

ERP IMPLEMENTATION SUCCESS WITHIN EXPORT ORIENTED FIRMS

ABSTRACT

Many Enterprise Resource Planning (ERP) projects report an unusually high failure rate. In this paper we investigated in the context of export oriented firms the relationship between consultant quality and ERP implementation success, analysing the moderating role of organizational learning capability. We used the responses of 134 ERP end users of 15 Spanish export oriented firms within the ceramic tiles industry. Results confirm that organizational learning capability moderates the relationship between consultant quality and ERP implementation, as perceived by users. Overall, these findings contribute to a better understanding of how or under which organizational conditions ERPs should be implemented.

Key words:

ERP; Information system; Organizational learning; Export oriented firms

1. INTRODUCTION

Enterprise Resource Planning (ERP) systems are packages designed to integrate a wide range of business functions to provide a holistic view of the firm from single information technology architecture (Klaus, Rosemann and Gable, 2000). ERP systems are based on developing a common IT infrastructure and common business processes that will support integration of the total business activity (Markus, Tanis and Fenema, 2000; Newell, Tansley and Huang, 2004). Implementation of an ERP system is an extensive lengthy and costly process. The integrative nature of ERP systems makes their implementation more complicated than other packages because its implementation must be managed as a program of wide –ranging organizational change initiatives rather than as a software installation effort (Hong and Kim, 2002). If an organization wishes to deploy an ERP system, taking into consideration their scale and complexity, this rarely can be done completely from within. Internal IS personnel is often trapped in daily IS operational problems. ERP systems require multiple kinds of specialised expertise and an internal team will not have such requisite knowledge (Karimi, et al. 2007b). Consulting firms play an essential role in almost all ERP implementations, as they facilitate it through their technical and business-industry expertise.

The importance of external consultants in ERP implementation has been traditionally recognised by literature (Gable, 1991; Thong, 2001; Robey, et al., 2002; Umble et al., 2003; Thong et al., 1996, 2004; Wang and Chen, 2006). However, this direct relationship between external consultants and ERP implementation might be influenced by internal actors, such as users, as they have to understand and learn what is embedded in the system or proposed by the consultants (Wang and Cheng, 2006). In fact, many

ERP related studies have traditionally focused on internal users, by stressing the importance of an organizational culture oriented to change and learning (Nah et al., 2004; Lapointe and Rivard, 2005; Kwahk and Lee, 2008; Ke and Kee Wei, 2008) for ERP implementation. The failure rate of ERP implementations has been estimated as 60-90% (Kwahk and Lee, 2008). ERP systems are often associated with fundamental organizational changes and some studies indicate that a major reason for failure was the resistance of the user to change (Nah, Tan and Teh, 2004; Lapointe and Rivard, 2005). Ke and Kee Wei (2008) affirm that ERP implementation success is positively related with organizational culture along the dimensions of learning and development, participative decision making, support and collaboration, and tolerance for risks and conflicts. Consequently, the concept of organizational learning capability, defined as the organizational and managerial characteristics or factors that facilitate the organizational learning process or allow an organization to learn (Goh and Richards, 1997; Chiva et al. 2007) might be essential for ERP implementation.

Organizational learning capability (OLC) is conceived as a construct with five different dimensions: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making (Chiva et al., 2007). Therefore, OLC might affect the relationship between external consultants and ERP implementation. Our research highlights the contribution of OLC to the process of ERP consultation. To our knowledge, no other empirical research has investigated the role of OLC on the relationship between external consultants and ERP implementation.

The basic proposition underlying this body of work is that a high quality of external consultants leads to effective ERP implementation, as perceived by the users. Building

on this, we further propose that the relationship between external consultant quality and ERP implementation success is contingent upon the level of OLC. Hypotheses will be tested in the Spanish ceramic industry. Results are obtained from questionnaire responses of 134 ERP end users of 15 Spanish ceramic tile companies exporting between 35% and 65% of their production.

This paper is structured as follows: firstly, we review the theoretical context and outline hypothesis; secondly, we describe our research methodology; thirdly, we develop and test a model of the moderating effect of OLC on the consultant quality – ERP success relationship. Finally, we reflect on the implications of our study and conclude with some suggestions for future research.

