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Impacts of organizational decisions' locus, tasks structure rules, knowledge, and IT function's value on ERP system success

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This research examined the impacts of organizational decisions' locus, tasks structure, rules and procedures, organizational actors' information technology (IT) skills/knowledge, and IT department's or function's value perceptions on enterprise resource planning (ERP) system success. While such antecedent factors matter in the discourse, research on their impacts on ERP success is rare. To increase understanding in the area, we proposed a research model and developed pertinent hypotheses that included the abovementioned factors. Using a cross-sectional field survey, we collected data from 165 firms in three European countries. Data analysis was performed using the partial least squares (PLS) technique. Statistical support was found for eleven (11) out of the seventeen (17) hypotheses formulated. Organizational design constructs, i.e. tasks structure, rules and procedures, in-house IT personnel skills/knowledge have impacts on ERP success, whereas the perceptions of IT function's value and business employees' IT skills/knowledge did not. Contributions and practical implications of the research are discussed.

Keywords: Organizational design, IT department's value, Organizational actors' IT skills, Enterprise resource planning (ERP), IS success evaluation, Field study

1. Introduction

Enterprise resource planning (ERP) systems are software packages that can integrate organization's processes and functions (Davenport, 1998; Klaus et al., 2000; Wu and Liou, 2011; Olson et al., 2013). Despite the popularity of ERP systems among practitioners worldwide, industry reports and academic researchers have shown that ERP investments have proven to be unsuccessful, in some instances (Zhu et al., 2009; Daneva 2010). As such, empirical studies are necessary to increase comprehension of factors that augment the success of such systems for adopting organizations; this is the driving force of this research.

Previous research has investigated the relationships between antecedents such as top management support and commitment (Liang et al., 2007), firm size (Hunton et al., 2003; Powell et al., 2013), external expertise (Wang and Chen, 2006; Ko et al., 2005) and organizational culture (Jones et al., 2006; Ifinedo, 2007) in relation to ERP success. Few researchers have examined the effects of organizational structure (Morton and Hu, 2008) as well as organizational information technology (IT) skills and/or knowledge (Wu and Wang, 2007) on ERP success; these researchers reported that organizational structure and internal IT expertise or knowledge were significant to the discourse. This current study endeavors to complement such prior insights by accentuating the pertinence of organizational design factors, IT function's or department's value, and internal IT knowledge/skills of organizational actors, i.e. IT personnel and business employees on ERP system success evaluations. Even though past studies (e.g. Willcocks and Sykes, 2000; Somers and Nelson, 2003; Wang et al., 2008) have signified the relevance of IT function's value and internal IT knowledge/skills to ERP success assessment, no previous research has combined all the foregoing factors in one study.

Quite certainly, organizational design factors capable of impacting ERP system success are extensive and varied (Fry, 1982; Daft, 1998; Donaldson, 2001); however, for illustration purposes, importance will be placed on organizational decisions' locus, organizational tasks structure, and organizational rules and procedures. Given the espoused perceptions of IT function's value to ERP success (Willcocks and Sykes, 2000), this particular factor was selected to enhance insight. Related to IT function's value, we considered internal computer or IT knowledge/skills of both business employees and in-house IT personnel, which previous studies (Amoako-Gyampah, 2007; Wu and Wang, 2007; Wang et al., 2008) noted as being critical for the long-term success of ERP packages for adopting organizations.

The exact question to be answered by this study is: what are the impacts of the foregoing contingency factors or antecedents on ERP system success? It is hoped that academicians and practitioners will gain a higher level of awareness and understanding from this study's findings and conclusions. In that regard, our results increased the depth of knowledge in the literature as we empirically showed that ERP system success is impacted by organizational tasks structure, organizational rules, and internal IT personnel knowledge. Additionally, our study contributed to IT success evaluation framework.

2. Theoretical foundation and variables

2.1 *Theoretical background*

We used the contingency theory (CT) (Lawrence and Lorsch, 1967) to provide a theoretical foundation for our research. CT posits that organizational effectiveness (such as ERP success in this instance) can be achieved by matching contingency factors to relevant antecedents (Donaldson, 2001). Generally, in the context of ERP success assessment, favorable levels of the preferred contingency factors are expected to generate desired outcomes.

2.2 *Research variables*

The concepts of organizational decisions' locus, organizational tasks structure, and organizational rules and procedures are embedded in the organizational structure literature (Daft, 1998). Organizational decisions' locus refers to where decision-making processes are situated in the organization. When decisions are made exclusively by those at the top, an organization is said to be centralized and when decision-making processes are dispersed or distributed to the units and functions, the organization is decentralized (Daft, 1998).Current research suggests that ERP systems support a command and control structure, which tends to favor those at the top of organizational hierarchy (Davenport, 1998; Abdinnour-Helm et al., 2003).

Organizational tasks structure describes how organization's subdivided various tasks into separate jobs (Daft, 1998; CliffsNotes.com, 2013); organizational rules and procedures refer to the extent to which rules are clearly documented and known to all employees (Cohen and Bacdayan, 1994; Daft, 1998). It is customary for ERP packages to demand disciplined task behavior from workers (Strong et al., 2001); clarity of procedures and rules bodes well for the success of such applications (Davenport, 1998).

IT function's value refers to the importance placed on IT department in the organization. Past ERP research has implied that where the perceptions of IT value are relatively high, the success of such systems also tends to be high (Somers and Nelson, 2003; Willcocks and Sykes, 2000). Business employees' computer/ IT skills and in-house IT personnel knowledge generally refer to basic technological know how of such organizational actors.

