

# **Factors Leading to Successful ERP Implementation: An Integrated Framework**

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## **Abstract:**

The successful implementation of ERP systems is a challenging task. Evidence shows that the number of failing ERP projects is increasing. This means that a model is necessary to help companies avoid previous mistakes and provide them with understanding of how ERP implementation can be effectively carried out and what its essential success components are. Referring to previous theoretical models, such as the System Development Life Cycle theory, the Systems Theory, and the Contingency Model, a model showing the factors that would lead to successful ERP implementation will be developed. The model shows different categories that are composed from management, human resource, and technology which firms must take care of in order to implement ERP systems successfully. The paper will refer to a quantitative method such as the weighted score method in order to assess the developed ERP model.

**Keywords:** ERP implementation, Critical Success Factors, Implementation model, Conceptual Framework, Model.

## **Introduction:**

ERP (Enterprise resource Planning) attempts to integrate all departments and functions across a company such as manufacturing, sales, marketing, finance, HR into a single software that can serve all of the different needs of those particular departments. ERP helps companies meet business needs more efficiently and quickly. It helps with the tracking of the product and the inventory in all stages in the company from raw materials to delivery. Customer Service department can easily determine when the product will be delivered to the customers, thus providing them with the accurate arrival time. Also, other departments can access the system and update their departments' responsibilities. A properly implemented ERP system can result in significant cost savings and increased efficiency.

However, the above-mentioned results cannot be achieved unless a successful ERP implementation has been done and this can be difficult. ERP implementation is both time-consuming and expensive. For example a typical implementation will take at least a year to give tangible results. However, the advantages outweigh these disadvantages due to the fact that companies the world over regardless of their size have benefited from this system. On the other hand, many companies fail in implementing ERP systems and as a result it does not improve the business performance. The large investments and negative ROIs have created a whirlpool of controversy. The trade press and other media have reported many negative ERP stories in which this system failed to meet the expected results. All of these stories have created a higher level of fear in the companies towards making a big mistake while implementing ERP systems. One of the reasons why ERP implementation fails to deliver is usually because management hasn't taken the time to structure the organization in order to take advantage of these systems. A

successful implementation is only achievable when high-level executives have a strong commitment to the project. A second reason is not implementing a standard shift in operation areas before ERP implementation (Shtub, 1999). Scott and Vesey (2002) have emphasized the need to be flexible in ERP implementations and to learn from unforeseen circumstances. Another reason is because of the complicated integration of organizational and technical levels (Huang et al., 2004). Most companies that implement ERP are unlikely to have processes and structures compatible with the structure, and types of information provided by ERP systems (Umble et al., 2003).

ERP implementation requires synchronization across all different functional areas in the company as well as external project members (Shanks et al., 2000). It can take many years to be completed and sometimes the process can be delayed because of faulty planning and execution. There should be a clear business mission and understanding of how the organization should operate behind the implementation effort to support it (Holland et al., 1999). Implementing an ERP system is a careful exercise in strategic thinking, precision planning, and negotiations among departments and divisions that require careful selection of appropriate project management structure (Bingi et al., 1999). With this change, businesses rarely remain static and try to solve the problems in the right way; however, most of them loose control over the project. To implement an ERP system smoothly and successfully, companies require a steering committee to lead and participate in team meetings, spend time with people, monitor the implementation efforts and provide clear directions of the project by giving feedback throughout the course of the implementation. Monitoring and feedback include the exchange of information between all project team members including users (Holland et al., 1999). Leaders need to keep updated alongside each other in regards to the progress of the project and make adjustments to organizational systems and processes as necessary in order to shape and successfully implement ERP (Kim et al., 2005).

