

SMALL ENTERPRISES' PREDISPOSITION TO ADOPT AN ERP

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Abstract: Enterprise resource planning systems (ERPs) are now being implemented in small and medium enterprises (SMEs). In addition to allowing for the integration of technological architectures, these systems make best practices available to small firms. This paper presents the results of a study that was aimed at identifying the dimensions of SMEs' readiness for the adoption of this new technology.

1 INTRODUCTION

Until recently, enterprise resource planning (ERP) technology had only been used by large firms. Over the last few years, however, ERPs have begun appearing in small- and medium-size enterprises (SMEs), particularly in the manufacturing sector (Palaniswamy & Frank, 2000). Since this technology is complex and its implementation often entails significant risks (Konicki, 2001; Songini, 2002), determining the ability of a firm to successfully adopt it is a critical issue. This study presents a model for assessing a manufacturing SME's potential to adopt an ERP. The model, tested in 11 firms, draws on the conceptual framework proposed by Raymond and Blili (1997) on the potential for EDI adoption in SMEs.

2 CONCEPTUAL MODEL

The potential for adopting an ERP depends on four basic groups of variables: the organization's predisposition to adoption, external forces, perceptions about ERP and the nature of business processes (see Figure 1).

The organization's predisposition to adopting ERP. An SME's predisposition to adopt and use ERP technology is related to the firm's specific attributes. The strategy adopted by the firm could itself call for the implementation of an ERP system. Thus a firm whose strategy calls for reducing costs or prices would be inclined to adopt an ERP (Banker *et al.*, 2000). The degree to which it takes advantage of available IT, in both operational as well as managerial applications, is an indicator of the firm's capacity to implement an ERP. Operational methods also influence whether ERP technology can be adopted. In a firm with just-in-time production, integrating production planning improves the

production cycle. The chronic lack of resources in SMEs is well known (Julien *et al.*, 1997). Generally speaking, this problem leads SMEs to enter into partnerships or outsourcing agreements in order to acquire the technology (Roy and Aubert, 2000). An ERP is a significant investment. Banker *et al.* (2000) identify three types of costs encountered in an ERP implementation: the cost of the software package itself, the costs related to the human resources required for its implementation, and the cost of adapting business practices to the needs of the ERP. Hence, it is critical for a company wishing to acquire an ERP to have the necessary resources.

External forces. Uncertainty about the organization's environment has been identified as a determinant of adoption (Julien *et al.*, 1997), and being able to maintain the integration of subsystems is a prerequisite to performance in organizations that operate in environments characterized by uncertainty and heterogeneity (Lawrence & Lorsch, 1969). Organizations confronting great uncertainty could show a marked interest in adopting an ERP system, because it would enable them to achieve greater integration of both their information management and operational processes (Banker *et al.*, 2000). In addition, an organization is likely to adopt a technology like ERP if its competitors have a similar technology that gives them a competitive advantage. SMEs, and more specifically manufacturing SMEs, tend to be dependent on large clients or a prime contractor, and this type of relationship is becoming more demanding in terms of the quality needed and the integration required in inter-organizational processes. Undertaking these types of processes imposes the adoption of technologies like ERP on SMEs (Raymond & Blili, 1997).

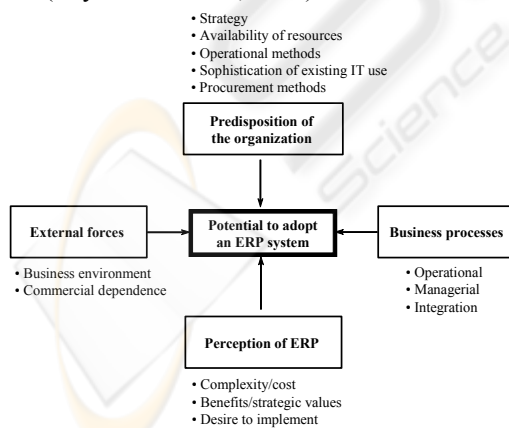


Figure 1: Conceptual model of an SME's potential for adopting ERP

Perceptions about ERP. An SME is usually very "organic," inasmuch as it tends to reflect the beliefs, attitudes and behaviour of an entrepreneur (Julien *et al.*, 1997). This is particularly true when it comes to

decisions concerning the adoption, implementation and use of IT (Raymond & Blili, 1997). A positive perception, on the owner/manager's part, of the benefits or strategic value that this type of technology can afford is critical to the firm becoming interested in implementing ERP technology. This positive perception takes the form of high expectations of the types of benefits to be derived from access to superior-quality information, support for business growth and improvements in decision-making when better information is delivered in real time. Furthermore, concerns may be raised about the complexity or cost of implementing and using ERP. Having management dedicated to and actively involved in the project is an important part of the adoption decision.

