Measuring the impact of Enterprise Systems on organisational performance

Abstract
The primary objective if this thesis is to explore the relationship between the adoption of Enterprise Resource Planning (ERP) systems and organisational performance of SMEs. Furthermore, in the light of the aforementioned considerations in the field of enterprise systems, the present study will explore the factors that determine a successful ERP system implementation and Organisational performance in SMEs.

This study develops an instrument that may be used as an ERP scorecard. The research model consists of three dimensions - systems performance information effectiveness, and service performance. The importance of the study lies in the fact that little research attention has been devoted to measuring the impact of ERP on SMEs. This lacuna of knowledge is unjustifiable because the implementation of ERP is a source of increasing cost and concern to management, especially in the SME sector.

1 The context of the study
1.1 ERP systems -an Overview

ERP systems are the software tools used to integrate and optimise various business processes within the supply chain such as inventory management, customer order management, production planning, shipping, accounting, human resource management, and other business functions (Somers and Nelson, 2003). ERP systems are meant to replace the old systems usually referred to as ‘legacy systems’ in order to help
organisations integrate their information flow and business processes (Abdinnour-Helm et. al, 2003).

In a recent paper, according to Guffond and Leconte (2006) the ERP system could be defined as follows: …the ERP system is a tool assembling and integrating all data and management skills which represent the firm's activity, in a unique database: from finance to human resources, going through the elements of the supply chain that permanently link the production to purchasing and sales.

\section*{1.2 ERP adoption and organisational benefits}

As Sumner (2005, p. 4) argues, an ERP achieves a number of important objectives, including maximising throughput of information, minimising response time to customers and suppliers, pushing decision making down to the lowest appropriate level, and providing timely information to decision makers. Moreover, according to the author, an ERP system integrates information throughout the supply chain. The key underlying idea of ERP is using information technology to integrate company operations. ERP systems impose ‘an integrated systems’ approach by establishing a common set of applications supporting business operations (Sumner, 2005 p. 3). In fact, successful implementation of an ERP system requires re-engineering business processes which are then better aligned with the ERP software (Brown and Vessey, 2003).

According to Dillon (1999), ERP provides two major benefits that do not exist in non-integrated departmental systems: (1) a unified enterprise view of the business that encompasses all functions and departments; and (2) an enterprise database where all business transactions are entered, recorded, processed, monitored, and reported. Moreover, it enables companies to achieve their objectives of increased communication and responsiveness to all stakeholders (Dillon, 1999). This is the most important point
raised when it comes to the ERP systems as they can support information sharing along company value chain and help companies achieve operating efficiency (Law and Ngai 2007).

1.3 Research objectives and significance of the study

Implementing ERP system in an organisation is a challenging endeavour involving a host of considerations ranging from ERP software selection and configuration, to revision of business practices, to securing sufficient ERP development and operating staff, to the process of “going live” with the ERP system. The complexity of ERP and its associated high costs and implementation problems are forcing many organisations to rethink their plans for acquiring and implementing such enterprise systems (Kumar and Hillegersberg, 2000).

It is on this basis that some companies have enjoyed considerable improvements whilst others have had to scale back their initiatives and to accept minimum payoffs, or even decide to give up on ERP implementation (Soh et al., 2000). This phenomenon motivated this research which aims at assessing the impact of ERP systems on organisational performance.

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The importance of the study lies in the fact that little research attention has been devoted to measuring the impact of ERP on SMEs. This lacuna of knowledge is unjustifiable because the implementation of ERP is a source of increasing cost and
concern to management, especially in the SME sector. With insufficient managerial and technical skills, and the lack of funds to acquire such skills, smaller firms often implement IS in a less than optimal way, thereby attaining fewer benefits than larger organisations (Delone, 1988)

2. Theoretical background

2.1 ERP systems performance measures

The review of the recent literature allowed us to identify two important studies: McAfee, (2002) studied the impact of ERP systems based on a survey of 101 U.S. implementers of SAP R/3 packages that reported performance improvement in some areas such as cycle-time, on-time completion rates, and quality of information. Wieder et al., (2006) conducted a field study to find the impacts of several aspects of ERP adoption using financial key performance indicators (KPIs) to measure overall performance.

All these studies have substantially contributed, in that they advocated the importance of performance measurement for the improvement of business activities and they identified a number of metrics for the IS / ERP evaluation. Nonetheless, for the purposes of the thesis the ISFS functional scorecard (Cha-Jan Chang & King, 2005) is used in this thesis for the measurement of ERP success.

