

ESTABLISHING THE RELATIONSHIP BETWEEN ENTERPRISE SYSTEMS BENEFITS, BUSINESS COMPLEXITY, AND BUSINESS ALIGNMENT IN SMES

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Abstract

The adoption and usage of enterprise systems pose new challenges and provide new competitive opportunities, especially for Small and Medium-sized Enterprises (SME). Yet, SME are only just beginning to embrace these new opportunities. Thus, this study attempts to test the influence of business complexity on enterprise systems, and business alignment and the achievement of enterprise systems benefits in SMEs. We propose a conceptual model of the influence of business complexity and business alignment in ES benefits achievement and a survey to collect the data for further analysis.

Keywords: Enterprise Systems, ERP, usage benefits, business alignment, business complexity.

1 INTRODUCTION

In the late 1990s, the high end of the Enterprise Systems (ES) market became saturated because most large organizations had already implemented ES such as Enterprise Resource Planning (ERP) systems. Nowadays, most large companies have been using an ES for some time, and ERP vendors are shifting their attention toward SME, by offering simplified and cheaper solutions [30]. It is important to evaluate the investments made in ES. Sometimes, the strategy adopted by some organizations when evaluating the ES investment is like an “act of faith,” and subsequently of an ad hoc nature [11]. Overall, there is evidence that IT/IS value research has given equivocal results, perhaps because measures and models used to study complex business and market systems have been too simplistic [28]. Several studies suggest that contextual factors associated with the firm and/or its IT/IS investment and its environment can moderate the effects of IT performance (e.g. [1] [3] [35]). Matolcsy and Booth [20] note that there is no specific analytic framework yet available to examine the potential benefits of ES use). Thus, although the benefits claimed from ES systems adoption have been identified (e.g. [28] [7]) they lack a context. Moreover, unlike previous research where SMEs have, as one homogenous group, been compared to large companies, Laukkanen et al. [13] findings show that medium-sized and small companies also differ significantly from each other regarding the emphasis on the more strategic business development objectives of ES adoption. The medium-sized companies placed most emphasis on the importance of business development objectives, leaving the small companies clearly behind. Although previous research has focused on the benefits of ES, research carried out on the factors that impact benefits is limited. This paper investigates the business complexity factor as an important factor for the realization of benefits.

1.1 ERP-business alignment

The first pillar of our framework is based on the concept of IS/IT business-alignment. “IT-business alignment as a construct concerns the degree of congruence of an organization’s IT strategy and IT infrastructure with the organization’s strategic business objectives and infrastructure” [22, p. 80]. Since the 1980s, scholars, analysts and consultants alike have advocated an aligned approach with regard to

introduction and deployment of IS in organizations. The most famous ID alignment model is Henderson and Venkatraman's Strategic Alignment Model, one of the first concepts to support organizations in leveraging new IT technologies [9]. Business strategy, IT strategy, organizational infrastructure and processes, and IT infrastructure and processes should be in balance through strategic fit, and functional integration (see also [16]). Subsequently, several authors have applied the Strategic Alignment Model. The connection between alignment and organizational performance has been investigated with varying success ([4] [17] [24]). We elaborate the business domain with this mind (while explicitly connecting it with the IT domain) by using the strategic alignment model of Turban, et al. [32] and specifically its extension by Scheper [27]. In Scheper's adaptation of the model, the following five 'business dimensions' are crucial parts of every organization, and need to be integrated: strategy and policy, monitoring and control, organization and processes, people and culture, information technology. Basically, Scheper's hypothesis is that synchronization or leveling of the five dimensions will significantly contribute to the performance of an organization. Because of its proven value, we will follow Scheper's framework of (strategic) business-alignment. Previous research stresses the alignment of IT with business strategy since strategic alignment has a key role to play in the determination of IT payoffs [30]. Alignment of organizational and technological infrastructures has also been found to enhance business performance [5].