2. THEORETICAL BACKGROUND AND HYPOTHESIS

2.1. ERP implementation: End-User Computing Satisfaction (EUCS)

Literature reveals that there are many different reasons that could provoke problems with the implementation of ERP systems (Karimi et al., 2007a). ERP systems were designed to solve the problem of fragmentation of information in large organizations by consolidating all business operations into a uniform system environment to improve delivery of critical information to users and improve data consistency. Furthermore, it uses database technology to control and integrate all the information related to a company and involves many employees from different business units, including internal IT specialists, who have to work jointly with external parties like vendors and

consultants (Ke and Wei, 2008). This large scale of integration makes ERP implementation a highly complex and interdependent task (Sharma and Yetton, 2003).

There are many published reports about the high percentage of failure in ERP implementations. However, there are not agreed measures to define ERP systems implementation success. Literature reveals that there are different measures of ERP implementation success: end-user computer satisfaction (Al-Mashari et al. 2003; Ang, Sum and Yeo, 2002; Burns and Turnipseed, 1991; Yusuf, Gunasekaran and Abthorpe, 2004), intended business performance improvements (Al-Mashari et al., 2003; Hong and Kim, 2002; Mandal and Gunasekaran, 2002; Yusuf, Gunasekaran and Abthorpe, 2004), implemented on time (Hong and Kim, 2002; Malbert, Soni and Venkatraman, 2003), implemented within budget (Hong and Kim, 2002; Malbert, Soni and Venkatraman, 2003), system acceptance and use (Ang, Sum and Yeo, 2002; Yusuf, Gunasekaran and Abthorpe, 2004).

In our opinion, system acceptance and use of the system is not an appropriate criteria to measure the success of an ERP implementation because the use of the system is mandatory or required. Whether the quality of the system itself and the information outputs are satisfying or not, and whether the users want to use the system or not, there is not choice for the user, users have to accept and use the system. Regarding the time and cost criteria, we also think they are inappropriate to measure implementation success because even if ERP system implementation exceeds contracted delivery time and budget, firms may still think their ERP implementation is a success. Concerning company performance, this general assessment may be influenced by many other internal and external factors.

EUCS is defined as the extent to which users believe the information system available to them meets their information requirements (Ives, Hamilton and Davis, 1980). Delone and Mclean (1992) identified three reasons to justify the choice of end-user satisfaction as widely used measure of information systems success: high degree of face validity, development of reliable tools for measure, and conceptual weakness and unavailability of other measures. The study of Somers et al. (2003) shows that the EUCS instrument may be used to evaluate ERP systems in organizations. There are an increasing number of researchers that are considering user satisfaction as a valid measure of ERP implementation success (Yusuf, Gunasekaran and Abthorpe, 2004). Based on it, we also consider user satisfaction as the best measure of ERP implementation success. A better understanding of the factors that may influence user satisfaction should be developed in order for ERP systems to be used effectively.

2.2. Consultant quality-ERP implementation

The prominent role played by external consultants has been usually highlighted by the literature (eg. Thong, Yap and Raman, 1994; Thong, 2001). External consultants play a crucial function in the outcome of ERP implementation. Consultant quality is related to the extent of support, help and work that they provide during the ERP implementation process.

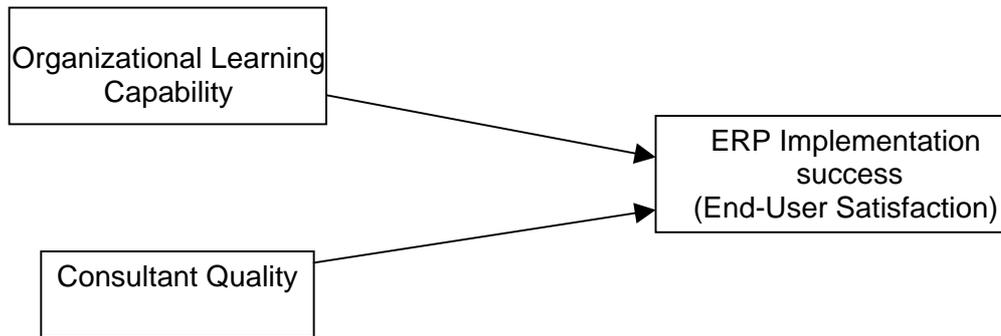
Competent consultants have the knowledge of methodologies and the experience of real system implementations (Al-Mahshari, Al-Mudimimig and Zairi, 2003; Bingi, Sharma and Godla, 1999). According to McGivern (1983) when a company hires the services of an external consultant, the crucial factor for getting the project goals is the quality of the

