employees in an organization would be more concerned about control over their immediate work processes than they are with control over managerial policy.

Interestingly, this finding contrasts with those of Hage and Aiken (1967) and Andrews et al. (2009), who observed that participation in decision-making seemed to be the more important dimension of the distribution of power than hierarchy of authority. Could the contrast owe itself to the fact that our study is set in organizational innovation? We note that Hage and Aiken (1967) studied centralization in health and welfare organizations and there is no mention of organizational innovation in their paper. Andrews et al. (2009) studied the same in public service organizations amongst which the *prospector* organizations engage in the development of new products and services; yet this type of innovation differs from organizational innovation as described earlier. All this raises questions as to whether it is useful to universally regard one form of centralization as *more* or *less* important than the other.

The significance of the interaction term between PRC and SIZE implies that the role of employees' participation in organizational decision making becomes more important as the organization grows bigger. Moch (1976) suggested that as size increases, delegating decision-making to more people can ease the administrative burden of the top management and reduce the distortion of information as it moves to lower level organizational members. Thereby, it can enhance the openness of users to ERP implementation. Larger organizations, thus, would benefit by having greater degrees of employee participation in decisions, while implementing ERP.

Our findings reinforce the observations of other studies set in an innovation context. Though our study was on implementing ERP, it upholds earlier theoretical propositions that decentralization, which represents structural looseness and is a characteristic of organic organizations, promotes innovation implementation in general (Burns and Stalker 1961; Thompson 1965). Along such lines, Rothwell (1994) noted that greater empowerment of managers at lower levels can reduce the number of approvals required and a reduction in hierarchy would reduce approval delays. The resulting reduction in communication complexity and improved decision making would enhance the efficiency of innovation. Other researchers who supported decentralization for innovation include Kanter (2004), West (2000) and McNulty and Ferlie (2004).

Conclusion

Previous work on ERP has studied several factors that are critical to implementation success. Our study makes an incremental contribution to the literature by turning the spotlight on relationships between centralization, a component of organization structure and the success of ERP implementation. It points to the greater benefits of decentralization in organizations in general, and policy-level decentralization in larger organizations in particular. A practical implication of our study is that organizations that are about to embark on the ERP journey will do well to reflect upon their current levels of centralization at both policy and work levels, and make necessary adjustments to ensure smooth and successful implementation.

The present study has its limitations. In order to ensure a certain extent of model parsimony, differences among ERP application packages used across organizations have not been factored into the study. In reality, there might be some differences in their features such as functionality, cost, and maintenance effort that can influence the implementation process. The second limitation concerns sample size being somewhat small, owing itself partly to our level of analysis being the organization and the fact that the population of ERP implementing companies is itself not very large in India. However, we ensured that the psychometric properties of our models are satisfactory. The third limitation is that the present study was conducted on Indian companies that have implemented ERP systems. The results might be sensitive to the cultural aspects of the country, and therefore need to be validated with organizations in countries with different cultural contexts. Given these limitations, the findings of this study may be generalized only with some caution.

Future studies can extend our work in several possible directions. Repeating our study with a larger sample size can help refine and confirm our findings. The influence of other structural dimensions such as formalization and specialization can be explored in relation to ERP implementation. Models that can test for the interaction effects of contingent factors such as size, culture and industry on these dimensions can help refine our understanding and move towards a more comprehensive theory. Another unresolved question pertains to the existence of reverse causality in the relationships – do organizations that have implemented ERP, experience structural transformations in the immediate few years, post-implementation? Such a study might require a

longitudinal design but can reveal interesting and relevant insights into the dynamics of ERP in organizations.

Acknowledgements

We thank Santosh Nandi, Sudheer Reddy and Sushanta Kumar Sarma for reviewing our manuscripts and offering us useful advice on improving the paper.

References

- Ahituv, N., S. Neumann, and M. Zviran. 2002. "A systems development methodology for ERP systems." *Journal of Computer Information Systems* 42(3): 56-67.
- Akkermans, H., and K. Van Helden. 2002. "Vicious and virtuous cycles in ERP implementation: A case study of interrelations between critical success factors." *European Journal of Information Systems* 11: 35-46.
- Allen, B. H., and W. R. LaFollette. 1977. "Perceived organizational structure and alienation among management trainees." *Academy of Management Journal* 20(2): 334-341.
- Al-Mashari, M. 2003. "Enterprise resource planning (ERP) systems: a research agenda." *Industrial Management & Data Systems* 103(1): 22 ó 27.
- Andrews, R., G. A. Boyne, J. Law, and R. M. Walker. 2009. "Centralization, organizational strategy, and public service performance." *Journal of Public Administration and Theory* 19(1): 57-80.
- Atuahene-Gima, K. 2003. "The effects of centrifugal and centripetal forces on product development speed and quality: how does problem solving matter?" *Academy of Management Journal* 46(3): 359-373.
- Bagchi, S., S. Kanungo, and S. Dasgupta. 2003. "Understanding user participation and involvement in ERP use." *Journal of Management Research* 1(1): 47-63.
- Bagozzi, R.P., and Y. Yi. 1988. "On the evaluation of structural equation models." *Journal of the Academy of Marketing Science* 16(1): 74-94.
- Barroso, C., G. C. Carrion, and J. L. Roldan. 2010. "Applying maximum likelihood and PLS on different sample sizes: Studies on SERVQUAL model and employee behavior model." In *Handbook of partial least squares: Concepts, methods, and applications*, edited by Vinzi, V. E., Chin, W. W., Henseler, J., and Wang, H, 427-447. Hiedelberg: Springer.