1.1.1 Business Complexity

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Corporate complexity can be thought of in several ways, including firms' organizational structures and the inherent complexity of their business activities. In this paper we address the business complexity of firms. Business complexity is defined as "...the scale and difficulty of buying and selling processes" [10]. Holland and Locket [10] propose a research framework in which inter-organizational systems interact with the effects of business complexity, and suggest that future research should consider implications for performance outcomes. Broadbent et.al. [2, p. 175] link IT capability with business complexity, saying, "Greater IT infrastructure capability is required where firms need to respond more rapidly to changes in the market place". Rai and Bajwa [27] present empirical evidence indicating that firms operating in complex environments were more likely to adopt EIS for decision support. Previous research has developed methods of measuring firm complexity essentially based on size, diversification, and divisionalization of the company. Setzekorn et al. [29] define business complexity as comprised by two dimensions: diversity and volatility. Diversity is measured by the firm's number of components in terms of its raw materials and finished goods inventories, number of suppliers/component, and number of product lines produced. Volatility refers to the degree of unpredictability in production scheduling. It is measured by suppliers' delivery unreliability; % forecasting error, frequency of late changes in delivery due dates; frequency of late engineering and design changes; production plan length and frequency of revision. Tagliavini et al. [31] studied the effect of business complexity in ES adoption. They hypothesized that "the business complexity is directly related to the use of ERP systems (the greater the business complexity, the greater the rate of adoption of ERP systems)". Business complexity was assessed by identifying a set of business variables, each supported by the most qualified literature: company size, market area, the membership of a group, the presence of branch offices, the level of diversification, and the degree of functional extension. The sample of 79 Italian SMEs did not provide conclusive results.

2 RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

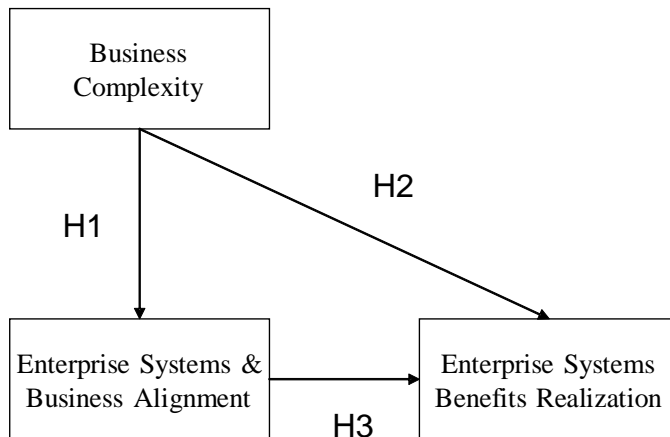


Figure 1. Research model.

- H1: Business complexity is directly related to alignment of business and ES implementation (the greater the business complexity, the greater the difficulty to align business and ES).
- H2: Business complexity is directly related to ES benefits realization (the greater the business complexity, the greater the level of benefits realization).
- H3: The use of ERP systems (the greater the business alignment, the greater the benefits obtained through ES usage).

In order to better understand the underlying reasons for H1 and to validate it, it is necessary to first highlight the correlation between each variable of the set and the business complexity.

2.1 Research Variables

Company size (classified as micro, small, medium): Existing literature seems to confirm a mutual dependence between size and business complexity. Size, together with other aspects, is widely accepted as an indicator of organizational complexity [18]. Kimberly [18] stressed the need to use a different approach depending on the industry the company belongs to: for the services industry the number of employees has a better fit, while for manufacturing companies the turnover seems to be more appropriate. Organizational complexity is therefore affected by size as well as by other issues, increasing the need for coordination and control of organizational activities [33]. Laukkanen et al. [13] show that company size does indeed matter in ERP system adoption and a number of significant differences between enterprises of different sizes can be found. SMEs, in general, have been found to focus more on day-to-day survival than long-range strategic thinking ([15] [26]). Laukkanen et al. [13] results indicate that both SMEs and large companies acquire ERP systems due mainly to their wish to develop business and integration capabilities. The second and third most prominent reasons for ERP adoption in all the company groups were related to the much-needed replacement of old information systems and to obtain an improvement in efficiency and cost reduction, respectively.

The market area (local, regional, national, international) - The hypothesis of correlation between the level of internationalization and the business complexity seems to be justified by the different legal and cultural issues that need to be managed [6] and by the competitive pressures that international firms have to face. The fact of being a member of a group (either as the holding or as a controlled

