Enterprise Information Systems for Business Integration in SMEs:
Technological, Organizational, and Social Dimensions

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All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

Chapter 26

Elements that Can Explain the Degree of Success of ERP Systems Implementation

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ABSTRACT

The implementation of an Enterprise Resource Planning System (ERP) is a risky and high cost action, even more when we are dealing with small and medium sized enterprises. Although many studies have shown the importance of paying attention to critical success factors in ERP implementations, there is still a high degree of failures and bad experiences around ERP implementations. Most literature has shown experiences of success and failure coming from large sized firms. But there is a lack of information of what has happened in the area of small and medium size firms, and for some economies, they are essential. In this chapter, we try to show a model containing the main elements that can better explain the degree of success and of failure in ERP implementations by providing examples mainly affecting to the circumstances of small and medium size firms. In our model, we propose 5 main groups of variables affecting final results in ERP implementations.

INTRODUCTION

In the last years, many firms have implemented ERP systems, particularly in the industrial sector.

ERPs, enterprise resource planning systems are software packages that allow a complete management of the different processes in a firm. This way by using a modular system, the ERP systems also support different functional areas such as produc-

tion, sales, distribution, finance, human resource management, maintenance, and so on. (Rashid, Hossain and Patrick, 2001).

They make easier the planning and controlling of all the resources, material, financial and human ones, by warehousing the whole information for the firm's decision making process in a unique centralised database (Mabert et al., 2003:303).

The main objective that firms usually seek in ERPs systems is to integrate their activities and organise their processes to make the best of informa-

tion and communication technologies. However, the implementation of an ERP system has some risks, mainly derived from the great quantity of different resources that the process demands (human and material ones) and the uncertainty in the deadlines. Both questions are directly affected by the way in which the process of implementation is taking place. It is then important to analyse the key factors that can offer better possibilities of achieving success when implementing the system.

In this chapter we try to describe the main causes that can affect to the final results in an ERP implementation. For that reason first of all we include a brief explanation on the literature on ERP system benefits, after that we offer a more detailed discussion about the literature appeared on critical success factors for ERP's implementation, finally we propose a model for firms to take into account ERP's Critical success factors.

The main literature reviews on these factors are the research coming from Clausen and Koch (1999), Holland and Light (1999), Koch (2001), Fui-Hon et al. (2003), Umble, Haft y Humble (2003), Al-Mashari, Al-Mudimigh y Zairi (2003),

Finney and Corbett (2007), Kumar et al. (2008), Wang et al. (2008).

The methodologies often used to know about critical success factors are the following ones,

- the studies normally apply surveys and interviews with managers,
- the workers and the external agents implied in the decision making, implementation and use of the system are questioned too.

THE LITERATURE ON ERP SYSTEM BENEFITS

From the nineties, the ERP systems have been one of the greatest investments in IT for the organisations. They are considered one of the best systems that firms can have in order to increase their competitiveness.

ERP systems can provide lots of benefits in firms (Summer, 1999:233). They allow, for example to compete in a global context, to reduce the warehousing material and the costs of production

Figure 1. An ERP schema
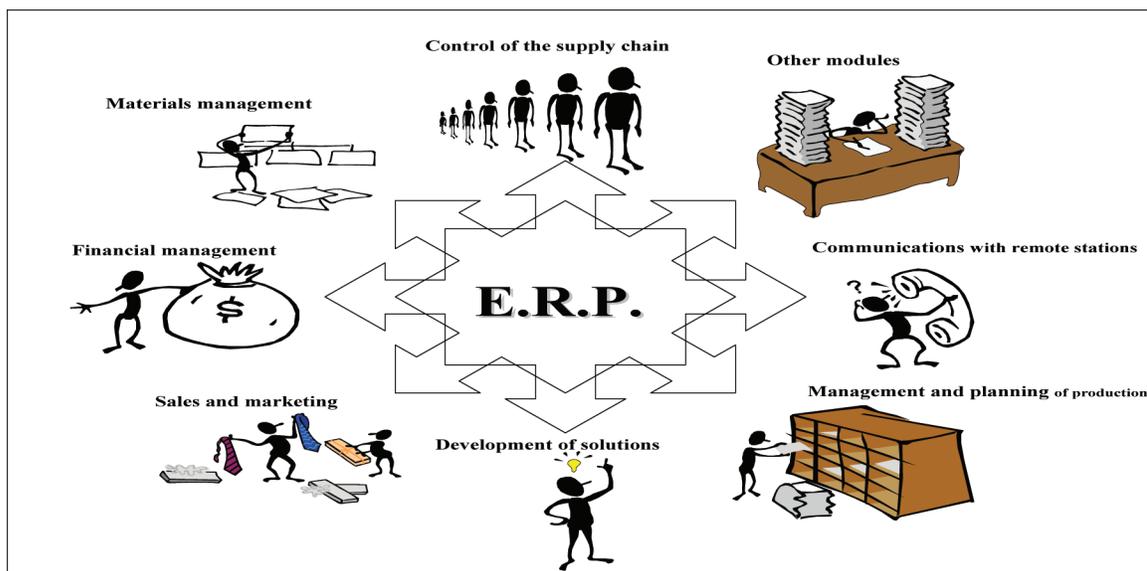
and the increase in the level of service offered to the customer (Ang et al., 2002).

ERP providers use as main marketing arguments the multiple advantages that for a firm arise as a consequence of the integration of their activities and the availability of their information at almost real time. However, in some occasions, these good perspectives are not achieved, and starting to work with the new system may mean big costs for the firms, and can even erode their competitive position.

Akkermans and Van Helden (2002:35) recognise that the ERP implementation demands a great effort and compromise from all the organisational levels. The problems that the firms face when trying a successful implementation have long been explained in the literature review (Holland and Light, 1999, Rosario, 2000, Esteves and Pastor, 2001, Wang et al., 2008).

Trying to find solutions to the problems that the implementation of ERP systems can offer, different academics and consultants have done research on the process of implementation and more specifically, about the determination of the factors that contribute to the success in the implementation, best known as critical success factors (Summer, 1999, Hong and King, 2002, Umble et al, 2003, Fui-Hoon et al., 2003, Finney and Corbett, 2007).

However, most small business owners still today think of ERPs in terms of old communication principles. For them, the ERP is no more than an upgraded version of old systems.

Amongst the common misconceptions regarding integration of ERP we have found (Holland and Light, 1999),

- The transfer of information is unidirectional

Figure 2. The processes of support in the ERP system
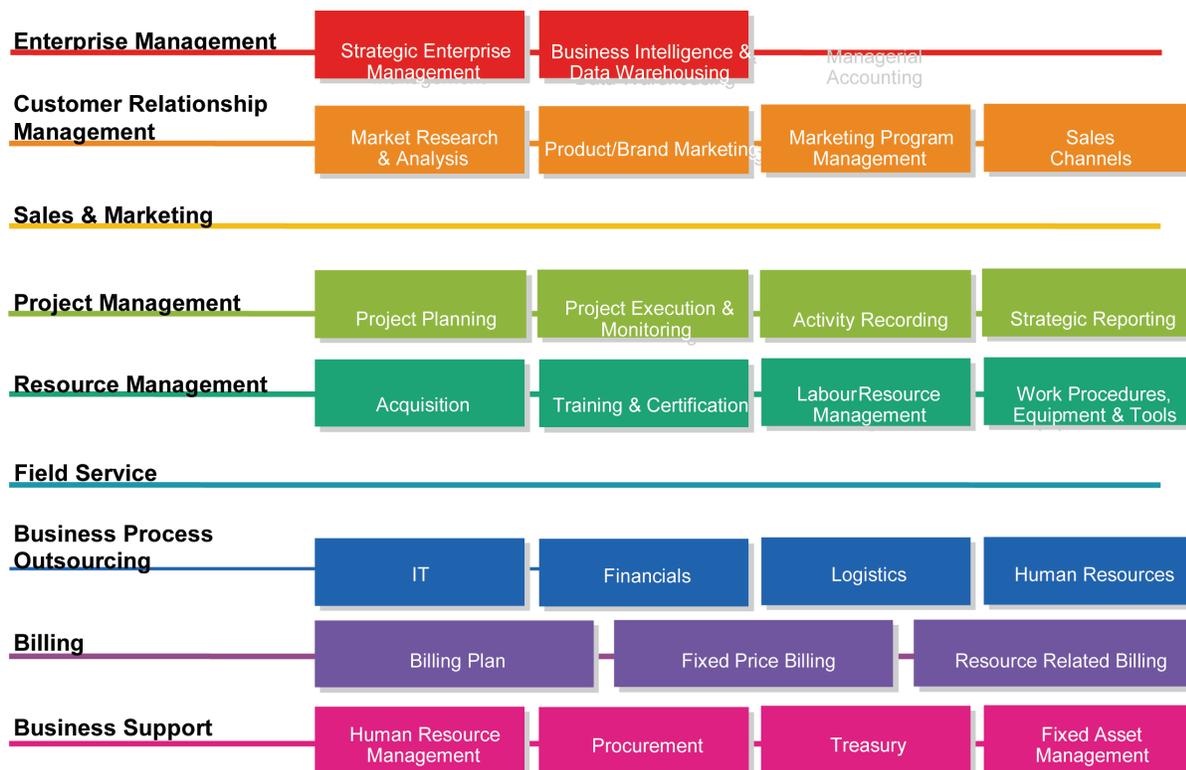
The information can flow in both directions, either from or to the ERP. If the ERP is integrated with the plant, it will demand a bi-directional information flow.

