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## Using TOE and RBV theories to define a theoretical model to assess ERP value across Iberian Manufacturing and Services SMEs

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### Abstract

Enterprise Resource Planning (ERP) system literature reports few studies with a focus on specificities of an industry analysis. Based on the Technology-Organizational-Environment (TOE) framework and the Resource-Based View (RBV) theory, we present a theoretically developed research model aiming at measuring and examining determinants of ERP use and value and their impact in the Iberian region (Portugal and Spain) across Manufacturing and Services industries in Small and Medium Enterprises (SMEs). The research model suggests ten hypotheses that will be tested and analysed with data from a questionnaire among firms that have adopted ERP systems in their organization. Due to the nature of the research model the data analysis will be supported by Partial Least Squares (PLS). Our aim with this research project is to provide new knowledge into which determinants contribute to ERP use and ERP value in Iberian Manufacturing and Services SMEs.

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## 1. Introduction

Enterprise Resource Planning (ERP) systems have been applied by many firms [1] to provide seamless integration of processes across functional areas with improved workflow, standardization of various business practices, improved order management, accurate accounting of inventory, and better supply chain management [2, 3]. The ERPs are particularly important for manufacturing and services in Small and Medium Enterprises (SMEs) [4, 5].

There is an ongoing current process of structural change in Europe, in which the share of manufacturing in the economy is declining while services are accounting for increasing shares of employment and added value [6]. However, the manufacturing and service industries are still the two main economic activities in the European Union [7, 8]. Several authors [9-11] state that SMEs are the backbone of Europe's economy, important for increasing productivity and gaining competitive advantage in the global economy, as well as important drivers of innovation and transformation. Literature reveals that little attention has been given to research on ERP in SMEs, and even less on specific industries such as manufacturing and services [12].

Hence we developed a conceptual model based on the Technology-Organization-Environment (TOE) framework to explain ERP use and Resource Based View (RBV) theory to explain ERP value between manufacturing and service industries. Theoretical perspectives are presented next, and then the research model and hypotheses are explained.

## 2. Theoretical Perspectives (abbreviated)

The service industry is quite unlike the manufacturing industry [13]. The growth of services in the European Union 27 countries raises questions about the adequacy of our understanding of innovation activities in service-dominated economies, especially as innovation is regarded as fundamental to the competitiveness of advanced economies [14]. Different industries have different operating characteristics and environments, and the factors related to ERP use and value may differ accordingly [11, 15]. Given the distinct nature of the offerings of manufacturing and services firms, differences in the use and value may be very plausible. Thus, it is expected that there will be systematic differences between industries in the actual use of ERP systems and related value creation.

One of the most important adoption models at the firm level is the TOE framework [16, 17]. The TOE framework identifies three aspects of a firm's context that influence the process by which it adopts, implements and uses technological innovation: (a) Technological context – which describes both the internal and external technologies relevant to the firm; (b) Organizational context – which refers to descriptive measures about the firm; and (c) Environmental context – which refers to the arena in which a firm conducts its business [17, 18].

The RBV theory remains the dominant theoretical explanation of IT business value, as IS researchers have employed the resource perspective to expand and deepen our understanding of IT business value [19-21]. The RBV theory sustains that a firm creates value by combining heterogeneous resources that are economically valuable, difficult to imitate, or imperfectly mobile across firms [22, 23]. The creation of value requires to effectively use the ERP system in the post implementation phase [24, 25]. Several studies have concluded that ERP systems can lead to sustained, competitive advantages [26, 27]. In line with the RBV theory, the present study will take into account several variables that can be perceived by firms as valuable assets, to better understand how to extract value from the ERP system.

## 3. Research model and Hypotheses (abbreviated)

The extent of ERP use by an organization will be influenced by its technological, organizational, and environmental contexts within the TOE framework [28]. The RBV theory is used to understand ERP value. Taking in consideration the theoretical background presented above, a conceptual model was developed to assess the use and value of ERP systems (Figure 1).