In a recent study these authors proposed the ISFS (Information Systems Functional Scorecard) to measure the performance of the entire IS function. The authors developed an instrument consisting of three major dimensions: systems performance, information effectiveness and service performance. These dimensions constituted the basic constructs for their field research (table 1).
2.2 Business Process Effectiveness

Aside from directly affecting organisational performance, the ERP function should have an effect on organisational performance through the impact on the effectiveness of business processes as shown in Fig. 1.

2.3 Organisational Performance

Measurement is a prerequisite to management in any firm. A performance measurement system (PMS) is a set of metrics used to control and quantify the efficiency and effectiveness of actions (Neely et al., 1996). In other words, a PMS is composed of more than one performance measures, is developed as a means of monitoring and maintaining organisational control, and is used in order to establish the degree to which certain goals and objectives have been attained by quantifying the end-result of the performed actions. Interestingly there is no agreement in the literature with regards to which KPIs measure overall firm performance best, in the context of ERP evaluation.

Table 1 Sub-ISFS Constructs, adopted by Cha-Jan Chang and King, (2005).

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<thead>
<tr>
<th>Systems performance</th>
<th>Information effectiveness</th>
<th>Service performance</th>
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<tbody>
<tr>
<td>Impact on job</td>
<td>Intrinsic quality of information</td>
<td>Responsiveness</td>
</tr>
<tr>
<td>Impact on external constituencies</td>
<td>Contextual quality of information</td>
<td>Reliability</td>
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<tr>
<td>Impact on internal processes</td>
<td>Presentation quality of information</td>
<td>Service provider quality</td>
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<td>Effect on knowledge and learning</td>
<td>Accessibility of information</td>
<td>Empathy</td>
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<td>Systems features</td>
<td>Reliability of information</td>
<td>Training</td>
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<tr>
<td>Ease of use</td>
<td>Flexibility of information</td>
<td>Flexibility of services</td>
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<td>Usefulness of information</td>
<td>Cost/benefit of services</td>
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3. Methodological approach

3.1. Conceptual framework

In order to carry out the research study, a conceptual framework has been constructed which is presented in Fig.1. The model in Fig. 1., has been utilised as a basis for many IS studies (Larsen 2003; Xia, 1998)

![Figure 1. The conceptual model](image)
3.2. **Operationalisation of Constructs**

Two sets of constructs will be operationalised in this study. –the three-dimensional ERP measures construct and the constructs related to the consequences of ERP implementation.

*Systems performance:* Measures of the systems performance assess the quality aspects of the system and the various effects that the ERP system has on the user’s work. Empirical studies listed under the categories “system quality” and “individual impact” in Delone and McLean’s model as well as in the ISFS functional scorecard are reviewed for the collection of measures such as reliability, response time, ease of use, and so on.

*Information effectiveness:* Measures of the information effectiveness assess the quality of information in terms of the design, operation, use, and value provided by information as well as the effects of the information on the user’s job. These measures are based on the Wang and Strong (1996) instrument.

*Service performance:* Measures of service performance assess each user’s experience with the services provided by the ERP system in terms of quality and flexibility of the services. The IS-SERVQUAL is included together with new measures used in the ISFS scorecard.

*Organisational Performance:* Much consideration is given to the choice of the measures and the necessary gathering of data. The decision favours quantitative measures and more specifically the following:

- Net profit margin, current ratio are used as indicators of liquidity (approach taken by Matolsky, 2005)
• Operating profit as an absolute KPI of profitability (including sales growth, cost of goods sold reduction approach followed by Poston and Grabski).

4 Research approach

At this stage of the research the decisions that have been taken are the following: a) the use of the deductive approach as it is deemed to be the dominant research approach (Collis and Hussey, 2003) and because it has specific characteristics that apply to the present analysis; b) a survey adopting an explanatory approach, being cross sectional in character, will be followed, given the structure nature of the research problem and the fact that sufficient evidence is available to formulate propositions for testing.

As far as sampling techniques are concerned the thesis will be based on the non-probability technique as it is associated with surveys and experimental research strategies and will enable the researcher to achieve objectives that require statistical estimation of the characteristics of the population from the sample. The sampling frame has not been finalised yet as the process of evaluation of the necessary directories is still in progress. Finally, the respondents will be ERP users who are the primary stakeholders of the ERP function as they represent the larger group and their efficacy in utilising such products directly affects the organisation’s performance.

Finally, the choice of the communication method will be a questionnaire which will be either a conventional postal questionnaire or an Internet-mediated one. The rationale justifying either option needs to be further explored, incorporating many other important issues that need to be assessed such as: potential respondents, questionnaire design and last but not least the time and budget constraints.
References