client-consultant relationship. Wang and Chen (2006) emphasize the importance of effective communication between user and consultant as a key aspect for a productive relationship. Communication effectiveness describes the extent to which consultants and users can understand each other expressions along the consulting process. ERP consultants need to understand the details of existing client business practices (Al-Mashari *et. al*, 2003) and translate the ERP requirements to the organization and process levels (Gulledge, 2006; Rettig, 2007). Therefore, consultants should have good interpersonal skills and be able to work with people as a team. Intensive information and knowledge sharing is a prerequisite for effective implementation. Through more effective communication, the probability of delivering a configuration that fits more closely with client requirements is improved (Wang and Chen, 2006). Clients and consultants may not have similar approaches to face problems and this may bring further conflicts to the relationship. Both parties must learn how to perform in conflict situations and come up with a mutual beneficial solution (Robey et al., 1993). In sum, according to McLahlin (1999) competent consultants must have sufficient technical knowledge, but also good management and communication skills in order to recommend effective solutions.

Consequently, effective consultants are crucial for delivering a high quality ERP system. Given the potential impact that Consultant quality has on successful ERP implementation, the following hypothesis is proposed:

H1. ERP consultant quality will be positively related to successful ERP implementation.

FIGURE 1



2.3. Organizational learning capability (OLC) - ERP implementation

Literature on ERP implementation success has mainly focused on two aspects: external, which is associated with the role of consultants, and internal, which underlines the role of the organizational and cultural context. Appleton (1997) shows that many ERP projects fail to achieve the anticipated benefits because managers underestimate the efforts involved in managing change. According to Somers et al. (2003), only 10% of new information system failures can be attributed to technological problems. Therefore, the human element has become a critical determinant of information system success (Martisons and Chong, 1999). Users play an important role in the ERP implementation success (Mahmood, Burn, Gemoets and Jacquez, 2000). As they have to learn what is proposed by the external consultants, the direct relationship between external consultants and ERP implementation might be influenced by how they are or how they do their work (Wang and Cheng, 2006).

Some literature on ERP implementation has stressed the importance of an organizational culture oriented to change and learning (Kwahk and Lee, 2008; Ke and Kee Wei, 2008; Lapointe and Rivard, 2005; Nah et al., 2004). Some studies indicate that a major reason for failure was the resistance of the user to change (Nah, et al., 2004; Lapointe and Rivard, 2005). Ke and Kee Wei (2008) affirm that ERP implementation success is positively related with organizational culture along the dimensions of learning and development, participative decision making, support and collaboration, and tolerance for risks and conflicts. Subsequently, the concept of organizational learning capability (OLC), defined as the organizational and managerial characteristics or factors that facilitate the organizational learning process or allow an organization to learn (Goh and Richards, 1997; Chiva et al. 2007) might be essential for ERP implementation. The OLC factors are: experimentation, risk taking, interaction with the external environment, dialogue and participative decision making (Chiva et al., 2007).

Experimentation can be defined as the degree to which new ideas and suggestions are attended to and dealt with sympathetically. Nevis et al. (1995) consider that experimentation involves trying out new ideas, being curious about how things work, or carrying out changes in work processes. Risk taking can be understood as the tolerance of ambiguity, uncertainty, and errors. Sitkin (1996) goes as far as to state that failure is an essential requirement for effective organizational learning, and to this end, examines the advantages and disadvantages of success and errors. Interaction with the external environment is defined as the scope of relationships with the external environment. The external environment of an organization is defined as factors that are beyond the organization's direct control of influence. Environmental characteristics play an important role in learning, and their influence on organizational learning has been

studied by a number of researchers. Dialogue is defined as a sustained collective inquiry into the processes, assumptions, and certainties that make up everyday experience (Isaacs, 1993). Some authors (Isaacs, 1993; Schein, 1993; Dixon, 1997) understand dialogue to be vitally important to organizational learning. Participative decision making refers to the level of influence employees have in the decision-making process (Cotton et al., 1988).