ERP success refers to the employment of such systems to realize organizational goals (Ifinedo, 2007; Gable et al., 2008); it does not comprise the technical installations' success (i.e. ERP implementation success) (Abdinnour-Helm et al., 2003; Somers and Nelson, 2003; Amoako-Gyampah, 2007) that covers such indicators as project management metrics, time estimate, and so forth. It is worth pointing out that our approach to ERP success evaluation differs from methods including fuzzy analytic network processes (Moalagh and Ravasan, 2013). To that end, our concept of ERP success largely borrows from the conceptualization proposed by Gable et al. (2008), which in turn drew from DeLone and McLean's (D&M) IS success evaluation model (DeLone and McLean, 1992).

Using multi-stage data collection and statistical analysis, Gable et al. (2008) eliminated dimensions such as "user satisfaction" in the original D&M success model. ERP researchers have since added other relevant dimension i.e. workgroup impact (Ifinedo et al., 2010) to Gable et al.'s framework. That said, this study used the following ERP success constructs or dimensions: system quality (ERSQ), information quality (ERIQ), individual impact (EINI), workgroup impact (WKGI), and organizational impact (EORI). Others have taken a comparable approach in similar studies (e.g. Bavarsad et al., 2013).

3. The research model and hypotheses

Figure 1 illustrates the research model. The paths signify the formulated hypotheses. The research model suggests that contingency factors of organizational decisions' locus (ODEC), organizational tasks structure (OTAS), organizational rules and procedures (ORUL), organizational IT department's value (OITV), employees' IT knowledge (OESK) and in-house IT personnel skills/knowledge (OISK) have a profound effect on ERP success. The hypotheses statements are presented below.

Figure 1. The research model

The architectural features of ERP provide a strong foundation for both the technical (system) and semantic (information) qualities of the system (Davenport, 1998; Klaus et al., 2000). In general, such characteristics are able to cope with organizational contingent imperatives including decision-making processes and associated activities. Given that ERP packages are viewed as more advantageous for organizations with command and control structure (Davenport, 1998; Abdinnour-Helm et al., 2003; Amoako-Gyampah, 2007), it is likely that a positive association will exist between the evaluations of ERP system qualities and organizational decisions' locus in which decision-making is centralized. Therefore, H1A: Organizational decisions' locus will be positively related to the evaluations ERP system quality

H1B: Organizational decisions' locus will be positively related to the evaluations ERP information quality

According to Daft (1998), specialization is the degree to which tasks can be subdivided into separate jobs in an organization. If specialization is wide-ranging, it is likely that each worker performs a narrow range of work; conversely, less specialization would mean that each worker is responsible for a variety of jobs (often in the domain) (Shepard, 1969). According to some critics, "Despite the apparent advantages of specialization, many organizations are moving away from this principle. With too much specialization, employees are isolated and perform only small, narrow, boring tasks" (CliffsNotes.com, 2013). It can therefore be disputed that with such changes to how job functions are organized, individual workers are better situated to realize the diverse potentials of ERP's capabilities as they 'job change' in their organizations (Daft, 1998; CliffsNotes.com, 2013). To that end, a negative relationship between organizational tasks structure and the assessment of ERP qualities is probable. Hence,

H2A: Organizational tasks structure will be negatively related to the evaluations ERP system quality

H2B: Organizational tasks structure will be negatively related to the evaluations of ERP information quality

Organizational rules and procedures can also be examined from the perspective of formalization, which underlines the extent to which rules and procedures are clearly documented and known to all employees. In discussing the link between formalization in IS development and IS success, Lee and Kim (1992) reported a positive association between the two variables. It is noteworthy that ERP systems are less relevant in organizations where procedures and rules are not properly identified (Strong et al., 2001; Ifinedo, 2007). This is because ERP imposes a regimented work behavior for adopting organizations in such a way that procedures need to be explicit (Klaus et al., 2000; Strong et al., 2001). It is worth stating that both the system and informational attributes of ERP are ideally appropriate for operations where procedures are unmistakably defined (Klaus et al., 2000). Therefore,

H3A: Organizational rules and procedures will be positively related to the evaluations of ERP system quality

H3B: Organizational rules and procedures will be positively related to the evaluations of ERP information quality

In general, IT applications and other technological products maintain a stance of positively transforming the business environment (Davenport, 1998; Klaus et al., 2000; Hunton et al., 2003). Such positive transformations are quite distinct where an organization's internal IT staff is knowledgeable of IT capabilities vis-à-vis organizational objectives (Davenport, 1998; Ko et al., 2005). Studies found that where the IT function or department is valued, operational success resulting from IT use tends to be high (Lee and Kim, 1992; Willcocks and Sykes; Wang and Chen, 2006). In fact, Willcocks and Sykes (2000) suggested that ERP acquisitions tend to be more successful where IT departments are rated highly and valued. This is because internal IT staff may be able to offer assistance to end users by helping them grasp the semantic and technical qualities of acquired systems (Ko et al., 2005; Wang and Chen, 2006; Wu and Wang, 2007). Hence,

H4A: Organizational IT department's value will be positively related to the evaluations of ERP system quality

H4B: Organizational IT department's value will be positively related to the evaluations of ERP information quality