- Bingi, P., M. Sharma, and J. Godla. 1999. "Critical issues affecting an ERP implementation." *Information Systems Management* 16(3): 7-14.
- Blauner, R. 1964. *Alienation and Freedom*. Chicago: University of Chicago.
- Boersma, K., and S. Kingma. 2005. "From means to ends: The transformation of ERP in a manufacturing company." *Journal of Strategic Information Systems* 14: 197-219.
- Bradford, M., and M. Florin. 2003. "Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems." *International Journal of Accounting Information Systems* 4(3): 205-225.
- Bradley, J. 2008. "Management based critical success factors in the implementation of enterprise resource planning systems." *International Journal of Accounting Information Systems* 9(3): 175-200.
- Burns, T., and G. M. Stalker. 1961. *The management of innovation*. London: Tavistock Publications.
- Carter, N. M., and J. B. Cullen. 1984. "A comparison of centralization/decentralization of decision making concepts and measures." *Journal of Management* 10 (2): 259-268.
- Chang, M., W. Cheung, C. Cheng, and J. H. Y. Yeung. 2008. "Understanding ERP system adoption from the users' perspective." *International Journal of Production Economics* 113: 928-942.
- Chin, W. W. 1998. "Issues and opinion on structural equation modeling." *MIS Quarterly* 22(1).
- Chin, W. W. 2010. "How to write up and report PLS analyses." In *Handbook of partial least squares: Concepts, methods, and applications*, edited by Vinzi, V. E., Chin, W. W., Henseler, J., and Wang, H, 655-690. Hiedelberg: Springer.
- Cooper, R. B. 1999. "FROM EXPERIENCE: The invisible success factors in product innovation." *Journal of Product Innovation Management* 16(2): 115-133.
- Damanpour, F. 1991. "Organizational innovation: A meta-analysis of effects of determinants and moderators." *Academy of Management Journal* 34(3): 555-590.
- DeLone, M. H., and E. R. McLean. 1992. "Information system success: The quest for the dependent variable." *Information Systems Research* 3(1): 60-95.
- Dewar, R. D., D. A. Whetten, and D. Boje. 1980. "An examination of the reliability and validity of the Aiken and Hage scales of centralization, formalization, and task routineness." *Administrative Science Quarterly* 25(1): 120-128.
- Dong, C. 2001. "Modeling top management influence in ES implementation." *Business Process Management Journal* 7(3): 243-250.

- Esteves, J., and V. Bohorquez. 2006. "An updated ERP systems annotated bibliography: 2001-2005." *The Communications of Association for Information Systems* 19(18): 386-445.
- Esteves, J., and J. Pastor. 2001. "Enterprise resource planning systems: An annotated bibliography." *The Communications of Association for Information Systems* 7(8): 1-52.
- Gefen, D., D. W. Straub, and M-C. Boudreau. 2000. "Structural equation modeling and regression: Guidelines for research practice." *Communications of the Association for Information Systems* 4(7): 1-77.
- Gefen, D., E. E. Rigdon, and D. Straub. 2011. "An update and extension to SEM guidelines for administrative and social science research." *MIS Quarterly* 35(2).
- Glisson, C. A., and P. Y. Martin. 1980. "Productivity and efficiency in human service organizations as related to structure, size and age." *Academy of Management Journal* 23(1): 216-37.
- Goetz, O., K. Liehr-Gobbers, and M. Krafft. 2010. "Evaluation of structure equation models using the partial least squares (PLS) approach." In *Handbook of partial least squares: Concepts, methods, and applications*, edited by Vinzi, V. E., Chin, W. W., Henseler, J., and Wang, H, 691-711. Hiedelberg: Springer.
- Gopalakrishnan, S., and P. E. Bierly. 2006. "The impact of firm size and age on knowledge strategies during product development: A study of the drug delivery industry." *IEEE Transactions on Engineering Management* 53(1): 3-16.
- Goodsell, C. T. 1985. *The case for bureaucracy: A public administration polemic*. Chatham: Chatham House.
- Grover, V., and M. D. Goslar. 1993. "The initiation, adoption, and implementation of telecommunication technologies in U.S. organizations." *Journal of Management Information Systems* 10(1): 141-163.
- Hage, J., and M. Aiken. 1967. "Relationship of centralization to other structural properties." *Administrative Science Quarterly* 12(1): 72-92.
- Hage, J., and R. Dewar. 1973. "Elite values versus organization structure in predicting innovation." *Administrative Science Quarterly* 18(3).
- Hair, J. F., G. T. M. Hult, C. Ringle, and M. Sarstedt. 2014. *A primer on partial least squares structural modeling (PLS-SEM)*. Sage.
- Hong, K., and Y. Kim. 2002. "The critical success factors for ERP implementation: An organizational fit perspective." *Information and Management* 40: 25-40.
- Ifinedo, P. 2007. "Interactions between organizational size, culture and structure and some IT factors in the context of ERP success assessment: An exploratory investigation." *Journal of Computer Information Systems* 47(4): 28-44.