Therefore, an organizational context with a high degree of organizational learning capability fosters experimentation, risk taking, dialogue, interaction with the external environmental and participative decision making. These factors might facilitate the effective use and learning of an ERP by the users of an organization. If end users usually experiment, dialogue, take risk or participate, they probably will adapt easily to the requirements and necessities of an ERP, they will efficiently cooperate with external consultants, by making suggestions or corrections, they will learn how to use it, and finally they will be more satisfied with the system. In sum, OLC would facilitate a successful ERP implementation. These lines of argument allow us to propose the following hypothesis:

H2. OLC will be positively related to successful ERP implementation.

3. RESEARCH METHODOLOGY

3.1. Sample

We conducted a field study to test the (1) direct effect of consultant quality on successful ERP implementation and (2) moderating effect of organizational learning capability (OLC) on the relationship between consultant quality on successful ERP implementation. Specifically, we surveyed ERP end users in 15 companies from the Spanish ceramic tile sector. Most of the firms from this sector are considered to be SMEs, as they do not exceed an average of 250 workers. Ceramic tile production is a globalised industry whose features belong to the scale-intensive and to the science-based trajectories of Pavitt's taxonomy (Alegre et al., 2004). In 2003, the Spanish ceramic tile industry was the world's biggest exporter and its production represented almost half of EU production (Chamber of Commerce of Valencia, 2004).

The field work was carried out from September to December 2008. With the help of ALICER technicians, we identified 15 ceramic tile manufacturers that recently implemented an ERP using consultancy services. We sent an introductory letter with copies of the questionnaire to the chief information officer or other top level executive who distributed the questionnaires among the end users.

The questionnaire was addressed to ERP end users trying to find their perception about the level of satisfaction with the ERP, consultant quality, and OLC in their organization. It was agreed with the participating firms that the questionnaire would be answered during working time. Participating firms received a feedback report on the survey.

We received a total of 134 valid completed questionnaires from 15 participant firms (see Table I). Participants were under no obligation to answer the questionnaire. The

variation in non-response could be due to a number of reasons such as lack of time because of work pressure or the support given by management to the survey.

TABLE I: Respondents distribution per firm

	% of exports in 2007 turnover	Total number of respondents
FIRM 1	40%	10
FIRM2	50%	15
FIRM3	50%	10
FIRM4	42%	15
FIRM5	35%	4
FIRM6	55%	10
FIRM7	65%	14
FIRM8	35%	3
FIRM9	40%	12
FIRM10	50%	7
FIRM11	35%	6
FIRM12	40%	5
FIRM13	60%	10
FIRM14	55%	7
FIRM15	50%	6
TOTAL		134

The responding companies implemented commercial off-the shelf systems from vendors such as Baan, Navision and Sap. Sixty percent of respondents were male; 31 percent were 26-35 years old, 57 percent were 36-45, and 17 percent were 46-55. All respondents were Spanish; 27 percent had completed High School studies, 62 percent had graduate degrees and 11 percent had master's degrees. End users typically used the

following ERP modules: finance, production, inventory, human resources, purchasing and distribution. End users had been using ERP systems for more than one year. The average organizational tenure was 8.8 years. Data came from 15 organizations with the number of respondents per organization ranging from a minimum of three to a maximum of fifteen.

3.2. Measures

Consultant quality was assessed using Wang and Chen (2006) 18-item measure (see Appendix). *ERP end user satisfaction* was measured through Somers et al. (2003) 12-item scale. *OLC* was assessed using Chiva et al. (2007) 14-item scale.

3.3. Control variables

Employee-based surveys typically include individual control variables such as gender, age, tenure, or education (Ganzach, 1998; Barrick, Bradley, Kristof-Brown & Colbert, 2007).

4. RESULTS

4.1. Measurement evaluation

The three measures used in this research have been validated previously (Wang and Chen, 2006; Somers et al., 2003; Chiva et al., 2007). However, we used alpha reliability to further assess the measures. Consultant quality computed an alpha of 0.91; OLC computed an alpha of 0.90; and ERP end user satisfaction computed an alpha of 0.97. Table II shows means, standard deviations and correlations between variables.