Previous researchers (e.g. Lazar et al., 2006) found that lack of computer knowledge can lead to frustrations with regard to the utilization of IT. Accordingly, business employees with a good knowledge of basic computers or IT skills/knowledge would be useful in ensuring the success of IT in their organizations (Torkzadeh and Lee, 2003; Lazar et al., 2006; Amoako-Gyampah, 2007). Such basic knowledge might enable them to comprehend the technical and semantic qualities of IT packages. Similarly, an organization that has knowledgeable internal IT staff is favored to succeed with its IT investments. Such personnel are critically important to adopting organizations as complex IT such as ERP are procured from vendors (Ko et al., 2005; Wang and Chen, 2006). They can help train end users i.e. business employees and assist them to realize greater benefits from acquired systems. Therefore,

H5A: Employees' IT knowledge will be positively related to the evaluations of ERP system quality

H5B: Employees' IT knowledge will be positively related to the evaluations of ERP information quality

H6A: In-house IT personnel skills/knowledge will be positively related to the evaluations of ERP system quality

H6B: In-house IT personnel skills/knowledge will be positively related to the evaluations of ERP information quality

In accordance with the nomological, casual conceptualization of IS success measurement in the DeLone and McLean (1992) model, increases in system quality often lead to growth in individual impact, which in turn has positive impact on enterprise or organizational impact. Previous IT studies have confirmed such positive relationships (Wixom and Watson, 2001; Hwang and Xu, 2008). With respect to ERP systems, studies by Gable et al. (2008) and Ifinedo et al. (2010) have also confirmed these relationships as well; the latter found that ERP individual impact was positively linked to ERP workgroup impact. Hence,

H7A: ERP system quality will be positively associated with ERP individual impact

H7B: ERP information quality will be positively associated with ERP individual impact

H7C: ERP individual impact will be positively associated with ERP workgroup impact

H7D: ERP individual impact will be positively associated with ERP organizational impact

H7E: ERP workgroup impact will be positively associated with ERP organizational impact

4. The Research Methodology

4.1 *Data collection*

We collected data for this study in three comparable European countries, i.e. Norway, Sweden, and Finland. A field survey was used to gather data from organizations in the countries. 500 companies from each country were selected from applicable business lists and directories. The developed questionnaire, which included validated items from the literature, was pre-tested by knowledgeable individuals, i.e. working professionals and university professors.

Those who participated in the main survey were asked to indicate an appropriate choice on selected statements. The unit of analysis of this study was at the organization level; hence, key organizational informants including chief information officers (CIO), chief financial officers (CFO) and other top business executives were contacted. Packets received by each participant consisted of a cover letter, questionnaire, and a self addressed, stamped envelope. Respondents were asked not to present their own personal views but that which represented their organizations.

After sending out two postal reminders, 182 questionnaires were returned. Excluding the undelivered questionnaires, the study's effective response rate is 26%, which is adequate. 165 were deemed usable, (56, 57 and 52 firms from Norway, Sweden and Finland, respectively). 17 of the returned responses were not included due to incomplete questionnaires, too much missing data, and ERP system(s) have been just been implemented in the organization. The study's sample size is sufficient for this study and compares with those obtained for similar studies in the region (e.g. van Everdingen et al., 2000).

Our sampled firms' annual revenues ranged from €12 billion to a little over €1 million, with €150 million as the median. A broad assortment of industries was included with major ERP packages such as SAP, MS Dynamics (NAV), and so forth are in use. More than 76% of the respondents have university degrees. The respondents have an average of 9.7 years work experience (S.D = 7.8) in their organizations. Tables 1 and 2 illustrate the demographic profiles of other participants and their firms.

We conducted a test for non-response bias by assessing whether non-response bias was a problem for the data. Namely, the data was divided into two parts, i.e. early and late respondents and a comparison made (Armstrong and Overton, 1977). Using the Chi-square ($\chi 2$) test, we compared the sampled firms' size, country, annual revenue, industry type, and year that ERP implementation. The results of the tests (significant at $p < 0.05$) did not reveal any statistical differences between the survey's non-participants (late respondents) and participants (early respondents) on the measures used.

Given that one individual presented views for their organization, common method bias (CMB) cannot be ruled out. CMB refers to a bias in the dataset due to something external to the measures used in the study. Such biases were contained by including views from across from differing job hierarchies and occupations. With such heterogeneity in the data sample, the potential of biases arising from CMB concerns diminishes. Regardless, procedural remedies for controlling CMB as recommended by Podsakoff et al. (2003) were followed. Namely, clear and concise questions were used in the questionnaire to reduce participant's apprehension. Additionally, a statistical procedure i.e. the Harmon one-factor test was used to assess if CMB was indeed problematic to the data sample. The test result (i.e. factor loadings) for constructs with more than one measuring item revealed several factors with eigenvalues greater than one to indicate a lack of evidence of a substantial CMB in the study's data.

4.2 *Operationalization of the constructs*

The unitary scales used to operationalize organizational decisions' locus (ODEC), organizational tasks structures (OTAS), organizational rules and procedures (ORUL) drew on insights from Daft's discussions (1998). A 7-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7) was used to gauge participants' perceptions. The following highlights the descriptive statistics of the measures: ODEC was operationalized by "In our organization, decision making is kept only at the top (Mean = 3.22, S.D. = 1.68); OTAS was represented by "In our organization, organizational tasks are divided into separate jobs" (Mean = 4.08, S.D. = 1.38) and ORUL was operationalized by "In our organization, rules and procedure are clearly documented and are known to all employees" (Mean = 4.35, S.D. = 1.47).