- The ERP integration is all about copying data

Since older methods of integration follow a system of coping a tag and its profile, business owners think that modern ERP system can be integrated the same way.

- The ERP can come up with standardized answers all the time

Many people think that the queries related to a business process follow a set pattern, as do their answers. But they are wrong. Even if the system knows the right question, the right answer may depend on a number of factors.

- One must use only the latest ERP technology

Although the latest ERP integration technologies offer many advantages to small business owners, they have their own share problems. The biggest one is the integration of a new technology to the old systems. Sometimes retaining older applications may be more useful than overhauling them completely.

- ERP to plant integration needs to be total

The ERP system deals with business process, although the plant, system deals with manufacturing and procurement issues. While the plant capacity fluctuates, the ERP capacity remains stable.

- Data security is compromised when you integrate plant to ERP

Many people are concerned about what happens to the data that is not on site. The ERP programmers have spent a lot of time and money on making the system as tool proof as possible, so even data that is not protected by elaborate passwords are not easily accessible by non authorized personnel.

- Installing an ERP system means that you can keep fewer IT staff

The ERP system is not meant to replace your IT staff, it is there to help them with day to day problems related to maintenance and troubleshooting.

ERP BENEFITS

Seddon et al. (1999) argue that is not worth it to talk about the benefits of IT systems without identifying the stakeholder group in whose interest benefits are judged.

Markus and Tannis (1999) explains that no single measure of enterprise system success is sufficient for all the concerns in an organisation's executives might have about the enterprise system experience, and that different measures are needed at different stages in the systems lifecycle.

The five benefits that Markus refers to are the following ones,

- Operational benefits

ERP systems automate business processes and enable processes changes. In this way we can admit according to the operational benefits revised in the literature review (Weill, 1990; Lichtenberg, 1995; Brynjolfsson and Hitt, 1996; Weill and Broadbent, 1998)

- Cost reduction
- Cycle time reduction
- Productivity improvement

- Quality improvement
- Customer services improvement
  - Managerial benefits

A few consider the most relevant literature centred on the managerial benefits of information systems (Zani, 1970; Keen, 1991, Rockart, 1979). We can consider the following ones emerging from the application of ERP systems,

- Better resource management
- Improved decision making and planning
- Performance improvement
  - Strategic benefits

ERP systems offer the opportunity for achieving competitive differentiation by customizing products or services for individual users, at a lower cost (Victor and Boynton, 1998), to support a link with customers (Vitale, 1986, Malone and Yates, 1987) or related business parties (Venkatraman, 1994). According to these authors and derived literature review, we can admit that the implementation of ERP systems offers the following strategic benefits in firms,

- Support business growth
- Support business alliance
- Build business innovations
- Build cost leadership
- Generate product differentiation
- Build external linkages
  - IT infrastructure benefits

Davis (1989), Davenport (2000) and Weill and Broadbent (1998) stress the infrastructure building as one of the fundamental management objectives in IT investment. ERP systems as integrated and standard application architecture provide the following infrastructure benefits,

- Build business flexibility for current and future changes
- IT costs reduction

- Increased IT infrastructure capability
  - Organizational benefits

Information technology, the accumulated information and the application of knowledge are important factors that facilitate organizational learning behaviour (Garvin, 1993).

ERP systems produce the following organisational benefits,

- Support organisational barriers
- Facilitate business learning
- Promotes empowerment
- And helps to build common visions

CRITICAL SUCCESS FACTORS: REVISION OF THE LITERATURE

Themistocleous et al. (2001:9046) motivated by the high degree of failed ERP implementations, describe that a 96.4% of ERP implementations in the international context fail due to the high costs and the poor planning of deadlines. Most of firms and consultants try to hide the causes of the main problems because they are reluctant to admit these failures. Only a few cases of failures as Hershey Foods, FoxMeyer Drugs and Whirlpool have been reported in the literature review (Pang, 2001: 15).

This is the reason why most studies try to collect information about firms having success in ERP implementations and this way identify the "lessons learned" or determine the factors that can lead to the success in the projects.

The Critical success factors (CSF) are the factors that are critical for the success in an organisation, in the sense that if the objectives that are associated with the factor neither are nor accomplished, then the organisation will fail in the achievement of the final objectives (Rockart, 1979: 240).

The establishment of the critical factors of success has long been spread in the literature in the area of information technology. For example, we

Table 1. Most cited CSF

Support to the management The presence of a project leader
The management of the project
Use of the best prepared personal at complete time
Effective communication
Degree of cooperation and inter-department communication
Management of expectations
Level of technical knowledge and business by users
Degree of participation of final users
Standardisation and discipline in the implementation proceedings
Adequate selection of the ERP provider
User's training
Implementation strategy
Clarity in the reach and objectives of the project
Use of external consultants
To develop a minor quantity of modifications to the system
Level of integration between the provider of the system and the customer
Conformation of a group to follow the project
Business project reengineering
Use of tools of support

can find studies about CSF in systems that allow electronic meetings (Grohowski et. al., 1990), the use of computers in small firms (Lai, 1994), e-business and the maintenance of software (Sneed and Brossl, 2003).

In the area of the projects for the implementation of ERP systems, the CSF means the essential ingredients for having success in the final implementation (Colmenares and Otienzo, 2005:628). The identification of the CSF in the local organisations is a way to increase the possibilities of achieving a proper implementation in the ERP system (Sum et al., 2002:274).

Nah et al (2001:7) mention "there is little and very fragmented research on the critical success factors in the implementation of ERP systems"

Taking into account the papers coming from Falkowski et al., 1998, Bingi et al., 1999, Holland and Light, 1999, Stefanou, 1999, Summer, 1999, Rosario, 2000, Wee, 2000, Esteves and Pastor, 2001, Nah et al., 2001, we can affirm that the twenty CSF more cited are the following ones. (See Table 1).

Finney and Corbett (2007), establishes the following critical success factors for ERP implementations,

- Top management commitment and support. It refers to the need to have committed leadership at the top management level
- Visioning and planning: it requires articulating a business vision to the organisation, identifying clear goals and objectives and providing clear link between business goals and IS strategy

- Build a business case: it involves conducting economic and strategic justifications for implementing and ERP
- Project champion: he or she should possess strong leadership skills, business, technical and personal managerial competencies
- Implementation strategy and timeframe: The need to address the implementation strategy and to, specifically, implement the ERP under a phased approach
- Project management: the ongoing management of the implementation plan. It involves the planning stages and also allocating of responsibilities to various players, the definition of milestones and critical paths, training and human resource planning
- Change management: it refers to the need for the implementation team to formally prepare a change management program and be conscious of the need to consider the implications of such a project
- Managing cultural change: it refers to the identification and usage of strategies that are needed to implement cultural change
- Balanced team: the need for a team to realise the implementation that spans the organization
- Communication plan: the communication between the IT personnel and business actors
- Empowered decision makers: the need for the team to be empowered to make necessary decisions in due time
- Team morale and motivation: the need for the project manager to nurture and maintain a high level of employee morale and motivation during the project
- Project cost planning and management: To know the real costs for the project and dedicate money to it
- BPR and software configuration: it must provide a complete description on how the business will operate after the package is in use

- Legacy system considerations: it is needed to know about the current legacy system and it will be a good indicator of the nature of the scale and potential problems
- IT infrastructure: the organisation must be well prepared in the IT architecture and skills
- Client consultation: the need for communicating and consulting various key stakeholders, in particular de client
- Selection of the ERP: the system must match the business processes
- Consultant selection and relationship: it is important to establish the way of knowledge transfer from the consultant to the company
- Training and job redesign: it refers to the need to plan for training facilities and establish compensation plans
- Troubleshoooting and crises management: the need to be flexible and learn from unforeseen circumstances
- Data conversion and integrity: the ability of the team to ensure data accuracy during the conversion project
- System testing: in the final stages of the implementation process, the project team should consider the inclusion of testing exercises
- Post-implementation evaluation: to use performance measures in order to know results of the implementation

Fui-Hoon et al. (2003) and later on Finney and Corbett (2007) offer a complete revision of the authors offering publications in journals of reference, dealing with CSF affecting ERP implementations in different contexts. Next table summarises the citations they offer in their articles, (Table 2).