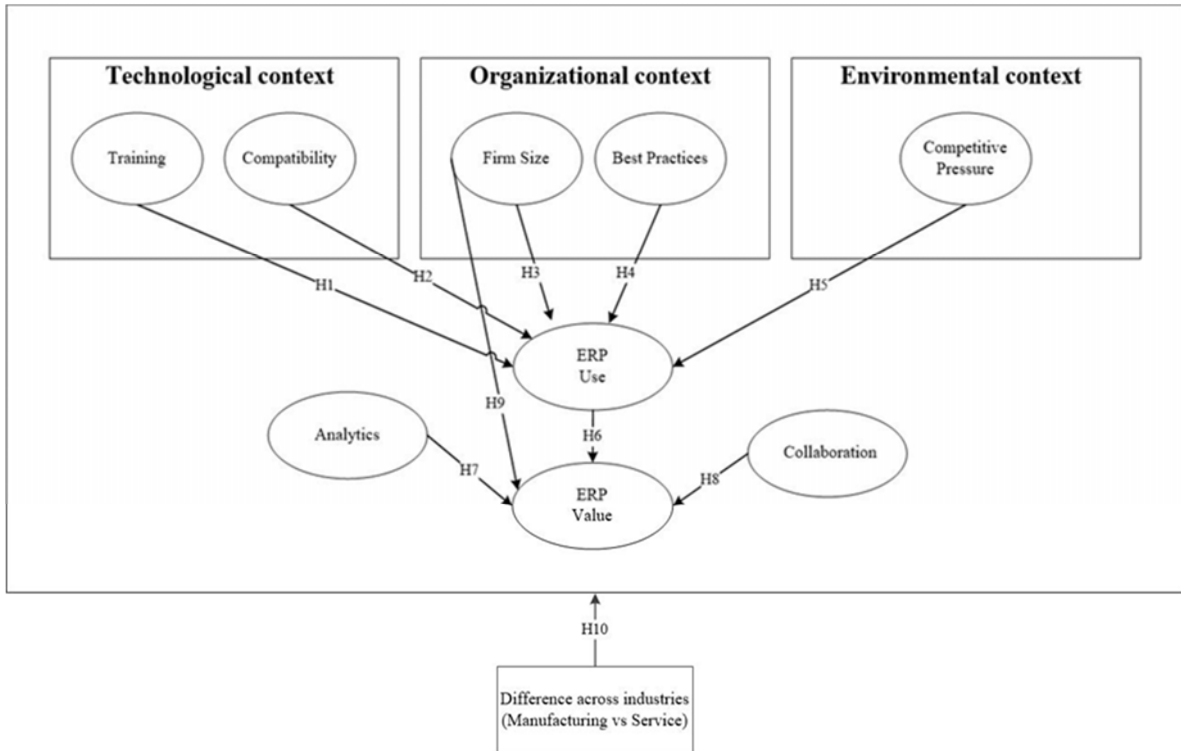


Figure 1. The Research Model

### Technology Context

According to Tornatzky and Fleischer [17] a firm with higher quality human resources, such as better education or training, will have greater ability in technological innovation. Literature shows that training is an important factor for IT implementation success [29].

*H1. The level of a firm's training programme will have a positive relationship with ERP use.*

Compatibility has been shown to be an important factor in explaining innovation use by organizations, and high compatibility has been identified as a facilitator for innovation utilization [30, 31].

*H2. Firms having ERP systems with greater compatibility are more likely to use ERP.*

### Organizational Context

Firm Size is one of the most commonly studied factors in the innovation literature [32]. Larger firms have an advantage over smaller ones, as they have more resources and can take greater risks associated with innovation adoption [33]. Since our study focuses on SMEs, we postulate that smaller firms are characterized by a resource poverty resulting from various severe constraints, which is a barrier for ERP use.

*H3. Larger firms tend to achieve a greater extent of ERP use.*

ERP systems are understood to represent "best practices" and a more competitive business model [34]. Literature shows that firms that implement industry best-practices dramatically improve usage and reduce risk and time-consuming project tasks such as configuration, documentation, and testing [11, 35].

*H4. Firms with a greater degree of business process fit to standard ERP “best-practices” are more likely to use ERP.*

### **Environment Context**

Competitive pressure refers to the degree of pressure from competitors, which is an external power pressing a firm to adopt new technology in order to avoid competitive decline [31]. Several studies have determined Competitive Pressure to be an IT adoption and use driver [28, 36, 37].

*H5. Firms facing higher competitive pressure are more likely to achieve a greater extent of ERP use.*

IT business value depends on the extent to which IT is used in the key activities in the firm’s value chain. The greater the use, the more likely the firm is to develop unique capabilities from its core IT infrastructure [29]. System use is essential for ERP to generate any impact on firm performance, and a strong link can therefore be established between system use and system impact [28, 38, 39].

*H6. Firms with greater ERP use are more likely to generate higher ERP value*

A number of case studies describe business analytics applications and discuss how they might contribute to firm performance [40, 41]. According to Bendoly [42], those firms that have embedded analytics capabilities into ERP database can easily and quickly use data for managerial decision-making and consequently acquire an advantage in attaining sustainable business performance [43, 44].

*H7. Firms with greater levels of analytical information extracted from ERP are positively associated with higher ERP value.*

The organizational culture promoting the free-flow of information and sharing of knowledge amongst employees and across department lines is important for ERP implementation’s success, in the same way that ERP implementation changes the organizational culture promoting the free-flow of information and sharing of knowledge amongst employees and across department lines [45, 46]. ERP systems help users to collaborate, increasing efficiency and effectiveness [47, 48].

*H8. Firms’ greater collaboration in ERP systems is positively associated with higher ERP value.*

The literature reveals no consensus on the role of firm size in the process of innovation implementation. Whereas larger firms often possess more resources that can facilitate innovation implementation [33], smaller firms, although more versatile, are characterized by severe resource constraints and do not readily adopt new technologies [49].

*H9. Firm size is positively associated with ERP value.*

Sohal et al. [50] report that manufacturing and service firms are achieving few benefits from their IT investments. The major benefits achieved across both industries have been limited to improvement in productivity and cost reductions. The structure of services are inherently different from manufacturing, and given the distinct nature of the offerings of manufacturing and services firms, different drivers for ERP use and value across the two industries are very plausible.

*H10. The antecedents of ERP use and value will differ for Manufacturing and Services Firms.*

### **4. Research methodology (future work)**

As the next steps for this research, we will develop an online questionnaire. Five research academics and six professional experts from both ERP, and manufacturing and services industries knowledge field will validate the content of the questionnaire. To assess constructs reliability, a pilot test with 30 firms and feedbacks will be incorporated. We plan to measure the constructs by using reflective items on a five-point Likert-type scale, ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5). With the assistance of IDC a large-scale survey will target several firms across Iberia for data collection. Due to the nature of the research model the data analysis will be supported by Partial Least Squares (PLS) [51].

## 5. Concluding remarks

In this paper we present a research model that aims to assess ERP value between manufacturing and services industries across Iberian region. We contribute to the IT value literature by the development of a theoretical model that aims to measure ERP value using a well-established IS theories - Technology-Organizational-Environment (TOE) framework and the Resource-Based View (RBV). This project will continue with the development of the questionnaire and then analyses of collected data through the use of PLS. The research project aims at producing contributions both to theory as well as practice by producing new knowledge on how ERP creates value between Iberian and manufacturing and services SMEs, as well as how can ERP positively influence value from IT investments on these two industries.

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