Business processes. An ERP system cannot improve organizational performance without a concomitant transformation of the organization's working methods (Bingi *et al.*, 1999). If an ERP is to generate the desired benefits, business processes must be aligned with the business practices implicit in the system design (Somers & Nelson, 2001; Nah & Lau, 2001). The organization fares better if it adapts its processes as much as possible to the ERP system (Holland *et al.*, 1999; Chen, 2001). The degree of integration achieved in a company's operational and managerial processes is a good indicator of the potential for ERP implementation. Many organizations today have only achieved limited integration of their business processes. In fact, companies often use several unintegrated applications to serve various functions, creating redundancy in the capture of data and increasing the risk of error, since information is not entered in real time but according to need (Markus & Tanis, 2000; Palaniswamy & Frank, 2000).

3 RESEARCH METHOD

In order to perform a preliminary test of the proposed research model, we conducted a field study of 11 SMEs. In each firm, we interviewed the senior officers (owner/managers, operations managers, general managers or other members of management). Interviewees then responded to a questionnaire that provided data on the company, such as the types of information systems and technologies used. The firms ranged in size from 17 to 245 employees; the average was 124. Data were first analysed so as to provide a rich description of the components of the model (see Raymond, Rivard, Jutras, 2003 for a complete description). We then conducted a cluster analysis to group participating companies on the basis of similarities according to

variables in the conceptual model. We used SPSS software (mean nearest neighbour algorithm, Euclidean distance).

4 CLUSTER ANALYSIS

The grouping represented by the dendrogram in Figure 2 was obtained for the following variables: presence of resources, operational methods, operational business processes, managerial process, integration of processes, business environment,

dependence on a single customer, complexity/cost and benefits/strategic values, because these variables best discriminated members of the groups. Three distinct groups were obtained.

Table 1 shows characteristics of the three groups with respect to potential for adoption of an ERP system (high, moderate and low). The determining factors for each of the dimensions were identified through quantitative analysis of the data. The groups are described below.

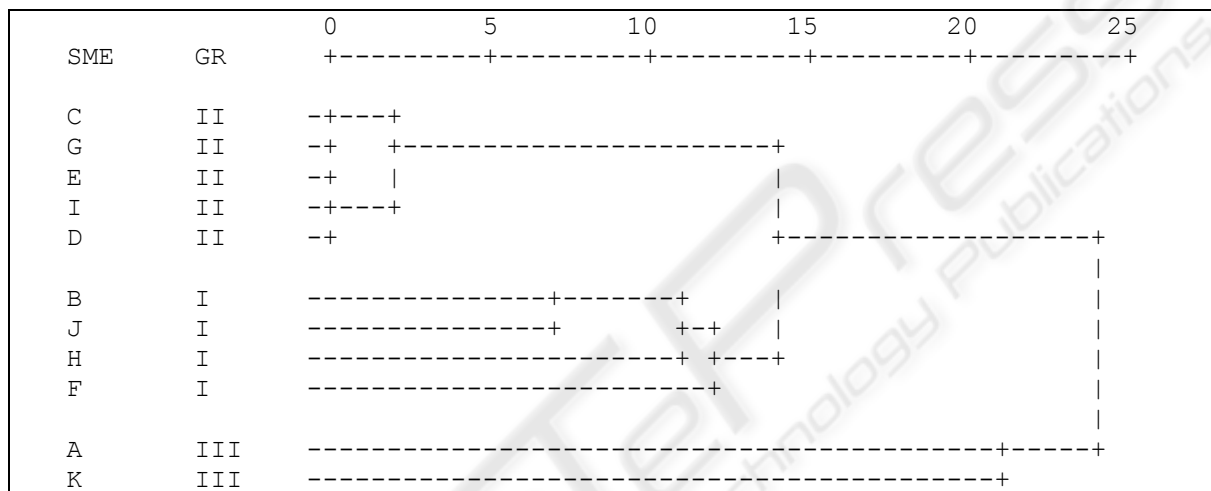


Figure 2: Euclidean Distance Between the Groups

Table 1: Three Profiles of the Potential for ERP Adoption

	Group I: Committed adopters (B, J, H F)	Group II: Uncommitted adopters (C, G, E, I, D)	Group III: Late adopters (A, K)
External pressure Pressure to adopt an ERP	Low	Low	Low
Predisposition due to organizational context Advanced use of IT	High	Moderate	Low
Perception of ERP Benefits	High	Moderate to high	Moderate
Business process Integration	Moderate to high	Moderate	Low to moderate