In a recent interview with a group of consultants specialised in the ERP implementation in the Spanish market (Realtech, Plaut, Strategys, 2008), we concluded as main elements to consider

Table 2. The academic literature review on CSF's

Critical Success Factor	Authors
Top management commitment and support	Roberts and Barrar (1992), Bingi et al., (1999), Buckhout et al. (1999), Summer (1999), Holland et al. (1999), Wee (2000) Shanks et al. (2000), Murray and Coffin (2001), Motwani et al. (2002), Lee (2003); Yusuf et al., 2004,)
Visioning and planning	Roberts and Barrar (1992), Falkowski et al. (1998), Buckhout et al. (1999), Holland et al. (1999), Rosario (2000), Shanks et al. (2000), Al-Mudimigh et al., (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003) Wee (2000)
Build a business case	Chen (2001), Xu et al. (2002), Roy (2003)
Project champion	Falkowski et al. (1998), Summer (1999), Stefanou (1999), Sumner (1999), Rosario (2000), Shanks et al. (2000), Murray and Coffin (2001), Kraemmergaard and Rose (2002), Mandal and Gunasekaran (2003)
Implementation strategy and timeframe	Roberts and Barrar (1992), Falkowski et al. (1998), Holland et al. (1999), Cliffe (1999), Sumner (1999), Gupta (2000), Murray and Coffin (2001), Rosario (2000), Scott and Vessey (2000), Siriginidi (2000), Motwani et al. (2002), Robey et al. (2002), Mandal and Gunasekaran (2003), Umble et al. (2003)
Project Management	Roberts and Barrar (1992), Falkowski et al. (1998), Holland et al. (1999), Sumner (1999), Shanks et al. (2000), Scheer and Habermann (2000), Wee (2000), Nah et al. (2001), Somers and Nelson (2001, 2004)
Change Management	Roberts and Barrar (1992), Falkowski et al. (1998), Bingi et al. (1999), Holland and Light (1999), Murray and Coffin (2001), Rosario (2000), Shanks and Parr (2000), Siriginidi (2000), Sumner (1999), Ross and Vitale (2000), Wee (2000), Aladwani (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004), Wood and Caldas (2001), Kumar et al. (2002), Skok and Legge, (2002)
Managing cultural change	Aladwani (2001), Nah et al. (2001), Davison (2002), Skok and Legge (2002), Tarafdar and Roy (2003)
Balanced team	Falkowski et al. (1998), Bingi et al., (1999), Buckhout et al. (1999), Holland et al. (1999), Stefanou (1999), Sumner (1999), Gupta (2000), Rosario (2000), Shanks and Parr, (2000), Siriginidi (2000), Soh et al. (2000), Wee (2000), Willcocks and Stykes (2000), Nah et al. (2001), Sommers and Nelson (2001, 2002), Kumar et al. (2002), Mandal and Gunasekaran (2003), Ribbers and Schoo (2002), Kalling (2003), Bajwa et al. (2004)
Communication plan	Falkowski et al. (1998), Holland et al. (1999), Sumner (1999), Rosario (2000), Wee (2000), Kumar et al. (2002), Grant (2003), Mabert et al. (2003), Manda and Gunasekaran (2003), Shanks et al. (2000), Yusuf et al. (2004)
Empowered decision makers	Gupta (2000), Shanks and Parr (2000), Chen (2001)
Team morale and motivation	Bingi et al. (1999), Wilcocks and Stykes (2000), Skok and Legge (2002), Trimmer et al. (2002), Barker and Frolick (2003), Mandal and Gunasekaran (2003)
Project cost planning and management	Bingi et al. (1999), Holland and Light (1999), Al-Mudimigh et al. (2001), Somers and Nelson (2001, 2004), Ribbers and Schoo (2002), Trimmer et al. (2002)

Table 2. continued

Critical Success Factor	Authors
BPR and software configuration	Roberts and Barrar (1992), Bingi et al. (1999), Buckhout et al. (1999), Holland and Light (1999), Sumner (1999), Shanks et al. (2000), Soh et al. (2000), Siriginidi (2000), Wee (2000), Aladwani (2001) Palaniswamy and Frank (2000, 2002), Al-Mudimigh (2001), Murray and Coffin (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004) Gulledge and Sommer (2002), Hong and Kim (2002), Ribbers and Schoo (2002) Kraemmergaard and Rose, (2002), Trimmer et al. (2002), Al-Masari et al. (2003), Grant (2003), Voordijk et al. (2003), Bajwa et al. (2004)
Legacy system considerations	Roberts and Barrar (1992), Holland and Light (1999), Siriginidi (2000), Al-Mudimigh et al. (2001), Nah et al. (2001), Al-Masari et al. (2003)
IT Infrastructure	Bingi et al. (1999), Holland et al. (1999), Rosario (2000), Scheer and Habermann (2000), Siriginidi (2000), Wee (2000), Murray and Coffin (2001) Sommers and Nelson (2001, 2004), Kumar et al. (2002), Palaniswamy and Frank (2002), Tarafdar and Roy (2003), Bajwa et al. (2004)
Client consultation	Holland and Light (1999), Al Mudimigh et al. (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003)
Selection of ERP	Chen (2001), Sommers and Nelson (2001, 2004), Kraemmergaard and Rose (2002), Al-Mashari et al. (2003), Yusuf et al. (2004)
Consultant selection and relationship	Bingi et al. (1999), Willcocks and Stykes (2000), and Al-Mudimigh et al. (2001), Kraemmergaard and Rose (2002), Al-Mashari et al. (2003), Motwani et al. (2002), Skok and Legge (2002), Trimmer et al. (2002), Kalling (2003), Bajwa et al. (2004)
Training and job redesign	Bingi et al. (1999), Cliffe (1999), Siriginidi (2000), Kumar et al. (2002), Motwani et al. (2002), Robey et al. (2002), Trimmer et al. (2002), Stratman and Roth (2002), Mandal and Gunasekaran (2003), Tarafdar and Roy (2003), Voordijk et al. (2003)
Trobleshooting and crises management	Holland and Light (1999), Nah et al. (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003)
Data conversion and integrity	Xu (2002), Umble et al. (2003), Bajwa et al. (2004), Sommers and Nelson (2001, 2004), Yusuf et al (2004)
System testing	Nah et al. (2001), Kumar et al. (2002), Al-Mashari et al. (2003), Yusuf (2004)
Post-implementation evaluation	Holland and Light (1999), Ross and Vitale (2000), Nah et al. (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003), Tarafdar and Roy (2003), Umble et al. (2003)

in order implementing with success an ERP solution in a firm,

- To check before contracting an ERP the state of the art of the data that are going to be further processed in the ERP system
- There must be a high managerial support to install the software

- There must be a responsible for the software installation (preferably one that does not belong to the top management in the firm)
- There must be training programs for the users
- It is very important to check that the software meets the needs of the whole company

Figure 3. The need of changing processes

Support to the management
The presence of a project leader
The management of the project
Use of the best prepared personal at complete time
Effective communication
Degree of cooperation and inter-department communication
Management of expectations
Level of technical knowledge and business by users
Degree of participation of final users
Standardisation and discipline in the implementation proceedings
Adequate selection of the ERP provider
User's training
Implementation strategy
Clarity in the reach and objectives of the project
Use of external consultants
To develop a minor quantity of modifications to the system
Level of integration between the provider of the system and the customer
Conformation of a group to follow the project
Business project reengineering
Use of tools of support