A 4-point Likert ranging from "not valued at all" (1) to "highly valued" (4) was self-developed to reflect organizational IT function's value. Respondents provided views to the following question: "How valuable is the information technology (IT) department in your organization?" (Mean = 3.03, SD = 0.81). For business employees' computer skills/knowledge, a measure relevant to our study was taken from Torkzadeh and Lee (2003); the following question was used to assess it: "How skilled are the employees of your organization with regard to using packaged application software?" (Mean = 4.44, SD = 1.16). We used an item taken from Wu and Wang (2007) to assess IT skills of in-house IT personnel in participating organizations. Respondents provided views to the question: "In general, how skilled or sophisticated are the IT staff/personnel in your firm?" (Mean = 4.60, SD = 1.15). Both constructs for business employees' and in-house IT personnel IT skills knowledge were anchored on a 7-point Likert scale ranging from "not skilled, at all" (1) to "very skilled" (7).

As per the constructs of ERP system success, i.e. ERSQ, ERIQ, EINI, EWGI, and EORI, five measuring items among those that had high item loadings in a study by Ifinedo et al. (2010) were used. We deemed that 5 items for each construct would be sufficient for this study; these items were based on prior studies (DeLone and McLean (1992; Gable et al., 2008). All constructs were anchored on a 7-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (7) in which respondents were asked to make a choice which best reflected their views. The study's measuring items and their descriptive statistics are shown in Table 3.

5. Data analysis

To analyze our data, we used the Partial Least Squares (PLS) technique, which utilizes a principle component-base for estimation (Chin, 1998). Suitable for exploratory models and theory development, PLS places minimal demands on sample size and residual distributions. For this study, SmartPLS 2.0 (M3) beta created by Ringle et al. (2005) was used. The literature of PLS suggests that information on two related measurement models, i.e. the measurement and structural models, be provided.

5.1 *The measurement model*

The following was used to assess the psychometric quality of the research's constructs: internal consistency reliability, convergent, and discriminant validities. Cronbach alpha coefficients and composite reliability measures as provided by SmartPLS 2.0 were used to assess internal consistency reliability. Cronbach alphas' and composite reliability's value of 0.7 are deemed satisfactory (Nunnally, 1978; Fornell and Larcker, 1981). Reasonably high values for relevant in our data (Table 4) indicate that the research's construct reliability is assured.

Convergent validity describes the degree to which a measure correlates with other measures that it is theoretically predicted to correlate with. It is evaluated using two means: a) item loadings greater than 0.7 indicate strong convergent validity results; b) the square root of the average variance extracted (AVE) for a construct is observed to see whether it explains at least half (50%) of the measures' variance. The results in Table 5 show that the item loadings are within acceptable thresholds. The AVEs for the multi-scaled constructs are above 0.50 (Table 4).

Discriminant validity calculates the degree to which constructs are distinct or diverge from one another; it can be measured in three ways. First, Fornell and Larcker (1981) suggest a minimum value of 0.5 for a construct's AVE. As indicated, Table 4 shows that all AVE values were above 0.50 which indicates that that principal constructs capture a much higher construct related variance than error variance. Second, the square root of AVE of the multi-item reflective constructs should also be greater than the absolute value of the inter-construct correlations in the model. The square roots of the AVEs (in the diagonal element) highlighted in Table 4 were larger than all other cross-correlations. Third, constructs' cross-loadings should be observed to assess whether measuring items demonstrated high loadings on their own particular constructs and no indicators loaded higher on other constructs that were not theoretically designed to represent them (Table 5). The study's measures were psychometrically adequate as indicated by the foregoing results.

5.2 *The structural model*

Information about the path significance of hypothesized relationships using the path coefficients i.e. beta (β) and the R squared (R^2) is presented in the structural model. Figure 2 highlights the SmartPLS 2.0 results for the βs and the R^2. Path significance levels (t-values) were determined using a bootstrapping procedure with 1000 samples. Chin (1998) indicated that R^2 values of 0.67, 0.33, and 0.19 for the percentage of variance in a model are substantial, moderate and weak, respectively.

The summary of the study's results are shown in Table 6. Of the seventeen (17) hypotheses, eleven (11) were confirmed; six (6) were unsupported by the data. H1A and H1B were rejected as Organizational decisions' locus was not found to be positively related to ERP system quality (β = 0.04) and ERP information quality (β = 0.10). H2B and H2B were confirmed as Organizational tasks structure was found to be negatively related to both ERP information quality (β = -0.30) and ERP information quality (β = -0.19).

H3A and H3B were confirmed to indicate that Organizational rules and procedures are positively related to both ERP system quality (β = 0.28) and ERP information quality (β = 0.22). H4A and H4B that suggested that Organizational IT function's value would be positively linked with ERP system quality (β = 0.01) and ERP information quality (β = -0.04) were unsupported by the data. The data did not support H5A and H5B, i.e. the relationships between Business employees' IT knowledge/skills and ERP system quality (β = 0.11) and ERP information quality (β = 0.16). As expected, the data confirmed H6A and H6B, i.e. the positive relationships between Internal IT personnel's knowledge/skills and ERP system quality (β = 0.25) and ERP information quality (β = 0.20).

A positive relationship between ERP system quality and ERP individual impact (β = 0.56) supported H7A. The data validated H7B to indicate that ERP information quality is positively related to ERP individual impact (β = 0.24). The result establishes substantial, statistical support for H7C, which predicted that individual impact would be positively related to ERP workgroup impact (β = 0.64). Support was found for H7D, which hypothesized that ERP individual impact would be positively related to ERP organizational impact (β = 0.55). Lastly, the data confirmed H7E to support the view indicating that that ERP workgroup impact is positively related to ERP organizational impact (β = 0.31).