- Ifinedo, P., and N. Nahar. 2009. "Interactions between Contingency, Organizational IT factors, and ERP success." *Industrial Management & Data Systems* 109(1): 118-137.
- Jansen, J. J. P., F. A. J. Van Den Bosch, and H. W. Volberda. 2006. "Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators." *Management Science* 52(11): 1661-1674.
- Jaskyte, K. 2011. "Predictors of administrative and technological innovations in nonprofit organizations." *Public Administration Review* 71(1): 77-86.
- John, J., and J. Martin. 1984. "Effects of organization structure of marketing planning on credibility and utilizations of plan output." *Journal of Marketing* 21: 170-183.
- Kanter, R. M. 2004. "The Middle Manager as Innovator." *Harvard Business Review* 82(7/8): 150-161.
- Kepes, B. 2013. "UPDATED: Avon's failed SAP implementation: A perfect example of the enterprise IT revolution." *Forbes*, Dec 17th. <http://www.forbes.com/sites/benkepess/2013/12/17/avon-s-failed-sap-implementation-a-perfect-example-of-enterprise-it-revolution/>.
- Kemp, M. J., and G. C. Low. 2008. "ERP innovation implementation model incorporating change management." *Business Process Management Journal* 14(2): 228-242.
- Klein, K. J., and J. S. Sorra. 1991. "The challenge of innovation implementation." *Academy of Management Review* 21(4): 1055-1080.
- Ko, D., L. J. Kirsch, and W. R. King. 2005. "Antecedents of knowledge transfer from consultants to clients in enterprise system implementations." *MIS Quarterly* 29(1): 59-85.
- Koch, C. 2002. "Supply chain: Hershey's bittersweet lesson." *CIO* Nov 15th. http://www.cio.com/article/31518/Supply_Chain_Hershey_s_Bittersweet_Lesson.
- Krasman, J. 2011. "Taking feedback to the next level: Organizational structure and feedback-seeking behavior." *Journal of Managerial Issues* 23(1): 9-30.
- Kwahk, K. 2006. "ERP acceptance: Organizational change perspective." Paper presented in Hawaii International Conference on System Sciences, Kauai, January 4-7.
- Liang, H., N. Saraf, Q. Hu, and Y. Xue. 2007. "Assimilation of enterprise systems: The effect of institutional pressures and mediating role of top management." *MIS Quarterly* 31(1): 59-87.
- Malhotra, A., S. Gosain, and O. A. E. Sawy. 2005. "Absorptive capacity configurations in supply chain: Gearing for partner-enabled market knowledge creation." *MIS Quarterly* 29(1): 145-187.
- McNulty, T., and E. Ferlie. 2004. "Process Transformation: Limitations to Radical Organisational Change within Public Service Organisations." *Organisation Studies* 25(8): 1389-1412.