Many researchers have indicated and listed factors that affect the implementation of ERP systems such as planning, team work, top management support, communication, project management, change management, education and training, culture, and user involvement. The next paragraph is a literature review discussing the results of researchers in regard to these factors:

- **Planning:** It is important to know up front exactly what the implementation costs will be and set aside the necessary funds (Trimmer et al., 2002; Somers and Nelson, 2001, 2004). Also having a realistic time frame is very important because if the target completion time schedules are unrealistically short or long, the pressure to rush or slow through would result in the implementation being carried out in an unorganized manner (Zhang et al., 2003). In addition along with the control plan, progress reports, and change requests; the manager could update the planning, inform team members of approved changes, and put in place the necessary corrective actions (Franc,oise et al., 2009).
- **Team work:** Having the right composition of the ERP implementation project team is very essential (Umble et al., 2003; Nah et al., 2001; Bingi et al., 1999; Laughlin, 1999; Ross, 1999). This team should contain the best people in the organization (Bingi et al., 1999), and be cross-functional (Nah et al., 2003) to reflect the cross-functional nature of ERP systems. Also, team members need to be assigned full time to the implementation and should be given rewards and incentives in order to successfully implement the system on time and within the assigned budget. The project team should be capable of, and entrusted with, making critical decisions (Laughlin, 1999; Minahan, 1998)

- **Top management support:** Kim et al. (2005), Umble et al. (2003), Nah et al. (2001), Bingi et al. (1999), Laughlin (1999), are amongst those who suggest that top management need to make continuous contributions and commitments in order to make the ERP implementation a success. First, they must create a suitable environment for implementing ERP system and must be seen as participants in the implementation process (Zhang et al., 2003).
- **Communication:** Kraemmerand et al. (2003), suggest that communication is critical to ERP implementation and it is essential for creating approval and well-known understanding of ERP. Gyampah (2004) mentions that effective communication will lead to the development of trust and exchange of information needed for process changes and the acceptance of the technology. According to Bancroft et al. (1998), the communication should start early and remain continuously until the end of the project, and it should include an overview of the system, the reasons for implementing it, and a vision on how the business will change and how the system will support these aspects (cited in Woo, 2007). Because the communication within the team goes beyond information transmission and affects areas such as conflict resolution and the definition of objectives and roles (Francoise et al., 2009). It can also increase personnel's commitment to change as well as reduce confusion and resistance to change (Lippitt, 1997).
- **Project management:** Good project management is necessary. An individual or group of people should be given the freedom and responsibility to drive success in project management (Rosario, 2000). Project management is an important requirement in implementing ERP. Umble et al. (2003) and Nah et al. (2003) suggest that successful ERP implementation requires excellent project management which includes a clear definition of objectives, development of both a work plan and a resource plan and careful tracking of project progress.
- **Change management:** Effective change management is important for implementations of technology and business process reengineering (Grover et al., 1995). The implementation of good change management practices is absolutely fundamental, since an ERP can lead to changes in how things are done and therefore to resistance on the part of end-users. This aspect of the management of ERP implementation is one of the most difficult aspects for managers to deal with since every company has a culture, which may or may not be strong and either has the tendency for openness to change or does not (Francoise et al., 2009).
- **Education and training:** Umble et al. (2003), Nah et al. (2003), and Gupta (2000) suggest that adequate training can help increase success for ERP systems. Vosburg and Kumar (2001) suggest that lack of proper training can demotivate ERP users thus they propose an on-going training as a way to ensure success in implementing ERP. Also, Russo and Kremer (1999) mention that training is an important driver in the success of new system implementation (cited in Woo, 2007). While Markus and Tanis (2000) observed that the lack of user training and failure to completely understand how the business processes change inside the organization could be an impediment to successful implementation. Holland et al. (1999) suggest that users should be involved in the design and implementation of business processes along with the ERP system, and the formal education and training should be provided to help them do so.

- **Culture:** Implementing an ERP system completely changes the culture within an organization, and many companies have found themselves forced to accomplish this successfully (Gargeya and Brady, 2005).
- **User involvement:** Ghosh (2002) suggests that end-users must be involved in the project, from the beginning to the end; this is just as crucial as the involvement of top management in an ERP project (cited in Francoise, 2009). While Gyampah and Salam (2004) mentions that ERP implementation certainly requires the insertion of users across the organization in various levels, this helps with the interaction and in testing the varieties that this system has to offer.

These factors compose a big part of the model of this paper, due to the fact that these factors along with other factors interrelate together leading to a successful ERP implementation.

This paper can be useful to managers of organizations and researchers who are willing and interested in buying ERP systems or those who are interested in finding more helpful ways that can lead to a successful implementation of ERP systems. The remaining sections of this paper will be discussed according to the following outline. The next section will be the statement of the problem, followed by the statement of objective. Next, the model will be described, followed by a proposed validation, and then an assessment. Finally, the study conclusions, limitations, and directions for future studies will be presented.