An amalgamation of all aforementioned contingent factors explained 18% of the variance in the ERP system quality; equally, the contingent factors explained 12% of the variance in the ERP information quality. The ERP system quality and information quality constructs explained 54% of the variance in ERP individual impact, which in turn accounted for 41% of the variation in ERP workgroup impact. 62% variance in ERP organizational impact is explained by all preceding constructs to suggest that the research model has substantial relevance (Chin, 1998).

6. Discussions and conclusion

An empirical examination of the impacts of selected contingency factors or antecedents, i.e. organizational decisions' locus, tasks structure, rules, IT function's value, and organizational actors' IT skills/knowledge on ERP success, was the focus of this study. The CT and IS success evaluation frameworks provided a theoretical base for the research.

6.1 *Theoretical contributions*

Empirical examinations of the impacts of the selected contingent antecedents on ERP success in adopting organizations are not widespread; hence, this study is among the first of its kind to enhance insight in the area. This research offers promising information regarding the significance of organizational design factors such as organizational decisions' locus, tasks structure, rules and other applicable antecedents, i.e. IT department's value and organizational actor's IT knowledge to ERP success. The critical importance of such factors in the ERP success discourse is presented herein. Such insights bolster the growing body of research and knowledge in the area.

Indirectly, this research adds credence to CT and IS success framework in that selected contingent antecedents examined in this study were found to impact on ERP system success or effectiveness. Other researchers may be enticed to explore the effects of other relevant organizational factors on ERP success to expand our focus.

Specifically, this study revealed that organizational decisions' locus - from the point of view of centralization - did not impact the semantic and technical qualities of ERP systems for adopting organizations. Thus, the idea that ERP systems are a better fit for organizations with command and control structures (Davenport, 1998) may need to be revisited. Increased research is needed to deepen the breadth of scholarship in this area. It is possible that the lack of support for HA and H1B may be due to contextual influences; we did not control for organizational types, i.e. decentralized or centralized ones.

Conclusions related to the connection between organizational tasks structure and ERP information and system qualities, to some extent, support the perspective signifying that ERP attributes are constructively evaluated in organizations with less job specialization. As per the extent to which organizational rules and procedures are clearly documented and known to all employees, the results of this study supported the widespread belief that ERP systems tend to enforce closely controlled behaviors among its users (Davenport, 1998; Strong et al., 200; Ifinedo, 2007). This information complement prior knowledge in the area.

Our research provided further proof that where the IT function is valued, the benefits of complex IT packages such as ERP are better grasped by users. The lack of support for H5A and H5B is not inconsistent with information indicating that business employees' basic IT knowledge may be inadequate in the context of complex IT packages such as ERP systems (Ko et al., 2005). On the other hand, the support for H6A and H6B affirms that internal IT personnel's know-how might be more rewarding for ERP adopting organizations.

This current study further adds to the literature by strongly supporting the relationships between the "quality", e.g. ERP system quality and "impact", e.g. ERP individual impact constructs in the evaluations of IT packages. A shortage of empirical studies exploring the D&M conceptualization has been documented in the literature (Gable et al., 2008). The results of the study, to a certain degree, offer increased validation of the direction of flow in D&M's conceptualization.

6.2 *Practical implications*

This study's findings also have strong implications for practitioners. Broadly, administrative personnel need to be conscious of the idea that certain facets of organizational design may impact the success of acquired complex IT systems. While locus of organizational decision-making processes was not found to strongly influence ERP success evaluations, organizational tasks structure, i.e. work specialization and organizational rules and procedures did. Before implementing or acquiring such systems, efforts must be made to guarantee that the right mix of macro-level contingent factors are instituted. It is noted that consideration of the underlying organizational design of the adopting organization may help to ensure favorable outcomes with acquired complex IT such as ERP systems.

Accordingly, management should not devalue such issues when deliberating on acquiring complex IT systems for their organizations. Some researchers have backed the applicability of effective change management and business process reengineering as vital factors for ERP initiatives (Somers and Nelson, 2003; Law and Ngai, 2007); our findings appear to add credibility to such perspectives. Corporate manager's attention is therefore alerted to the magnitude of such issues for ensuring ERP success in the long term.

Where the value of the IT function is appreciated, success with ERP applications will be high; however, the lack of support for prediction might be related to research design, extraneous factors, and perhaps a reflection of reality in the area. Even so, it is up to management to advance the positive activities of the IT department's personnel in relation to ERP initiatives. Regarding, the importance of organizational actors' IT skills/knowledge to ERP success, we suggest that organization-wide ERP project team composition (Somers and Nelson, 2003) that includes both IT staff and business employees be considered for ERP initiatives. Such an arrangement would enable those lacking in technological know-how to benefit from counterparts possessing such.

The study offers practical tips that can steer future success assessment of such applications. For example, management can draw on information about how workers evaluate the "quality" attributes of ERP systems to determine the future "impact" of such systems on individual workers, workgroups or sub-units, and the entire organization.

6.3 *Limitations and future research opportunities*

Our study participants may experience a halo effect, meaning that those with favorable impressions of their ERP applications will offer positive responses. What is more, those with negative perceptions will present adverse views. Our study used subjective and perceptual measures; it is likely that an objective measure of ERP success (i.e., profit and productivity indicators) might generate a dissimilar result from one presented here. Our study's findings may not be applicable in a global sense as the data was gathered from only one technologically advanced region of the world. Data from organizations located in other regions may differ from what was reported and discussed in this study. A cross-sectional field survey generated the study's data; more insight may be facilitated with longitudinal data. Deeper insight could have been achieved if multiple-item scales had been used for all constructs.