firm): This variable seems to be strongly related to issues involved in the coordination of dispersed business units. This is true in terms of alignment of processes and procedures both between the holding and the controlled companies and among the controlled companies themselves. If, however, the imposition of common operating processes on all units could lead to tight coordination among the controlled companies' business, it should also be noted that in a multiregional context strict process uniformity could be counterproductive in terms of flexibility [6]. The presence of branch offices (where, how many): Nowadays, for companies with branch offices which need to be remotely controlled, information flow management is a crucial issue. SMEs face different challenges (i.e. the cultural and technological level of knowledge of the entrepreneur): this is one of the aspects that must be considered in order to fully comprehend fallouts in terms of management complexity, organizational impact and required competencies. The level of diversification (in terms of products, markets and technologies): Complex organizations operate in different product market combinations [33]. In related diversified firms, an increase in the number of businesses adds information processing demands by increasing business unit interdependencies (e.g. [21] [25]). Because of the greater need for coordination and control of activities, complex organizations will tend to have specialized planning departments, employ a larger number of planners and consequently devote a substantially larger amount of financial resources to strategic planning. The degree of functional extension (number of activities carried out internally): There are companies which consider certain business functions trivial: the degree of functional extension refers to the number of strategic functions directly managed within the company.

2.2 The dependent variable

Markus and Tanis [19, p. 186] note that the benefits of ES systems implementation should be assessed in relation to the organization's unique goals for the system. Davenport [7] states that there are different types of benefits and that some types are likely to arise before others e.g. benefits from improved transactional processes and common data appear to precede benefits associated with improvements in management and decision-making. The first starting point is the identification of the ES business benefits. Gattiker and Goodhue [8] group the literature of ERP benefits into four categories: (1) improves information flow across sub-units, standardization and integration facilitates communication and better coordination; (2) enables centralization of administrative activities such as account payable and payroll; (3) reduces IS maintenance costs and increases the ability to deploy new IS functionality; (4) ERP may be instrumental in moving a firm away from inefficient business processes and toward accepted best practice processes. Shang and Seddon [28] created an ES benefit list from a review of 233 success stories presented by ES vendors and published on the web with 34 follow-up interviews to confirm the content of their analysis. The ES benefits found were classified into five benefit categories, namely operational, managerial, strategic, IT infrastructure and organizational.

3 RESEARCH METHOD PROPOSED

We developed a survey that is based on previous literature (see appendix A for the survey details and questions). The survey needs to be answered by all the stakeholders involved in ES usage such as end-users, top managers, IS professionals, etc., from equal numbers of different companies, classified according to the different characteristics of each one. Regarding the sample, we will send the survey to all the SME that have implemented mySAP all in one or Business one during the period 1996-2004 in Spain. This information was provided by SAP Spain.

4 CONCLUSIONS

Few studies have attempted to understand the reasons why some organizations have been more successful in realizing business benefits from ES than others. This study adds to the body of knowledge in this area with a quantitative approach that both tests existing models and provides new insights into business benefits achievement from ES. The model proposed comprises the following components: (i) business complexity, (ii) IT/IS business alignment and, (iii) ES benefits.

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APPENDIX A - SURVEY ABOUT STATE OF ART OF INFORMATION TECHNOLOGIES IN SPANISH ENTERPRISES

Business Complexity

1. How many employees do you have?
 - Between 1 and 10
 - Between 11 and 50
 - Between 51 and 250
2. How is your business market?
 - Local
 - Regional
 - National
 - International
3. Do you have other branch offices distribute geographically?
 - Yes
 - No
4. Does your enterprise is diversified?
 - Yes
 - No
5. Select activities that your enterprise do:
 - Logistic
 - Production
 - Marketing
 - Sales
 - Supply
 - Human Resources
 - R+D
 - Systems
 - Administration
 - Finance
 - Quality Control
 - Others

Business Alignment

In all questions of this topic you could ask: Totally accord, Partially accord, Neutral, Partially disaccord or Totally disaccord.

6. Strategy and Politics

Do you find new business opportunities?

Do you try to open / acquire new business units (diversification)? Do you are leaders in introduction of new products?

Does the criterion to budget definition is the short term?

Do you are oriented to the future? Do you think in the long term?

Do you make an effort to be one of the 3 better companies in the sector?

Do you act aggressively in your market? Do you are obtaining the growth expanding you in new markets?

Do you develop strong relations with your clients?

Do you put special emphasis in your main clients?

Do you develop strong relations with your suppliers?

Do you put special emphasis in your main suppliers?

Do you use a strategy of low prices?

Do you use a quality strategy in your products/services?

Do you use a strategy intensive in marketing?

Do you use a differentiation strategy?

7. Supervision and Control

Do you optimize the coordination between different functions?

Do you realize a follow up to improve the efficiency in operations?

Do you hope to obtain benefits in the short, half or long term?

Do you hope to obtain sales growth?