(if the software provides the final reports but it worsens the work for employees, it can lose competitiveness)

THE PROPOSED MODEL

In our model we propose 5 main groups of variables affecting to the final results in ERP implementations,

1. the decision-making policy of the firm in the ERP selection, implementation and use
2. the training characteristics of the people involved in the ERP implementation and final use
3. The organisational inertia in the firm
4. The final internal user satisfaction
5. The final external user satisfaction

1. THE DECISION-MAKING POLICY OF THE FIRM IN THE ERP SELECTION, IMPLEMENTATION AND USE

We include as main variables here the following ones,

*   The existence of managerial support,

Finney and Corbett (2007) stresses in their study how this aspect is one of the most cited in the literature review (Roberts and Barrar (1992), Bingi et al., (1999), Buckhout et al. (1999), Summer (1999), Holland et al. (1999), Wee (2000) Shanks et al. (2000), Murray and Coffin (2001), Motwani et al. (2002), Lee (2003); Yusuf et al., 2004). Besides in our recent interview with consultants specialised in ERP implementation in the Spanish market this aspect is highly stressed as one of the most important CSFs.

Top management support in ERP implementations offer two main aspects,

Figure 4. The steps in the process of change

Critical Success Factor	Authors
Top management commitment and support	Roberts and Barrar (1992), Bingi et al., (1999), Buckhout et al. (1999), Summer (1999), Holland et al. (1999), Wee (2000) Shanks et al. (2000), Murray and Coffin (2001), Motwani et al. (2002), Lee (2003); Yusuf et al., 2004,)
Visioning and planning	Roberts and Barrar (1992), Falkowski et al. (1998), Buckhout et al. (1999), Holland et al. (1999), Rosario (2000), Shanks et al. (2000), Al-Mudimigh et al., (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003) Wee (2000)
Build a business case	Chen (2001), Xu et al. (2002), Roy (2003)
Project champion	Falkowski et al. (1998), Summer (1999), Stefanou (1999), Sumner (1999), Rosario (2000), Shanks et al. (2000), Murray and Coffin (2001), Kraemmergaard and Rose (2002), Mandal and Gunasekaran (2003)
Implementation strategy and timeframe	Roberts and Barrar (1992), Falkowski et al. (1998), Holland et al. (1999), Cliffe (1999), Sumner (1999), Gupta (2000), Murray and Coffin (2001), Rosario (2000), Scott and Vessey (2000), Siriginidi (2000), Motwani et al. (2002), Robey et al. (2002), Mandal and Gunasekaran (2003), Umble et al. (2003)
Project Management	Roberts and Barrar (1992), Falkowski et al. (1998), Holland et al. (1999), Sumner (1999), Shanks et al. (2000), Scheer and Habermann (2000), Wee (2000), Nah et al. (2001), Somers and Nelson (2001, 2004)
Change Management	Roberts and Barrar (1992), Falkowski et al. (1998), Bingi et al. (1999), Holland and Light (1999), Murray and Coffin (2001), Rosario (2000), Shanks and Parr (2000), Siriginidi (2000), Sumner (1999), Ross and Vitale (2000), Wee (2000), Aladwani (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004), Wood and Caldas (2001), Kumar et al. (2002), Skok and Legge, (2002)
Managing cultural change	Aladwani (2001), Nah et al. (2001), Davison (2002), Skok and Legge (2002), Tarafdar and Roy (2003)
Balanced team	Falkowski et al. (1998), Bingi et al., (1999), Buckhout et al. (1999), Holland et al. (1999), Stefanou (1999), Sumner (1999), Gupta (2000), Rosario (2000),

- It provides leadership
- It provides de necessary resources
- To successfully implementing an ERP system, firms need spend time with people and provide them with the needed resources. The implementation could fail in case that the critical resources are not available when needed.

For achieving success in a project of ERP implementation it is important to involve the managers in the organisation. Managers must involve to the rest of the people in the organisation in the collaboration and support with the project.

For that reason, periodical committees headed by the main managers in the firm must be cel-

Figure 5. Tools for the management of the change

Plan

Reduction of the
implementation risk

A better management of the
human aspects of the
change

Greater possibilities of
obtaining the results in
forecasted time and budget

ebrated. The organisation must be kept informed about the evolution of the project and about the problems arisen.

• The existence of clear procedures established for the required re-engineering of business processes in the firm

It has mainly to do with managing the cultural change, identified in Finney and Corbery (2007) by the following authors (Aladwani (2001), Nah et al. (2001), Davison (2002), Skok and Legge (2002), Tarafdar and Roy (2003)) and Business Process reengineering Roberts and Barrar (1992), Bingi et al. (1999), Buckhout et al. (1999), Holland and Light (1999), Sumner (1999), Shanks et al. (2000), Soh et al. (2000), Siriginidi (2000), Wee (2000), Aladwani (2001) Palaniswamy and Frank (2000,

2002), Al-Mudimigh (2001), Murray and Coffin (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004) Gulledge and Sommer (2002), Hong and Kim (2002), Ribbers and Schoo (2002) Kraemmergaard and Rose, (2002), Trimmer et al. (2002), Al-Masari et al. (2003), Grant (2003), Voordijk et al. (2003), Bajwa et al. (2004)

Implementing ERP systems requires the redesign of the existent business processes. Many times the ERP implementations fail because some firms underestimate the extent to which they have to change processes. Motwani et al. (2002) suggested that the organisations should be prepared for fundamental change to ensure the success of the business process reengineering.

The companies must profit from the ERP implementation to optimise their business processes by promoting the change in the management system

Figure 6. Schema of the different phases and associated tasks
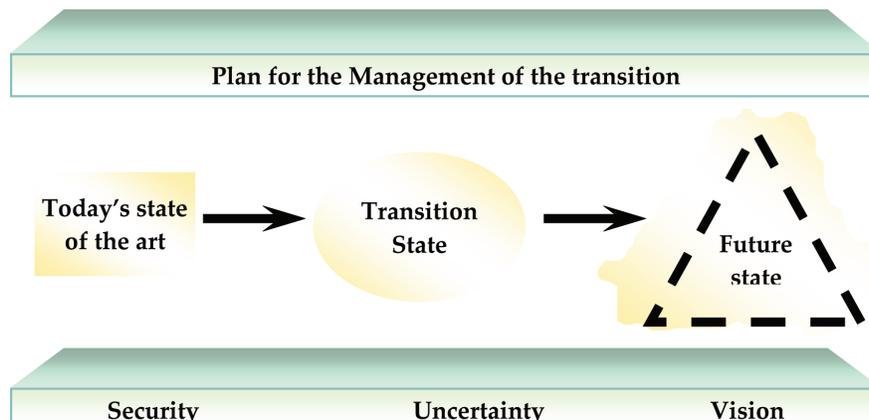
and the experience in the consultancy teams that take part in the implementation of the new system. Therefore, it is critical the process of change that accompanies to the project.

The focus in the change of the management allows surpass the uncertainty state that appears in the people working in this kind of projects.

In the management of the change in a project for the implementation of an ERP system, the firm must work on three different aspects:

• The effectiveness of the project management

It has to do with the aspects of change management (Roberts and Barrar (1992), Falkowski et al. (1998), Bingi et al. (1999), Holland and Light (1999), Murray and Coffin (2001), Rosario (2000), Shanks and Parr (2000), Siriginidi (2000), Sumner (1999), Ross and Vitale (2000), Wee (2000), Aladwani (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004), Wood and Caldas (2001), Kumar et al. (2002), Skok and Legge, (2002)) and project cost planning and management(Bingi et al. (1999), Holland and Light (1999), Al-Mudimigh et al. (2001), Somers and Nelson (2001, 2004), Ribbers and Schoo (2002), Trimmer et al. (2002)

Project management plans, co-ordinates and controls the complex and diverse activities of modern, industrial and commercial projects.