Future research should aspire to tackle our highlighted study's limitations. For example, differing regions of the world and public-sector organizations' views should be included to produce a broader spectrum of data. Multiple-item scales should be used for all constructs. Other theoretical frameworks such as organizational citizen behavior and resource-based view could be integrated into our research model to further augment insight. Future studies could also endeavor to discover the relative magnitude of each of the selected contingent factors or antecedents on ERP success. The impacts of the selected antecedents for this study and others could be investigated in terms of similar enterprise systems such as customer relationship management (CRM) and supply chain management (SCM).

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Table 1. Firm demographics (number of organizations = 165)

Measure	Frequency	Percent (%)
Industry type	4	2.42
Automobile Dealership		
Bank, Insurance, Finance	5	3.03
Oil and Gas	4	2.42
Chemical & Pharmaceuticals	9	5.45
Dairy, Food & Meat Products	12	7.27
Electrical & Electronics	7	4.24
Information Technology (IT)	5	3.03
Manufacturing	33	20.00
Material Handling & Metal	5	3.03
Retail/Wholesale/Distribution	21	12.73
Telecommunications	3	1.82
Transportation, Maritime, Logistics & Courier	19	11.52
Construction	4	2.42
Other (e.g. Engineering, Energy, Facility Management, Defense, Industrial Tools, Utility, Forestry, Legal, Travel, Shipbuilding, Media, Medical & Healthcare)	34	20.61
Revenue (€ Euro Million)		
Over 1,000	27	16.36
501 to 1,000	10	6.06
251 to 500	21	12.73
101 to 250	28	16.97
Less than 100	71	43.03
Missing data	8	4.85
Number of Employee		
Less than 50 employees	35	21.21
51 – 100 employees	20	12.12
101 – 500 employees	46	27.88
501- 1,000 employees	19	11.52
1,001 to 10,000 employees	33	20.00
10, 001 employees and above	10	6.06
Missing data	2	1.21
Organization's ERP Software		
IBS (ASW, Enterprise)	8	4.85
Basware	6	3.64
IFS	18	10.91
IFS, Basware, SAP	2	1.21
Lawson Movex/M3	19	11.52
Oracle (ERP Applications)	11	6.67
Microsoft Dynamics (NAV)	11	6.67
Microsoft Dynamics (AX)	6	3.64
Visma	7	4.24
Agresso	4	2.42
Visma / MS Dynamics (NAV)	1	0.61
SAP	25	15.15
SAP, Lawson Movex/M3, Oracle (ERP Applications)	3	1.82
Infor ERP (PRISM, System 21, BPCS)	2	1.21
IFS, Jeeves, Micosoft Dynamics (NAV)	1	0.61
SAP, Oracle (ERP Applications)	1	0.61
Oracle (ERP Applications), Infor ERP (PRISM)	2	1.21

Scala, BPCS & SAP, Oracle (ERP Applications)	2	1.21
Visma, IFS, Microsoft Dynamics (NAV)	1	0.61
Microsoft Dynamics AX, Movex, Visma	1	0.61
Lawson Movex/M3, In house ERP system	1	1.21
In house ERP	7	4.24
Other (Nova, Aurora, Baan, Hansa, Liinos, Scala, Exact, Speckra, Xledger)	23	15.15

Note: Oracle (ERP Applications) includes erstwhile Oracle E-Business Suite, JD Edwards, PeopleSoft and Siebel software.

Table 2. Profile of respondents (number =165)

Measure	Frequency	Percent (%)
Job title		
Accountants	5	3.03
CEO	7	4.24
CFO	15	9.09
CIO	21	12.73
Controller	7	4.24
Director (SCM, Operations, Admin, Sales)	21	12.73
IT Manager	30	18.18
Manager (Area, Export, Quality, Marketing, Sales, Segment, Procurement)	42	25.45
VP Finance	6	3.64
VP IT	4	2.42
Other (Production planner, Plant manager, Design engineer)	7	4.24
Position in organization's hierarchy		
Top management position	49	29.70
Mid-level personnel	78	47.27
Staff	33	20.00
Missing data (Unknown)	5	3.03
Gender		
Male	120	72.7
Female	37	22.4
Missing data	8	4.8
Age (years)		
Less 20	0	0
21 - 30	4	2.4
31 - 40	46	27.9
41 - 50	57	34.5
51 - 60	44	26.7
Over 60	4	2.4
Missing data (Unknown)	10	6.1
Education		
Secondary school	6	3.6
Vocational/Technical/Other	31	18.8
University	126	76.4
Missing (Unknown)	2	1.2

Table 3: The ERP success dimensions and their measurement items' descriptive statistics

Construct	Measurement item
ERP system quality Mean = 4.72; S.D. = 1.26	Our ERP is flexible
	Our ERP is easy to use
	Our ERP is reliable
	Our ERP allows data integration
	Our ERP is efficient
ERP's information quality Mean = 5.24 S.D. = 1.13	The information on our ERP is understandable
	The information on our ERP is brief/concise
	The information on our ERP is relevant
	The information on our ERP is usable
	The information on our ERP is available
ERP individual impact Mean = 4.61 S.D. = 1.16	Our ERP enhances organizational learning and recall for individual worker
	Our ERP improves individual productivity
	Our ERP is beneficial for individual's tasks
	Our ERP enhances higher-quality of decision making
	Our ERP saves time for individual tasks/duties
ERP workgroup impact Mean = 4.49 S.D. = 1.11	Our ERP improves inter-departmental coordination
	Our ERP create a sense of responsibility
	Our ERP improves the efficiency of sub-units in the organization
	Our ERP improves work-groups productivity
	Our ERP enhances solution effectiveness
ERP organizational impact Mean = 4.54 S.D. = 1.24	Our ERP reduces organizational costs
	Our ERP improves overall productivity
	Our ERP provides us with competitive advantage
	Our ERP increases customer service/satisfaction
	Our ERP allows for better use of organizational data resource