### **Statement of the Problem:**

ERP implementation is not an easy task since it is complicated, expensive and time-consuming. Implementation duration depends on the companies' size; it might take few months for small companies whereas it might take years for large ones. As for the costs, it varies and can range from a few hundred dollars to 1 million dollars or more for small companies and up to 10 million dollars for large international companies (Mabert et al., 2001). Even after exhausting such a large amount of money on these projects, we still hear about many failure stories of ERP implementation in the media press. The number of failure stories is increasing despite the vast amount of researches that has been made in this domain. Many researchers and consultants are trying to find ways to decrease the rate of failure which is between 60% and 80% (Kocakulah et al., 2006). Nearly 90 percent of ERP implementations are late or over budget (Martin, 1998) and the success rate with ERP implementation is about 33 percent (Zhang et al., 2003).

By losing such large amount of funds, many companies might go bankrupt that leads at the same time to many layoffs. As the fact of the economy which is formed from many interrelated components and people are essential factors of it, firing employees can affect the economy as a whole.

### **Statement of the Objective:**

As the number of failing ERP project is increasing, it becomes essential to form a model that helps businesses in avoiding this threat. Many researchers have talked before about Critical Success Factors (CSFs) and Critical Failure Factors (CFFs) by listing them without explaining the relationships between these factors. Understanding the relationships among these factors from the businesses' side helps them to move towards the right path and to not fall in previous businesses' mistakes.

Basically, this paper is written to help businesses (senior managers, project leaders) as well as researchers. The model in this paper is a comprehensive model that helps businesses to understand the relationships among factors that lead to success by not only pointing and counting

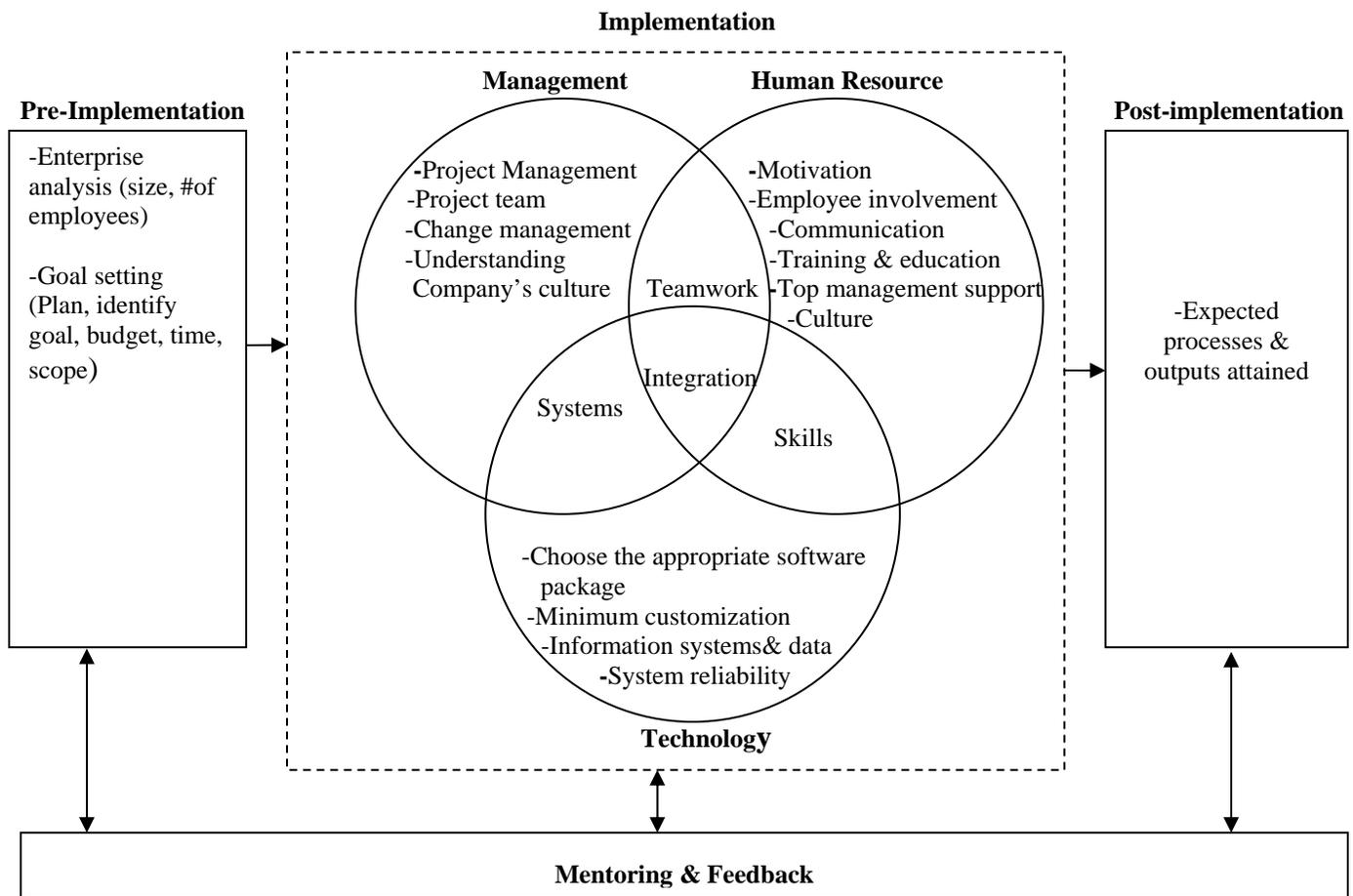
elements but by actually showing the interrelationship among these elements. For researchers, this model will be a good start for more research and models that give a big and complete picture for the factors that lead to successfully implementing ERP.