The implementation of ERP systems implies the working of different activities, all involving business functions and requiring a long time effort. There are five main parts to consider in project management

1. having a formal implementation plan
2. offering a realistic time frame
3. celebrating periodic status meetings
4. having an effective project leader
5. including project team member that, at the same time, are stakeholders

◦ The existence of a wide commitment in the different areas of the firm

It refers to the existence of a communication plan (Falkowski et al. (1998), Holland et al. (1999), Sumner (1999), Rosario (2000), Wee (2000), Kumar et al. (2002), Grant (2003), Mabert et al. (2003), Manda and Gunasekaran (2003), Shanks et al. (2000), Yusuf et al. (2004)), empowered decision makers (Gupta (2000), Shanks and Parr (2000), Chen (2001)) and team morale and motivation (Bingi et al. (1999), Wilcocks and Stykes (2000), Skok and Legge (2002), Trimmer et al. (2002), Barker and Frolick (2003), Mandal and Gunasekaran (2003).

Taking into consideration that the ERP systems are enterprise wide information systems that attempt to integrate information across all functional areas in an organisation, it is important to get the needed support from all functional areas from the organisation. Everyone in the organisation must be responsible for the whole system and key users from different departments must have cleared the project implementation phases.

When realising the implementation of an ERP, a previous methodology must be established, where clearly the steps in the project and the involvement of each of the key-users and the consultancy team that takes part in the implementation are specified.

• The existence of a wide commitment in the different stakeholders in the implementations (vendor support, external services)

It is close referred to the selection of the ERP (Chen (2001), Sommers and Nelson (2001, 2004), Kraemmergaard and Rose (2002), Al-Mashari et al. (2003), Yusuf et al. (2004)) and the consultant selection and relationship (Bingi et al. (1999), Willcocks and Stykes (2000), and Al-Mudimigh et al. (2001), Kraemmergaard and Rose (2002), Al-Mashari et al. (2003), Motwani et al. (2002),

Skok and Legge (2002), Trimmer et al. (2002), Kalling (2003), Bajwa et al. (2004).

It is very important for the customer that decides to implement an ERP system in his/her organisation and for the providers, to align the implementation services with the achieving of the objectives fixed for the project.

Those objectives must be clearly defined in the design document elaborated once that the analysis and requirements feeding phases have been finished. The design document must contain the situation of the business processes before the implementation and the future situation, once that the business process reengineering effort to implement the ERP systems, has taken place

2. THE TRAINING CHARACTERISTICS OF THE PEOPLE INVOLVED IN THE ERP IMPLEMENTATION AND FINAL USE.

It is related to the aspects of training and job redesign (Bingi et al. (1999), Cliffe (1999), Siriginidi (2000), Kumar et al. (2002), Motwani et al. (2002), Robey et al. (2002), Trimmer et al. (2002), Stratman and Roth (2002), Mandal and Gunasekaran (2003), Tarafdar and Roy (2003), Voordijk et al. (2003), data conversion and integrity Xu (2002), Umble et al. (2003), Bajwa et al. (2004), Sommers and Nelson (2001, 2004), Yusuf et al (2004)) and system testing (Nah et al. (2001), Kumar et al. (2002), Al-Mashari et al. (2003), Yusuf (2004). The interviews with the consultants offer us a similar criterion when they refer to the need of establishing training programs for the users.

As we know by the nature of an ERP system, it includes all the material and human resources related to the management of the information in the firms. In this sense, a first vision distinguishes between both types of human resources in the information system of a firm: the final users and the personal working on them.

Final users are all those persons that take part

in the information system of a firm to get the final product, as defined by Garcia Bravo (2000). We can consider that all the members in an organisation are potential final users of the system, since all of them are going to use and modify information.

The role of final users has more relevance in the last years due to the decentralization of these systems. This way, a greater proportion of the people in the organisation are involved not only in the processing of information and the obtaining of a result, but in some other activities as can be the development of the systems.

The personal of the information systems include all the workers in charge of the ERP development, management and maintaining. Traditionally it has been considered that this people is specialised in the information system by being named system techniques.

The change in the role of the information systems in the organisations has evolved along time. This way, by considering the ERP strategic role, it has been considered that the responsibilities in the ERP are not just technical ones but they necessarily include some other functions related to the strategic management or the firm's policy. Additionally part of this workers must have specific skills in the management of human resources.

For that, we must also consider widely extended the differentiation between managerial and ethical skills.

It is also traditional the division of people of information systems according to the hierarchical order of responsibility assumed. We can consider this way, that the system always includes a top executive of the company, the Chief Information Officer, CIO, directly reporting to the President or the chief Executive Officer in the firm (CEO); a certain number of intermediate managers, with limited responsibilities, the technical personal, specialised in some tasks if a certain added value in the firm, and therefore with a margin of decision, and the operations personal, in charge of the performance of concrete task of structural character, this means, low autonomy.

Figure 7. People from the IS working on ERP system (McLeod, 2000)
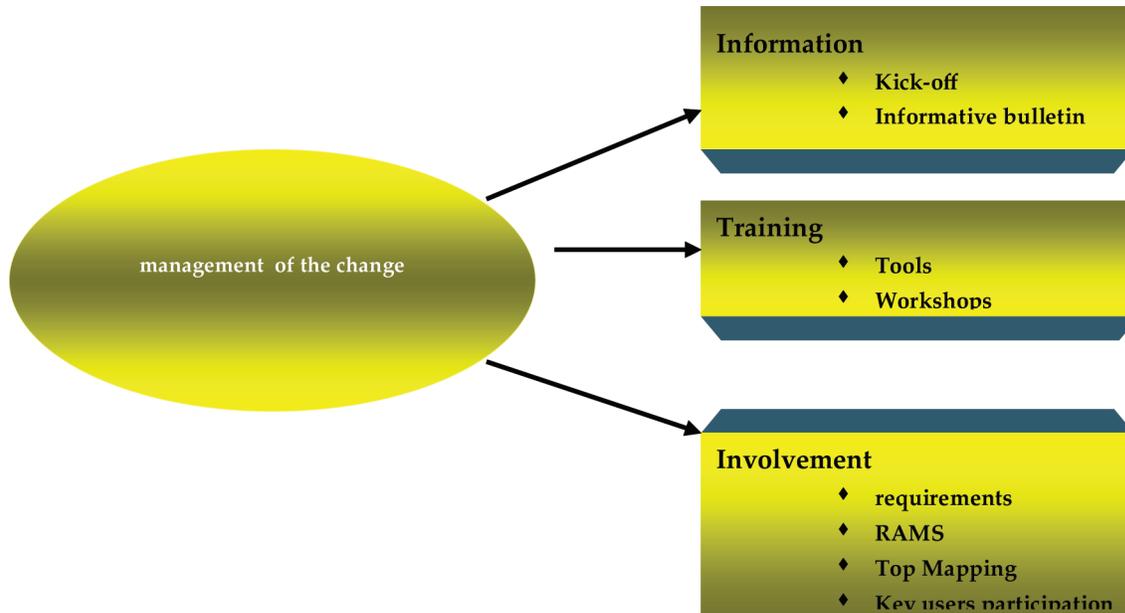
Functions of the Workers in ERP Systems

Monforte Moreno (1995) refers to the organisation of the ERP systems to a series of functions, independent from the firm's dimension, which we can sum up in the following ones,

Development of the systems, programming and operations of exploitation: it includes the tasks related with the analysis, design, development and implementation of the ERP systems in the firm, together with the programming and maintaining of applications.

Security of the ERP systems and installations, It includes the needed operations to avoid the loss of information, the prevention of physical and logical attacks to the system or the insurance of the buildings against human or natural errors.

The administration of the ERP information, related with the management of the use of the resources of information systems and the "internal payment" of these services to the departments requiring them.

Standards and system techniques, it refers to the planning in the acquiring of new technologies and their implementation in the firm. One of the main tasks for this aims it is the constant seeking of the technological environment, to analyse the new availabilities of resources for acquisition.

In a similar way, McLeod (2000) propose a scheme of the organisation adapted to the model of the life cycle, reflected in figure 1. The main character is the CIO with a wide group of responsibilities and functions. In the middle level, the author situates a group of supervisors of the different areas of the system, under his/her control. And reporting to these last ones, we can find the technical people and the operators working in each of the functions.

Mc Leod refers to a functional organisation in the department of information systems in the firm. If we take into account a matrix structure, we must add in the horizontal direction, the existence of different projects, with a person in charge in each case. The authority of the responsible of the various projects can be in charge of a group of firms.