Table 4: Cronbach's alpha, composite reliability, AVE, and inter-construct correlations

	CRA	COM	AVE	EINI	ERIQ	OITV	ODEC	EORI	ORUL	ERSQ	OTAS	EWGI	OESK	OISK
EINI	0.84	0.89	0.62	**0.787**										
ERIQ	0.85	0.89	0.63	0.603	**0.794**									
OITV	NA	NA	NA	0.160	0.075	NA								
ODEC	NA	NA	NA	-0.069	0.073	0.108	NA							
EORI	0.88	0.91	0.67	0.750	0.574	0.122	-0.043	**0.819**						
ORUL	NA	NA	NA	0.274	0.152	0.233	-0.015	0.235	NA					
ERSQ	0.81	0.87	0.57	0.713	0.659	0.127	-0.007	0.664	0.189	**0.755**				
OTAS	NA	NA	NA	-0.028	-0.046	0.114	0.223	-0.037	0.415	-0.128	NA			
EWGI	0.84	0.88	0.60	0.641	0.521	0.069	-0.022	0.664	0.330	0.454	0.169	**0.775**		
OESK	NA	NA	NA	0.210	0.200	0.116	0.007	0.199	-0.029	0.173	-0.067	0.126	NA	
OISK	NA	NA	NA	0.204	0.225	0.272	0.099	0.179	0.134	0.261	0.197	0.161	0.201	NA

NA = Not applicable; AVE = Average variance extracted; CRA = Cronbach's alpha; CRO = composite reliability

Table 5: Item loading and cross-loading of measues

	EINI	ERIQ	OITV	ODEC	EORI	ORUL	ERSQ	OTAS	EWGI	OESK	OISK
OESK1	0.210	0.200	0.116	0.007	0.199	-0.029	0.173	-0.067	0.126	**1.000**	0.201
OISK1	0.204	0.225	0.272	0.099	0.179	0.134	0.261	0.197	0.161	0.201	**1.000**
OITV	0.160	0.075	**1.000**	0.108	0.122	0.233	0.127	0.114	0.069	0.116	0.272
EORI1	0.612	0.465	0.048	-0.041	**0.811**	0.164	0.581	-0.097	0.503	0.190	0.135
EORI2	0.699	0.560	0.006	-0.034	**0.850**	0.168	0.542	-0.042	0.606	0.272	0.137
EORI3	0.587	0.389	0.128	-0.071	**0.829**	0.226	0.552	-0.096	0.525	0.157	0.160
EORI4	0.559	0.415	0.113	-0.028	**0.810**	0.205	0.518	0.048	0.553	0.049	0.106
EORI5	0.598	0.502	0.220	0.000	**0.789**	0.205	0.524	0.038	0.520	0.126	0.195
ERIQ1	0.478	**0.803**	-0.029	0.014	0.452	0.077	0.491	0.033	0.460	0.186	0.116
ERIQ2	0.477	**0.762**	0.095	0.126	0.465	0.078	0.513	0.004	0.451	0.175	0.203
ERIQ3	0.393	**0.795**	0.041	0.010	0.359	0.068	0.458	-0.047	0.320	0.108	0.144
ERIQ4	0.564	**0.769**	0.090	0.166	0.543	0.228	0.592	-0.069	0.440	0.171	0.188
ERIQ5	0.420	**0.824**	0.085	-0.082	0.396	0.105	0.512	-0.094	0.359	0.134	0.225
EINI1	**0.787**	0.488	0.093	0.044	0.537	0.178	0.558	-0.019	0.469	0.178	0.060
EINI2	**0.842**	0.368	0.140	-0.052	0.631	0.265	0.498	0.109	0.586	0.138	0.209
EINI3	**0.702**	0.446	0.077	-0.145	0.405	0.163	0.426	-0.076	0.559	0.114	0.152
EINI4	**0.804**	0.511	0.187	-0.086	0.666	0.287	0.632	-0.014	0.485	0.203	0.189
EINI5	**0.783**	0.547	0.118	-0.039	0.668	0.170	0.656	-0.115	0.432	0.182	0.180
ODEC1	-0.069	0.073	0.108	**1.000**	-0.043	-0.015	-0.007	0.223	-0.022	0.007	0.099
ORUL1	0.274	0.152	0.233	-0.015	0.235	**1.000**	0.189	0.415	0.330	-0.029	0.134
OTAS1	-0.028	-0.046	0.114	0.223	-0.037	0.415	-0.128	**1.000**	0.169	-0.067	0.197
ERSQ1	0.559	0.444	0.076	-0.074	0.592	0.093	**0.720**	-0.095	0.413	0.202	0.208
ERSQ2	0.563	0.514	0.098	-0.011	0.481	0.148	**0.757**	-0.182	0.362	0.158	0.144
ERSQ3	0.453	0.480	0.149	0.078	0.369	0.237	**0.693**	0.055	0.214	0.029	0.255
ERSQ4	0.482	0.454	0.068	-0.040	0.461	0.029	**0.752**	-0.256	0.212	0.189	0.082
ERSQ5	0.608	0.583	0.092	0.027	0.574	0.202	**0.837**	-0.003	0.468	0.070	0.289
EWGI1	0.482	0.368	0.019	-0.026	0.446	0.138	0.343	0.077	**0.731**	0.023	0.154
EWGI2	0.491	0.406	0.085	0.014	0.440	0.329	0.352	0.185	**0.780**	0.050	0.130
EWGI3	0.442	0.411	0.031	-0.030	0.476	0.238	0.310	0.170	**0.797**	0.025	0.187
EWGI4	0.450	0.340	-0.055	-0.037	0.531	0.221	0.257	0.154	**0.750**	0.130	0.013
EWGI5	0.597	0.482	0.158	-0.009	0.646	0.335	0.471	0.085	**0.822**	0.217	0.144