Do you hope to improve finance resources? (Liquidity and capacity of investment)

Do you hope to improve the public image and the customer loyalty?

8. Organization and Process

Do your way to operate is riskier than your competitors?

Do you have a preservative vision when you made important decisions?

Do your operations generally follow a way of test and error?

Do you constantly improve efficiency of your production process / services?

9. People and Culture

Do you tend to be risk averse?

Do you need a lot of effective information for day to day decision making?

Do you tend to be highly analytic in your decision making?

Do you search innovative and imaginative solutions for most of problems?

Do you adopt innovations in an early way?

Do you tend to be creative and originals?

10. Information Technologies

Does it help you to identify companies that you can be interested in acquiring?

Does it allow you to make a pursuit of your competitors and to compete in a better way with them?

Does it give you the information that you needed to take advantage of the opportunities that appear in your way?

Does it provide enough detailed information (quality information) for the right decision making not only in long term but also for day to day?

Does it support effective coordination between different functions (internal integration)?

Does it improve the efficiency in operations? Does it help you to reduce costs?

Does it allow you to adjust budget allocation based on decisions of short term?

Does it represent an investment to provide a future competitive advantage?

Does it support more the long term planning that the short term?

Does it facilitate forecasting of key indicators of business operations?

Does it make possible the development of strong relations with yours main customers?

Does it make possible the development of strong relations with yours main suppliers?

Does it help to establish strong relations with market in general?

Does it make possible the generation of creative and original solutions for most of problems?

Does it use end technology?

Does it help you in differentiation strategy of your products?

Does it make possible improve the quality of your products?

Does it make possible diversify products and to introduce them before your competitors?

Does it make possible to give to your clients a quality service?

Does it facilitate realization of marketing campaign intensive of your products?

Does it make possible identify new markets?

Does organization has improved it image with the new system?

Business Benefits

In all questions of this topic you could ask: Stabilize, Synthesize and Synergize.

11. Operational

What percentage of costs considers that it has been saved with the implementation of the new systems in the day to day of the company?

What percentage of improvement in the support activities to customers it has been obtained with the implementation of the new systems?

What percentage of improvement in the support activities to employees it has been obtained with the implementation of the new systems?

What percentage of improvement in the support activities to suppliers it has been obtained with the implementation of the new systems?

Do you have noticed an increase in the productivity for implementation of the new systems? In what percentage it increase?

Do you have diminished the error rate? What percentage has increased the data trustworthiness in the system?

Do you considerer that has improved customer service? In what percentage it has improved?

12. Administrative

In which percentage has improved the administration of the resources in your company with the implementation of the new systems?

What so fast considers that it is made the planning and the decision making with the implementation of the new systems?

How much consider the improvement in the performance of the organization with the implementation of the new systems?

13. Strategic

Does the volume of transactions in the organization have been increased with the implementation of the new systems? In what percentage it has been increased?

The adoption of the new systems has brought a change in the procedures. What percentage has varied?

Do you have been integrated the architectures of information systems of the different business units? In what percentage it has been integrated?

In which percentage contributes to the innovation of the market strategy, to the form to make the process or to the creation of new products/services?

With the use of information technologies have been harnessed the scale economies? In what percentage it has been harnessed?

Do you have savings of costs in the use of shared services? What percentage has varied?

Can be formed the products/services according to the client? In what percentage it has improved the differentiation of your products?

Do new systems allow centralize data and world-wide operations? In which percentage has integrated the systems?

Do new systems foment the B2B and/or the B2C? In which percentage has improved this situation with respect to the previous system?

Do new systems have made agile the process of decision making and the compatibility with the clients? In what percentage has improved this situation with respect to the previous system?

14. Organizational

Do new systems have improved the interdepartmental coordination? In which percentage has integrated the different departments?

Do new systems have motivated the employees and facilitate the development of its abilities? In which percentage has improved its productivity?

Do the employees have their specific functions within the new systems? In how much they have improved in his productivity?

Does is had the same vision in all levels of the organization? This vision is rooted in the company in which percentage?

Do new systems cover central tasks of business? Which is the percentage of adjustment?

In which percentage the systems offer tools for better decision making, as well as for a resolution of problems more efficiently?

15. System Infrastructure

Do new systems have improved the adaptability of the applications to internal and external changes? In what percentage have improved?

What percentage of savings has been taken place in integration and personnel dedicated to the systems?

Do new systems are more stable than the previous one? What percentage of falls has new systems respect to the previous one?