TABLE II: Descriptive Statistics and Correlations

Variables	Mean	s.d.	1	2	3
1. Consultant Quality	6.21	0.63		0.41**	0.51**
2. OLC	6.77	1.82	0.41**		0.88*
3. User Satisfaction	7.14	1.85	0.51**	0.88*	
Age	38,29	6.76	-0.08	0.01	-0.03
Gender	1.40	0.49	0.08	0.03	0.02
Education	1.72	0.44	0.13	-0.02	-0.11
Tenure	8.84	4.38	0.15	0.05	0.08

4.2. Hypothesized relationships

To test the hypotheses we used moderated hierarchical regression analysis (Table III). In step 1, we entered the control variables and the direct effect of consultant quality over user satisfaction. In step 2, we entered the direct effects of consultant quality and OLC. Table 3 reports the results from a series of hierarchical models. Step 1 model provides support for hypothesis 1 while step 2 model gives support to hypothesis 1 and 2.

TABLE III: Moderated Regression Analysis Results

	Step 1	Step 2
Age	0.055	-0.074
Gender	-0.032	-0.032
Education	-0.099	-0.021
Tenure	-0.045	0.063
Consultant Quality	0.533**	0.158**
OLC		0.814**
Interaction: Consultant Quality * OLC		
F (df)	9,21 (5)	86.56 (6)
R ²	0.265	0.794
ΔR^2		0.529**

** p<0.01

Furthermore, Table IV exhibits the distribution of sample firms according to their level of OLC. The sample was split using the 33 and the 66 percentiles. The level of ERP end users satisfaction rises as the level of OLC rises.

TABLE IV: Moderating effect of OLC

		Mean	s.d.	Sample
Low OLC (below 5)	Consultant Quality	5.90	0.62	N=43
	ERP end user satisfaction	4.83	0.48	
Intermediate OLC (Between 5 and 7.9)	Consultant Quality	6.26	0.68	N=34
	ERP end user satisfaction	7.78	1.54	
High OLC (8 and more)	Consultant Quality	6.43	0.51	N=57
	ERP end user satisfaction	8.49	0.65	

5. DISCUSSION

ERP systems are becoming increasingly important for companies and their performance. Their implementation is a complex process that has received a great deal of attention in recent years. The huge investment in ERP system packages and the significant different adoption results brought many researchers to search for critical success factors. However, the underlying process of how these factors affect ERP implementation success still remains a complex research area. Following to Somers et al. (2003), we have taken the end user satisfaction as a valid instrument to evaluate the success of ERP system implementations. This instrument provides not only an overall assessment, but also the capability to analyze which aspects of ERP implementation are most problematic.

Literature has traditionally underlined the importance of external consultants in ERP implementation. Our study advances previous research by using end user satisfaction to evaluate ERP implementation success and by proposing that a certain organizational context, the one that facilitate organizational learning, moderates the direct relationship between external consultants and ERP implementation.

First, this research provides empirical evidence that the quality of external consultant has a direct positive relationship with ERP implementation, measured through the EUCS, sustaining Hypothesis 1. The better the consultant quality the higher the ERP end user satisfaction.

Second, OLC has a direct positive relationship with ERP implementation, supporting Hypothesis 2. Therefore, an organizational context that facilitates learning, experimenting, dialoguing and participating has a direct positive relationship on ERP implementation.

Our study contributes to the literature by supporting the perspective that ERP implementation success depends on consultant quality, although this effect will be higher when OLC is higher. This result is important both for academics and practitioners. Successful ERP implementation does not emerge by chance, nor by simply investing in quality consultants, but rather as the result of a managed process fostering an organizational context that facilitates organizational learning.

This article has implications for practitioners. Even though managers recognize the importance of selecting good external consultants for ERP implementation success, the management of the internal context is often an ignored ingredient for its success. In fact, we are also suggesting the importance of a particular context, the one that fosters organizational learning. This study provides additional insights into why OLC is an essential organizational issue nowadays.

Our results must be viewed in the light of the study's limitations. The analysis of measurement scales constitutes an accepted research method that is particularly useful to test theoretical relationships between concepts such as consultant quality, ERP end user satisfaction and OLC. However, further qualitative research could be useful to provide a more in-depth picture of these relationships.

Because this research carries out a single industry analysis, it has benefited from dealing with firms that are likely to be economically and technologically homogeneous. However, it must be stressed that single industry conclusions should be considered with caution. Further research in other industries is needed to empirically assess the effect of consultant quality on ERP performance, moderated by OLC. Further research is also required in order to provide a more detailed picture of the role of ERPs in the particular context of export marketing systems (Leonidou & Theodosiou, 2004)

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