This paper will discuss and answer two questions:

- 1- What are the factors that would enhance the success of ERP implementation?
- 2- How can the contribution of these factors to the ERP project implementation be insured.

### **Proposed Model and Taxonomy:**

The notion of factors leading to successful ERP implementation is definitely not a new one. Many researchers have attempted to list, define and label these factors as mentioned previously. Besides conceptual simplicity, this model offers an excellent classification, organization, and matching of the factors with each other under same categories. The research framework introduced in this paper classifies factors of successful ERP implementation into three phases: first the pre-implementation, in which decision makers choose to go with the project or not. This is followed by the second stage, the implementation which is made up of three subcategories: Management, Human resources, and Technology. These categories are interrelated with each other due to the fact that ERP software implementation is not a simple project but instead it is a very complex process. A monitoring and feedback process should be done periodically throughout the whole stage of the project in order to achieve the expected final result. Finally the successful implementation (goal of the project) will be achieved. Based on the above-mentioned literature review, a model will be proposed following depicted in Figure 1.



**Figure I.** An integrated model of ERP implementation.

**1. Pre-implementation:**

- **Enterprise analysis:** Buonanno et al. (2005), observes that “existing literature confirms the existence of a mutual dependence between size and organization complexity”. The enterprise analysis is very crucial and important and it has to be done before starting the implementation. Each company has its own structure and it differs from other companies. Enterprise planning should identify the size of the company, the type of work that is done in it, the number of employees, as well as their ability to adapt to new technology and implement a new project such as ERP. Due to this reasoning, managers cannot look at what other companies have done before and follow the same application. Enterprise planning should provide a clear answer to the question whether or not the company is able to start this project.
- **Goal setting:** This should be the first stage of any project; it should begin by defining the goals and the possible methods needed to accomplish these goals. Goal setting can be used as a map where employees can see the light of project success from the beginning of the project. It has a dual benefit: it defines what the project aim is, as well as it motivates employee to commit to the project. A well defined goal helps employees to work harder towards achieving it. Also a clear business vision for the project is required because without it, implementation is likely to be lengthy, costly and the result will not be the

same as the organization's overall strategic vision (Holland et. al 1999). Employee involvement in the setting of the goal is very important and effective since they sometimes have firsthand knowledge and experience that managers themselves do not possess. This variable should answer the question of how to implement the project.