4.1 Group I: Committed adopters

The firms in Group I have already committed or are likely to commit to commencing an ERP adoption process. This commitment is largely explained by their concern for continuous improvement, the search for better management practices, and a desire to improve the quality, quantity and accessibility of

information. As opposed to members of the two other groups, their potential for adopting the technology arises spontaneously from a need for information. They are increasingly preoccupied with the idea of obtaining data in real time in order to make better decisions, and this requires greater integration of the systems used. The firms in Group I believe that their competitors have deployed ERP

systems, and this provides an additional incentive to implement an ERP-type system. As far as potential benefits are concerned, the executives have high expectations. Expectations are not as high, however, when it comes to the strategic value of ERP systems.

Business processes in this group are more complex, most are computerized and they are better controlled by management. All the respondents believed that a greater integration of their systems would improve performance as well as business processes, since an ERP creates better management practices only when the firm decides to minimize customization. The firms in Group I identified individuals from within the organization who would participate in a team or a steering committee during implementation. In a project of this magnitude, senior management tends to feel that it should get directly involved as leaders and champions, and that users must actively participate, at whatever level. In view of the scope, the complexity and the cost of this type of project, the role played by senior management is critical. Members must be directly involved as motivators in order to minimize resistance to change.

4.2 Group II: Uncommitted adopters

The firms that make up this group are in an intermediate state, inasmuch as questions are being raised about the need to improve their technological infrastructure, and significant changes will need to be made relatively soon. Inconsistencies are apparent in operational methods, and there is little concern shown for improving management processes. These firms seek to become more competitive by growing and increasing production capacity, by distinguishing themselves with product improvements and innovative, improved processes, by developing new products and by finding new market niches. Their managerial approach favours operational processes and information flows as they relate to production. In fact, technological infrastructures for operational processes are much more advanced than those used for managing. Furthermore, at the management level, only accounting functions are computerized and payroll services are outsourced. New applications for the integration and computerization of HR management would appear to generate interest in this group.

Firms in Group II generally have a positive perception of integrated management systems. Members of Firm E, however, did not see the advantages of adopting such a system. Its respondents believed that they would be best served by the technology already in place, as well as the different tools that were developed over the years

and continue to be upgraded on a regular basis. But overall, all the companies in the group are interested in more advanced technologies than what is presently being used. They recognize the importance of implementing IT that will bring improvements to how they work and that will give them access to a wealth of information for decision making. There are a variety of ways to implement IT, but the key to succeeding is to consult employees and get them to participate in the process. Nevertheless, the technological development of these firms faces a serious handicap; a lack of resources, and in particular financial resources, within the organization. This lack of resources limits their access to IT.

4.3 Group III: Late adopters

The two firms in Group III have been classified as late adopters. In Firm A, managers did not feel the need to implement a technological infrastructure like ERP. Existing technologies were considered effective enough to meet the firm's needs. Executives also considered the investment too great, given the size of their business and the potential return on investment. They remained reticent about taking on this type of project. The organization's approach to strategic issues is reactive. Since they were not facing pressure from their partners to adopt an ERP system, and since they only have a small share of the market, the firm's management was not considering deploying an ERP package in the short or medium term.

Firm K is governed by a board of directors that oversees an entire group. The first issue to be confronted therefore concerns the group as a whole; should it operate in a centralized or decentralized manner. This question will require considerable reflection. This firm must also review most of its operational and managerial processes before making the transition to ERP-type technology. Finally, the firm is still using traditional methods, few of which are computerized. Last year, top management studied the idea of adopting an ERP system. The project was launched by an executive who had limited information about ERP systems. After a few meetings and getting a better understanding of the implementation process, the company decided to put the project on hold. The committee in charge concluded that the group was not ready to undertake the project. Even so, the project remains on hold, and the executive interviewed hoped that it would be re-evaluated in the short or medium term.

5 CONCLUSION

This work has direct benefits to corporate management. The analytical framework could enable executives to work with concrete criteria when comparing their organization with others. The assessment could serve as the starting point for development of an implementation process that would be adapted to the specific planning and control needs of an SME. The SME is well known for its flexibility and adaptability in the face of operational and technological changes, and SMEs are increasingly the site of complex and cutting-edge manufacturing systems. The firms are looking to integrate these systems in order to improve performance. It is still uncertain, however, if SMEs have the will or even the capacity to formalize business processes. This would be a critical asset if the firm decides to undertake the implementation of an integrated management system. If an ERP system is to deliver all the benefits promised by its vendor, the new technologies must fully integrate all corporate functions.

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