In fact, McLeod, manifest how his drawing it is not necessarily a unique model nor a fundamental referent, by indicating that the drawings of different firms reflect in a more precise way the existent responsibilities. In this sense, the analysis of the more frequent asked positions from the human selection firms can contribute to better define which ones are the human resources profiles that can better contribute to establish the profile of the main specialists related with information systems.

The Annual Report from the Michael Page Consultancy firm (2005), specialised in the search of specific profiles related to the information technologies, considers the existence of four types of functions in the ERP system, by indicating which ones are the profile of responsibility in each of them.

The managerial functions offer the main responsibilities of the information system. The Chief Information Officer (CIO) is the main responsible of them, with a main managerial profile.

The observation of the most demanded profiles to a specialised consultancy firm in human resources offers a vision on the variety of profiles that correspond with human resources in the information system. However, it seems that the key factor for the identification of these responsibilities, and therefore, for the definition of the needed human resources is in the identification of the functions, and the specific responsibilities of each level.

In this group of functions or responsibilities, we can stress the Chief Information Officer, as the main responsible of the system and at the same time, an important part of the executive management of the firm. This situation makes more interesting to plan a study on the functions of the CIO and on the abilities that this person must have to match these functions.

Human Efforts of the ERP Implementation and Rewards

The strategic management in the human resource area refers to a group of policies that define the strategy of human resources in a firm, this means, the main decisions related to this area. They can have a significant influence over the organisation and the results.

Some of the main human resources policies widely studied have been the following ones,

Recruitment policy: it deals with integrating in the organisation people having the required skills for the development of a group of activities and firm's functions in relation with the ERP system. In this sense, one of the decisions more studied is "to do instead of buying", that faces the internal formation of the new personnel with the search in the market of the human resources containing the proper profile in competencies. It also belongs to this ambient the decision about the factors that must be taken into account when searching new human resources.

Training and development policies, they have to do with the increase of stock of individual skills coming from the human resources in the firm, that can besides contribute to the improvement of collective skills. Inside this ambit, we can consider the decisions around the quantity of training to be offered about the ERP system.

Policies on the design of the work profile, they mainly refer to the variety of functions and tasks included inside a work profile around the ERP system. Inside this part, policies for job enrichment and level of specialisation desired are included.

Rewarding policies, related with the rewards that the workers receive from their work. In this sense, we must consider included here all the decisions dealing with rewards, shares offered, holiday programs and any other extra reward.

These policies will be the main part in the strategy with ERP workers.

Ferrat et al (2005) realise an empirical analysis where they consider five different configurations in the human resources policy in a firm:

- Policies oriented to the human capital: the responsible for the people management in the ERP system treats to motivate them to keep them in the firm. This means the use of rewards techniques by including the promotion of different groups taking part in the ERP implementation.
- Policies oriented to the tasks: the work profiles in the ERP systems tend to a high rotation, with high salaries according to technical aptitudes.
- Technical people rewarded: being offered great economic incentives. Their selection is only based on their technical skills. We are often dealing with a high rotation work profile. It is due to a limited offer of professionals containing certain abilities.
- Work assured. This is the main way to maintain workers, to offer them stability at work, further of incentive policies and a feeling of belonging to the group of the organisation.
- Work utility. A greater emphasis is paid for an important level of incentives, the search of non technical knowledge and the work stability, by leaving apart a sense of belonging or work enrichment.

It seems clear that the human resources policies of the information system can be varied, especially by having into account the wide number of available tools in this area.

The Ethics and the ERP System

The CIO must be the highest responsible for the computer ethics in the ERP system, and must then supervise and pay attention to the influence of the ERP over society and consider the policies that can be adopted for a correct use of the technology.

For Moor (1985) there are three main factors that make society be cautious with their use,

- The logical malleability, which makes that an ERP, can be programmed to operate in various ways. This makes society be afraid of the bad use of information systems, as can be the physing practices (trying to capture user keys)
- The transformation factor. ERP have radically changed the way workers interact. This capacity of change makes people ask themselves about the proper use of a resource with such a power of change.
- The invisibility factor that promotes the ERP system to be a true "black box" for some users. They know what it produces but they do not know how and why it produces it.

This preoccupation for the ethics is immediately perceived by people working with the ERP systems, especially for those in charge of the more invisible part of them.

Many countries have developed Acts that punish some non-ethic conducts. We count on with the existence of ethical codes associated to a professional conduct related to information technologies and systems, probably the more extended ones are the ACM and IEEE (Association for Computer Machinery e Institute of electrical and Electronics Engineers) and the DPMA (Data processing managerial association), The ICCP (Institute for certification of computer professionals) the ITAA (Information technology association of America). In Europe the CEPIS (Council of European Professional Informatics Societies) has its own ethical code.

Parker (1988) proposes ten actions to promote the ethical conduct in the employees in the information system of a firm that could be extended to the ERP cases,

Figure 8. The change in the organisation
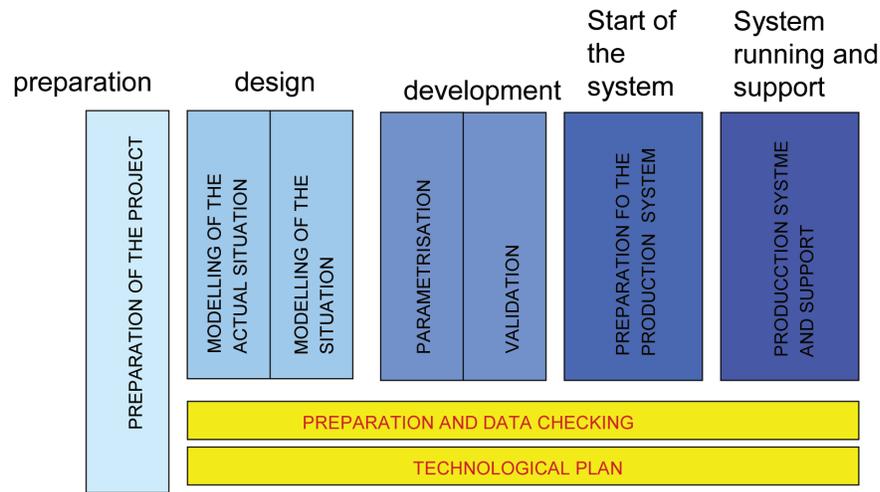
- To formulate a conduct code
- To establish the clear acting rules in situations of ethic conflict
- To clearly specify the sanctions applied in non ethic conducts
- To public recognise the ethical conducts
- To develop programs, meetings and recommend readings
- To inform, promote the knowledge of the Acts implied with the proper use of IS and IT at Organisations
- To delimitate the ethical responsibilities if each worker according to their tasks.
- To promote the use of "restructuring programs" for people avoiding ethical norms.
- To promote the integration of workers in the professional associations
- To offer example with the own acts.

3. THE ORGANIZATIONAL INERTIA IN THE FIRM

It is referred to the following aspects: visioning and planning Roberts and Barrar (1992), Falkowski et al. (1998), Buckhout et al. (1999), Holland et al. (1999), Rosario (2000), Shanks et al. (2000), Al-Mudimigh et al., (2001), Al-Mashari et al.

(2003), Mandal and Gunasekaran (2003) Wee (2000), change management Roberts and Barrar (1992), Falkowski et al. (1998), Bingi et al. (1999), Holland and Light (1999), Murray and Coffin (2001), Rosario (2000), Shanks and Parr (2000), Siriginidi (2000), Sumner (1999), Ross and Vitale (2000), Wee (2000), Aladwani (2001), Nah et al. (2001), Sommers and Nelson (2001, 2004), Wood and Caldas (2001), Kumar et al. (2002), Skok and Legge, (2002), balanced team Falkowski et al. (1998), Bingi et al., (1999), Buckhout et al. (1999), Holland et al. (1999), Stefanou (1999), Sumner (1999), Gupta (2000), Rosario (2000), Shanks and Parr, (2000), Siriginidi (2000), Soh et al. (2000), Wee (2000), Willcocks and Stykes (2000), Nah et al. (2001), Sommers and Nelson (2001, 2002), Kumar et al. (2002), Mandal and Gunasekaran (2003), Ribbers and Schoo (2002), Kalling (2003), Bajwa et al. (2004). It is in relation with the need of establishing a responsible for the software installation referred by the consultants in the interviews.