Table 6: The summary of the study's results

Hypothesis Number	Relationship	Beta (β)	t-value	Result
H1A	Organizational decisions' locus (ODEC) →ERP system quality (ERSQ)	0.04	0.385	Not supported
H1B	Organizational decisions' locus (ODEC) →ERP information quality (ERIQ)	0.10	0.978	Not supported
H2A	Organizational tasks structure (OTAS) (-)→ERP system quality (ERSQ)	-0.30*	2.965	Supported
H2B	Organizational tasks structure (OTAS) (-)→ERP information quality (ERIQ)	-0.19*	1.992	Supported
H3A	Organizational rules and procedures (ORUL) →ERP system quality (ERSQ)	0.28*	2.606	Supported
H3B	Organizational rules and procedures (ORUL) →ERP information quality (ERIQ)	0.22*	1.999	Supported
H4A	Organizational IT department's value (OITV) →ERP system quality (ERSQ)	0.01	0.101	Not supported
H4B	Organizational IT department's value (OITV) → ERP information quality (ERIQ)	-0.04	0.390	Not supported
H5A	Business employees' IT knowledge/skills (OESK) →ERP system quality (ERSQ)	0.11	0.943	Not supported
H5B	Business employees' IT knowledge/skills (OESK) →ERP information quality (ERIQ)	0.16	1.759	Not supported
H6A	Internal IT personnel's knowledge/skills (OISK) →ERP system quality (ERSQ)	0.25*	2.257	Supported
H6B	Internal IT personnel's knowledge/skills (OISK) →ERP information quality (ERIQ)	0.20*	2.002	Supported
H7A	ERP system quality (ERSQ) →ERP system individual impact (EINI)	0.56**	5.939	Supported
H7B	ERP information quality (ERIQ) →ERP system individual impact (EINI)	0.24*	2.601	Supported
H7C	ERP system individual impact (EINI) →ERP system workgroup impact (EWGI)	0.64**	9.883	Supported
H7D	ERP system individual impact (EINI) →ERP system organizational impact (EORI)	0.55**	5.276	Supported
H7E	ERP system workgroup impact EWGI) →ERP system organizational impact (EORI)	0.31**	2.857	Supported

Note: * significant at $p < 0.05$ level; ** significant at $p < 0.01$ level

Figure 1. The research model

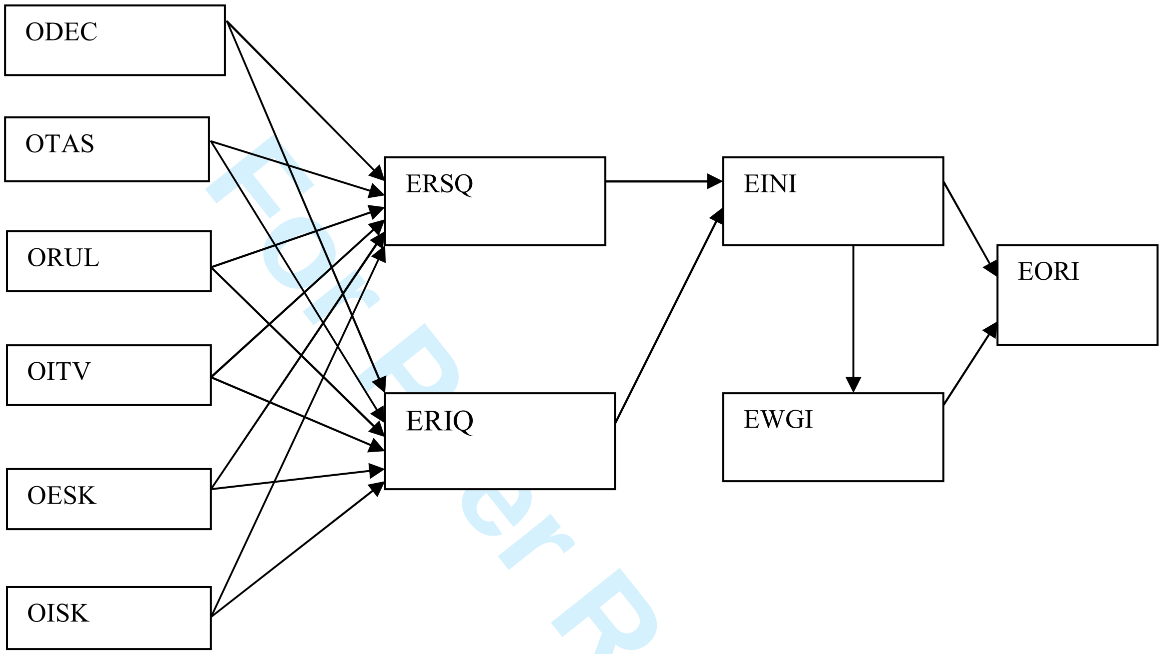

Figure 2: The PLS results