- Moch, I. K. 1976. "Structure and organizational resource allocation." *Administrative Science Quarterly* 21: 661-674.
- Nah, F. F., J. L. Lau, J. Kuang. 2001. "Critical factors for successful implementation of enterprise systems." *Business Process Management Journal* 7(3): 285-296.
- Ouchi, W.G. 1980. "Markets, bureaucracies and clans." *Administrative Science Quarterly* 25(1): 129-141.
- Nandhakumar, J., M. Rossi, and J. Talvinen. 2005. "The dynamics of contextual forces of ERP implementation." *Journal of Strategic Information Systems* 14: 221-242.
- Pierce, J. L., and A. L. Delbecq. 1977. "Organization structure, individual attitudes and innovation." *Academy of Management Review* 2: 27-37.
- Pugh, D. S. 1968. "Dimensions of organization structure." *Administrative Science Quarterly* 13(1): 65-105.
- Ram, J. and D. Corkindale. 2014. "How 'critical' are the critical success factors (CSFs)? Examining the role of CSFs for ERP." *Business Process Management Journal* 20(1): 151-174.
- Ringle, C. M., M. Sarstedt, and D. W. Straub. 2012. "A critical look at the use of PLS-SEM in MIS Quarterly." *MIS Quarterly* 36(1): iii-xiv.
- Ringle, C. M., Wende, S., and Will, A. (2005). SmartPLS (Version 2.0) [Software]. Available from <http://www.smartpls.de/>
- Rogers, E. 1983. *Diffusion of innovation*. New York: Free Press.
- Rothwell, R. 1994. "Towards the fifth-generation innovation process." *International Marketing Review* 11(1): 7-31.
- Sedera, D., and G. G. Gable. 2010. "Knowledge management competence for enterprise system success." *Journal of Strategic Information Systems* 19: 296-306.
- Shaul, L., and D. Tauber. 2013. "Critical success factors in enterprise resource planning systems: Review of the last decade." *Journal of ACM Computing Surveys* 45(4).
- Slappendel, C. 1996. "Perspectives on innovation in organizations." *Organization Studies* 17(1): 107-129.
- Smith, K.G., C.J. Collins, and K.D. Clark. 2005. "Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms." *Academy of Management Journal* 48(2): 346-357.
- Somers, T.M., and K. Nelson. 2001. "The impact of critical success factors across the stages of enterprise resource planning implementations." Paper presented at Hawaii International Conference on System Sciences, 34th International Conference, Maui, January 3-6.

- Subramanian, A., and S. Nilakanta, 1996. "Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance." *Omega* 24(6): 631-647.
- Tanriverdi, H. 2005. "Information technology relatedness, knowledge management capability, and performance of multi-business firms." *MIS Quarterly* 29(2): 311-34.
- Taylor, Frederick W. 1911. *The principles of scientific management*. New York: Harper and Bros.
- Zaltman, C., R. Duncan, and J. Holbek. 1973. *Innovations and organizations*. New York: Wiley.
- Tenenhaus, M., V. E. Vinzi, Y. Chatelin, and C. Lauro. 2005. "PLS path modeling." *Computational Statistics & Data Analysis* 48(1): 159-205.
- Thompson, V. A. 1965. "Bureaucracy and Innovation." *Administrative Science Quarterly* 10(1): 1-20.
- Urbach, N., and F. Ahlemann. 2010. "Structural equation modeling in information systems research using partial least square." *Journal of Information Technology and Application* 11(2): 5-40.
- Wang, E. T. G., C. C. Lin, J. J. Jiang, and G. Klein. 2007. "Improving enterprise resource planning fit to organizational process through knowledge transfer." *International Journal of Information Management* 27: 200-212.
- West, M. 2000. Creativity and Innovation at Work. In *Innovative theories, tools and practices in work and organisational psychology*, edited M. Vartiainen, F. Avallone, and N. Anderson, 1-14. Canada: Hogrefe and Huber.
- Wilson, I. Q. 1966. "Innovation in organizations: Notes toward a theory." In *Approaches to organizational design* edited by J. D. Thompson, 193-218. Pittsburgh: University of Pittsburgh.
- Worthen, B. 2002. "Nestlé's enterprise resource planning (ERP) odyssey." *CIO*, May 15. <http://www.cio.com/article/2440821/enterprise-resource-planning/nestl--s-enterprise-resource-planning--erp--odyssey.html>.
- Zhang, Z., M. K. O. Lee, P. Huang, and X. Huang. 2005. "A framework of ERP systems implementation success in China: An empirical study." *International Journal of Production Economics* 98: 56-80.
- Zmud, R. W. 1982. "Diffusion of modern software practices: Influence of centralization and formalization." *Management Science* 28(12): 1421-1431.

Appendix A:

Table A1: Questionnaire items (the original document had all tables and figures at end. This document have them in their respective places.)

Policy Related Centralization (PRC)
How frequently do you usually, participate in the formulation of rules and procedures related to your department?
How frequently do you usually, participate in the decisions on activities related to your department?
How strong is the practice of consulting an employee, in the matters related to promotion of his/her sub-ordinates?
Work Related Centralization (WRC)
There can be little action taken here, in our organization, until a senior manager approves a decision.
In general, employees in our organization need to consult their seniors often, while performing their job responsibilities.
Organizational Size (SIZE)
Number of employees in our organization at the time of implementation of ERP systems
User Acceptance (ACP)
Overall, the decisional processes among the managers during the implementation did not involve major conflict of interests
The employees were resistant while implementing the ERP system.
Use of ERP System (USE)
Overall, the employees in our organization use all the features that were incorporated in the ERP system.
As a safety measure to avoid discrepancies due to lack of users' acquaintance with the ERP system, our organization maintains a parallel book keeping system (Eg. in paper files, or some other computer applications).
Presently, the ERP system is an integral part of the day-to-day functioning of our organization.