The organisational inertia has to do with aspects in relation to culture, values and ways of group expression in the organization. Organizational change implies the leaving of some structures, procedures and behaviours and the adoption of

other ones, with the main objective of improving the final performance. The management of the change implies the application of concepts, techniques and methodologies that are going to make it possible de complex migration from an initial not desired status to another final desired one.

The simple acceptation of the change is a quite controversial theme in the firm, at an individual and organisational level. At an individual level, it means the abandonment of some habits and the acceptance of new ways of working and interacting at work. In the most extreme of the cases, as it would be the massive virtualisation of a process, it can even lead to new ways of socialisation, than can not be accepted by the people collaborating or working at the organisation. At an organizational level, this situation is even more complex, since there are more people implied that have to deal with the imposition of a decision that can dislike others.

The management of change must start with the challenge of determining what is going to be changed. We have to distinguish between people; they must make decisions in relation to what it is going to be changed since they have responsibilities in the organisations, and those who are directly related in the process, people who are asked in an informal way and those others who are not even asked for. Once the change has been implemented, there will be people informed and trained in the process and people who have just been informed. These circumstances logically are going to have an impact in the change, in a positive or negative way.

The Process: The Main Axis for the Change

Organisations develop their objectives through processes. A process is a group of tasks allocated in different firm areas and that develop a group of functionalities or specialisations. In this sense, we can say that a process is trans-functional. A process has a point of start and end and around it

many different functions are working in different periods of time, in a parallel or sequential way.

Garvin (1998) classifies the firm processes in two categories: operational processes, the ones that create, produce and develop goods and services that the customer's desire, and administrative processes, they do not produce anything for the customer, but they are needed for the daily business operations.

The concept of trans-functionality in the process and the consideration of the co-living of different kind of processes in the organisations are very important when considering the organisational change. In the first place, because the effort in the change it is going to promote impact in the whole process, because any of the firm's task is part of a whole business process, and, in the second place, because a change in any part of a process, it does not matter its nature, will have an impact in a process connected with the previous one but of different nature (for example a working process has an impact in a decision making one). In this sense, and just as an example, the automatic feeding of a customer's data by using a corporative Intranet (work process) can allow that any point of selling can directly solve a decision that affects the customer, and in case of not counting with that automatic feed, it will be impossible to develop this process (for example the process of offering a bank loan to a customer).

Models of Change Oriented to Processes

The management of change does not only mean a decision in the choice of the new ERP tools for the management of work, it also constitutes a decision on how to maximise the competitive advantages that the technology can offer to the firm. In the nineties the term business process reengineering (BPR), (Hammer, 1991) appears. Champy and Hammer (1994:32) define business process reengineering as the "fundamental thinking and radical redesign of business processes with

the main objective of reaching drastic improvements". The objective of the business process reengineering it is not a pure change on any existent process, but the development of a new one that substitutes the previous one by following the criteria of firm's value.

In contrast with the concept of BPR, it appears the concept of organisational development (OD), also known as "planned organisational change". This concept proposes a model of change based in the participation. The main premise in this orientation consists of accepting what attitudes, values and behaviours of a group of members in an organisation are, and what it is important to be changed before promoting any change in the system.

In the organisational development we must to take into account not only the processes, but the quality of life of workers too. For that reason we work with the concept of decrease in the hierarchical distance amongst them and a different distribution of power that helps to develop a culture of mutual trust. While the BPR is developed from up to down (it is an action imposed from the management in the organisation), the organisational development follows a bipolar strategy, it could be up down, or the other way around.

The organisational development (OD) includes a structural approach and personal for the change. The structural aspect relates with the creation of a favourable framework. It means a change in the rules and description of work tasks. The personal aspect is centred on the promotion of the skills and a desire coming from the employees to accept the support in the change process. The effective application of the organisational development is mainly supported in two principles:

- To help people to take care of themselves
- And involve everyone that can be affected by any change initiative

Normally in the management of the change, basic models based in the sequences "unfreeze-

build and freeze" are used. The main idea is to change the organisation from an organizational way and a determined cultural model maintained along time and for that, it is needed to unfreeze, for building a model of acting that better fits with the environment and the technological possibilities at the moment, and try to make that model work and be maintained in the organisation "freeze".

This model has to be rapidly moved since the innovation rate that the information technologies offer runs at a fast speed.

Any effort that attempts to managing the change in a clever way must recognise the absolute need to generate a lack of satisfaction with the start point. This way the optimal point of start is guaranteed to sell or convince about different ways of developing the processes.

We offer here some ways of creating an environment of change in the organisations,

- To create a dissatisfaction: by showing lack of skills in the status quo, by communicating relevant variations in the internal profile and the external situation, that show the need of change. For example, the globalisations of the markets have made appeared the need of marketing the products in new geographical areas. For that reason, it is important for the system and the people in the company to be able to work in different languages and currency.
- To reduce the fear for the change: by establishing open discussions, based on the experience of other companies and other parts in the organisation. For example, the resistance to change can be a decisive cause for the failure of a project of ERP implementation. For that reason, most companies apply for the collaboration of external consultancy firms experienced in the same industry, to be informed before starting any project.
- To create energy in the company around the benefits of the change in people from

Figure 9. Organization of teams
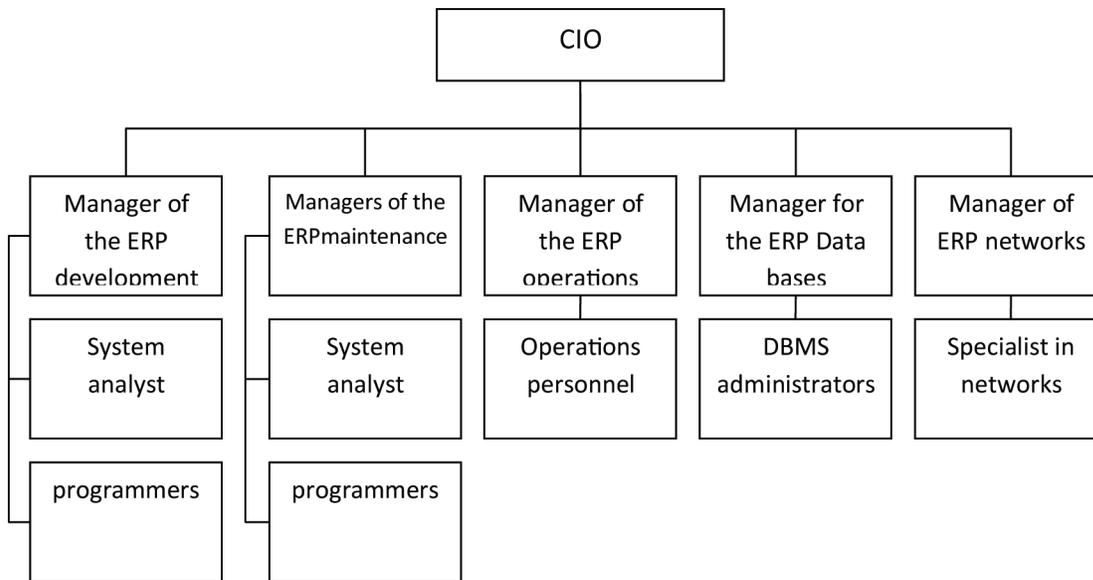
an individual and collective perspective. For this reason the information must be properly managed. It must reach to everyone in the firm and it must help people to be involved and enthusiastic with the new project. The firms can use different channels to offer the information

- ◦ Kick-off: a meeting with all the participants. A starting point in the project with an explanation of the main objectives and the methodology used to achieve them.
- ◦ The information bulletin
- ◦ The periodical information, to publicity the project state of the art
- ◦ The development of the Intranet: public information of the generated documents from the project to the firm's intranet.
- To build support for the change: by identifying the persons in charge of the change efforts and work with them. Before starting a project, it is important to define who are responsible of it in the firm that it is implementing the system and in the external collaboration groups too.

- To define specific objectives for the change: in detail and that can be measured in clear deadlines. Work teams are usually established to fix the objectives associated to the different business areas implied in the project and measure the persecution of the objectives and typical deviations.
- To define awards and punishments in the change and their impact in the profiles and work places. In the contracts of collaboration with external providers, it is important to include mechanisms of punishment by both parts (provider and customer). They can be activated in case there are deviations in the final ERP functionality or in the initial agreed deadlines.
- To plan the adequate training and synchronised with change. In the various phases of the project, different training plans are established according to the different users implied on them. As we descend in the organisational levels, the training required is more specific and specialised.
- To communicate the efforts for the change and make participate to the employees in them, etc. Communication matrixes must

be defined where the different people's profiles and the related information with the project are informed in each of the project steps.