## 2. **Implementation:**

### 2.1. **Management:**

- **Effective project management:** One of the important things that management should take note of is the project scope because ERP systems implementation is very complex, and often involves all business functions as well as requires anywhere between one and two years of effort. A project scope should be clearly defined and should identify the modules selected for implementation. If management chooses not to modify the software and keep it as is, this will help minimize the project's complexity and keep the delivery time on schedule. Nah et al. (2003) believe that excellent project management includes a clear definition of objectives along with the development of a work plan, a resource plan and careful tracking of project progress all of these can lead to a successful ERP implementation. While Zhang et al. (2003) point out that "there are five major parts of project management: (1) having a formal implementation plan, (2) a realistic time frame, (3) having periodic project status meetings, (4) having an effective project leader who is also a champion, and (5) having project team members who are stakeholders".
- **Teams:** are the groups of employees who are formed in order to achieve a successful implementation. These teams should have "the best and brightest" (Finney and Corbett, 2007) people who are capable to lead the project to success. Forming the teams is an important issue as the ERP systems integrates all departments together; thus teams should be formed from people from all departments. Implementing ERP is not only technical and does not belong to the IT department alone. Also interdependence and collaboration among members of the same team and among other teams plays an important role that can lead to success.
- **Change management:** introducing new software such as ERP in the company changes the way jobs are done in the company. ERP systems introduce a large-scale change that can cause resistance, confusion, redundancies, and errors that make the change management essential (Somers and Nelson, 2001). An effective change management helps the organization change and improve its analysis capabilities as well as helping the implementation processes to be carried out smoothly and effectively (Marnewick and Labuschagne, 2005).
- **Companies' culture:** is made up of shared values and common objectives that can lead to a successful organization (Nah et al., 2001). The culture within an organization defines what is of importance within that particular organization and influences as well as directs everyone in the organization. Marnewick and Labuschagne (2005) suggest that the culture of the organization must be changed in order for the ERP system to be successful. That is due to the fact that ERP systems break down all functional barriers within an organization thus requiring users to be multi-skilled and multi-managed. Keeping in mind it is often difficult to implement in an organization with a strict hierarchy structure.

## 2.2. Human Resource:

- **Motivation:** represents the forces within a person that affect his or her direction, intensity, and persistence of voluntary behavior. Direction is the path that employees take to achieve goals. Intensity refers to the amount of effort that the employee sets toward the goal. While the persistence is the duration that employees can sustain their efforts in order to achieve the desired goal. Thus, by motivating the employees; firms can achieve a successful implementation of ERP.
- **Employee involvement:** increases employees' commitment to their job, as well as helps to build trust and loyalty to the company within them. It helps employees to feel as if they are running their own company leading them to provide the best of what they have to offer. User involvement is effective because employees can participate during the whole project plan. In implementing ERP systems, Zhang et al. (2003) finds that there are two areas for user involvement: (1) user involvement in the stage of definition of the company's ERP system needs, and (2) during the implementation of ERP systems.
- **Communication:** is an essential factor in implementing ERP systems as well as in any other project. It has several benefits for the company as well as the team and individual employees in all levels. Communication is a way of coordination between all teams that helps employees to fulfill the needed knowledge about a certain aspect. In addition, communication can be a key driver in knowledge management. It helps distribute the knowledge among employees so everyone remains knowledgeable about any particular task. As a result of the previous benefits communication can be considered the glue that holds the whole organization as well as the teams together. It builds strong social relationships that help employees to cross over the hard time that they face during implementation as well as the development of trust and exchange of information needed. In fact, the lack of communication has been linked to many project failures. Communication provides the path through which employees from different functional areas share important information that can lead to successful implementation of ERP systems (Gyampah and Salam, 2004).
- **Training & Education:** Gyampah and Salam (2004) proposed that training should be provided as part of the implementation process since it affects the shared beliefs about the benefits of the ERP system. Training provides managers with a mechanism to distribute useful and relevant information about the ERP system and how it fits in with the existing and proposed system. In addition, it allows users to interact with the new system and provides a means for them to develop and test varieties of inferences about the ERP system Gyampah and Salam (2004). The main reason for this phase is to increase the expertise and knowledge level of the employees in all levels of the company. According to Zhang et al. (2003) the "three aspects concerning the contents of training are: (1) logic and concepts of ERP; (2) Features of the ERP system software; and (3) hands-on training." Each of these aspects plays an important role in the implementation of ERP systems such providing and understanding of the process as well as decreasing the fear that people might have towards the new computer systems.
- **Top management support:** is necessary for ERP implementation due to the fact that it is a highly integrated information system that requires the complete cooperation of employees from all departments of the business. Top management should be involved in allocating the people and resources needed for continuous improvement after the completion of the main project (Holland et al. 1999). Choosing a project champion by the

top management is very critical and important. The project champion should have strong leadership skills to manage the project as well as strong technical background. Also Zhang et al. (2003) recommend the formation of a steering committee in order to participate in team meetings, monitor the implementation efforts, spend time with people and provide clear directions of the project all of these can lead to a smooth and successful ERP implementation.

- **Culture:** differs from one country to another. People have two cross-cultural values: individualism and collectivism. Understanding the culture and how people deal with each other is a very important issue that decision makers should take care of before starting the project. Some of the cultural issues that are of importance to decision makers are: power distance, individualism and collectivism, uncertainty avoidance, masculinity and femininity. These issues differ from place to place and from one society to another thus decision makers must have a general understanding and decide accordingly.

### **2.3. Technology:**

- **Choose the appropriate software package:** Choosing the appropriate ERP software package that best matches the companies' information needs is vital to guarantee minimal customization. A wrong decision in choosing the software package may lead to a commitment of architecture and applications that do not fit the organizations' business process. To ensure that this does not happen, the decision process should entail the following considerations: (1) budgets, (2) timeframes, (3) goals, and (4) benefits. Organizations differ from each other and everyone has its own structure and business process, so not all ERP software packages are compatible with all companies. Thus, companies should conduct requirements analysis in order to confirm what problems need to be solved and select the appropriate ERP systems.
- **Minimum customization:** It is advised that business processes should be changed in order to fit the new system. Minimizing customization could save a lot of money. Customizations are usually associated with increasing in the information systems costs, longer implementation time and going over the time schedule, along with decreasing and limiting the ability of updates and upgrades of the software later on. Customizations should be avoided to reduce errors and to take advantage of newer versions and releases (Rosario, 2000). All of these previously mentioned points explain and highlight that the organizations should be prepared to change the business to fit the software with minimal customization (Holland et al., 1999) instead of changing the software to fit the business.
- **Information & data network:** Converting data from old systems to new systems is always considered a big challenge for companies. The ability of team members to ensure data accuracy during the conversion process has big effects and can ultimately lead to successful ERP implementation. Data accuracy and correct data should be top priorities in the conversion process. ERP systems are integrated systems that integrate all departments together, that means a mistake in the data can lead not only to a small mistake in the department where it happened but instead it affects the entire organizations. Training employees to ensure that they know how to correctly convert data will be beneficial since it shows them the result of mistakes that can occur at this stage. Besides, it is recommended to use the direct conversion method where all old systems must be eliminated and employees are forced to use the new systems.

- **System reliability:** can be defined as the ability of a system to execute what it is supposed to do in a defined environment. It is a major challenge for companies because unreliable systems can have dual bad effects for them. First, it can frustrate users since they are the ones who are in direct contact with the systems. Second, it can be so expensive for companies. In order to avoid these problems and the system unreliability, companies must understand what makes a system unreliable and then fix it.

### 3. Post implementation:

- **Expected processes & outputs attained:** this is the last stage of the project in which executives can identify whether they have achieved the expected and planned outputs or not. Generally speaking, outputs differ from one company to another depending on each company's respective plan defined at the beginning of the project.

### 4. Monitoring and Feedback:

- **Monitoring and Feedback:** is essential to ensure that the project is on the right path as planned in technical and organizational terms particularly given the mix of internal and external employees who are working on the project and the resulting relationships (Holland et al. 1999). Monitoring and Feedback is the link between all variables and all phases of a project. It can show the errors while working on the project, so it can be fixed at an early stage and does not affect other stages. This is called corrective feedback because employees can catch the errors and fix them. Another benefit of the feedback is that it can be used as a motivational tool especially when employees get positive feedback. This will help them to give more for the project in order to achieve the overall plan and goal setting.

In order to be effective, a feedback should be:

Specific, that means it should not be a general description of the work done, but it should be more detailed and be able to highlight every minute detail.

- Periodic, that means it should be done in very short periods during the whole project in order to evaluate it especially when new stages are added to the project.

The management and the human resource should be linked and have in common teamwork, management and technology with system, human resource management and technology with skills; and all three should have the integration which is the main objective of the ERP.

References are available upon request.