However, any effort for the change must also recognise the appearance of a group of situations that are going to promote the desired modifications. Amongst them, we can stress,

- Immobilisation: a feeling of being unable to plan and understand. It can be especially relevant when the transition is negative represented or unexpected. For example, a situation in which someone can lose a work that he or she specially loves.
- Minimisation: a negative for the change that it exists or it is going to take place. It has a positive effect in time, and it is also influenced by psychological mechanisms.
- Depression: to recognise that the change can not be avoided, joined to a feeling of being unable to stop it.

   Laisser-faire: an acceptation of the reality

- Tests: in the new situation, one tries to experiment new ways of work, socialisation and so on. Sometimes all mixed with a sense of irritability.
- Search of sense: after the energy consumed in the previous phase, it is the search of understanding why things are different.
- Internalisation: once finished the transition, changes are incorporated in the behaviour. People must be involved in the management of change that accompanies to a project of implementation of a new ERP system, and they must make feel part of the main success. For that reason two types of meetings must be established according to the degree of interrelation of the different hierarchical levels in the structure of the organisation:

    ◦ RAMS (Requirement analysis for management systems), group meetings with the users for the requirements. The consultancy team collects the initial information to develop the further work. It is a nice moment to identify some opportunities of improving the functionality of the system or changes at an organisational level produced by the implementation.
    ◦ Top Mapping: personal meetings with the main responsible of each area. The main objective of this action it to complete the firm's vision and its future.

Apart from creating the need and desire of change and define results, it is needed to consider the resources for the change plan (money, personal, time, managers, consultancy firms and new work profiles, etc.). it is also needed to decide in which way the progress of the plan it is going to take place.

Amongst the most common failures that are going to be produced in the management of change, we can stress,

- To dedicate less attention to the work places, responsibilities, structures and resources.
- To change the program preview at first glance.
- To wrongly assign responsibilities of change to people that are not prepared.
- A non realistic estimation of the time dedicated to the change.
- The lack of identification of the desired emotions in the employees during the implementation of the change.
- The inadequate consideration on how to be involved in the change.
- Not considering contingency plans for events that are not be taken into account previously.

- To ignore the need of communication the results expected for the change.
- Not to recognise the work of all those that have promoted the change
- A deficient thought in the expectations created about the change
- Not to pay attention in how maintaining the employees motivated and involved.

All of them are typical failures in the projects of ERP implementations, The managerial positions must take into account that we are dealing with strategic projects for the company and therefore, the resources assigned to them must be independent of the typical daily tasks. This is very important to organise the required time to the project.

We can include as main critical factors in the implementation of ERP systems here the following ones,

- To involve the final customer in the project
- To design the needed measures to make final users real participants in the project
- To synthesis the demanded needs and translate them in computer terms
- To create a technological culture
- To discuss and propose improvements in the processes
- To warranty the internal and the external coordination of the project by minimising risks
- To establish roles and responsibilities of the project form the initial phase
- To assign the proper people profiles to the project, with the proper level of authority, experience and capacity
- To use a proper methodology specialised in ERP implementations
- To develop a plan of quality
- To make sure that the personal in the project is trained enough and the management of the change takes place.

And amongst the main characteristics that make possible the change of the management we can stress,

- A wide access of the most complete information possible
- To have the organisational skills for manipulating ambiguity
- To promote organizational innovation
- To open the organization to be ready to take risks.
- To have the kind of information systems required clear.
- To develop the skills to manage the conflict.

Information and communication technologies play an important role in the change. They enable and make it possible the change in the actual business environment.

The organisation is in a constant need of change. When a certain process is clearly inefficient, an effort for the redesign is developed. Afterwards in time, and until again the situation in the new process can be maintained, the firm will periodically develop initiatives for the continuous improvement.

Methodologies for implementing changes coming from ERP implementations in the firm.

The main methodologies explaining change in firm's processes are considering the following principles exposed by Hammer and Champy (1996),

- Organise around results, not tasks
- Make that those that are going to be benefited from the final results be the ones implied in the change
- Include the work of processing information in the real work produced by the information
- Treat geographically dispersed resources as if they were centralised

Table 3. Organisational changes and principles of the redesign of processes (Davenport, 1996)

Change	Result
Working units	From functional departments to processes
Change of work	From simple tasks to multidimensional work
Change in people's role	From training to education
Measure of the results	From measuring activities to measuring results
Organisational structures	From hierarchical to flat structures
Change in business leaders	From seekers to leaders

Table 4. The process of change (Davenport, 1996)

1. Identification of the processes to change
2. Identification of the change enablers
3. Understanding today's processes
4. Development of the vision of the process
5. Design and build of a prototype of a new process

- Link parallel activities instead of integrating tasks
- Position the decision making point where the work that it is going to be performed and provide control in the process
- Reach the information once and in its primary source.

This brief list shows the main keys of change efforts when trying to restructure organisations around processes, further specialised functions. Some way, this principles change the ones traditional coming from the division of work orientation.

The application of this principles has offer a group of organisational changes, extended along firms and collected in the Table 3,

Davenport (1996), by considering these principles, describes five steps for the change of processes that can be applied to help in a successful ERP implementation. (Table 4)

In the identification of the processes to change, the main processes in the organisation must be described. They will be limited by clearly defining their point of start and end. Lastly, an evaluation about the degree of satisfaction in these processes will be developed.

In the identification of the change enabler's step, the main elements that come from inside and outside the firm and can have an influence in the effort of the change are identified. The ERP information technologies and human resources in the firm can be essential, as we have already previously defined.

In the following phase, it is important to understand the existent processes. It is really difficult to describe where we want to arrive if we do not know about our starting point. Besides, understanding where some failures are being done today can help us preventing them in future occasions. Besides, this phase implies communicating to the implied agents in the processes of today the desire to promote changes or substituting them.

In the vision of the process, it would be convenient try to find a link between that vision and the strategy for promoting a logical congruence in these elements that need to change. Strategy and processes in the organisations must look at

Figure 10. Business change and information technologies

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┌─────────────┐      ┌┈┈┈┈┈┈┈┈┈┈┐      ┌─────────────┐
│  Initial non│      ┊  CHANGE  ┊      │    Final    │
│   desired   │      └┈┈┈┈┈┈┈┈┈┈┘      │   desired   │
│  situation  │                         │  situation  │
└─────────────┘                         └─────────────┘
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the same direction. For that, it is needed to draw the new process. In this sense, some steps can be of help,

- To evaluate the up to day competitive strategy to determine the direction in the process
- To consult with customers the process on expectations of results in the same
- To compare amongst the improvement expectations and examples of existent innovations
- To fix the objectives of results in the new process
- To develop the specific attributes of the new process. This means establishing the basic characteristics it tries to build.

In the design of the new process, we can use a group of ideas that can help us to generate the process, for example, the brainstorming, or use techniques that can help us analysing viability, success and benefits of new processes; clearly draw a new process and communicate it to all the implied people; to develop a strategy for modifying the process from old to new, and be realistic with the need of converting the organisation with the implementation of a new process.

The Role of Information and Communication Technologies in the Change Efforts

The actions guiding to the change of business processes has made appeared two kind of opin-

ions, those thinking that the ERP possibilities can promote changes in a radical way in the firm processes and those other that think that the need of changing obsolete organisational structures is a great opportunity to incorporate the ERP systems. Davenport and Short (1990) put together these two options by establishing a bi-directional recursive relation between this two arguments, by admitting that the information technology is the essential tool to promote business process reengineering and the other way around.

Davenport and Short (1990) put into relation the business process reengineering and the information technologies in a bidirectional way, supporting the hypotheses that "each of them makes us thinking of the other". These same authors present examples on how information technologies promote business processes. Some authors even consider a BPR effort as an alternative way for implementing information technologies in the information system.

We think that the efforts of change and the implementation of ERP systems in a firm are just tools that allow in the building of more rational and efficient processes. Information technologies must be essential elements for promoting the change.

4. THE FINAL INTERNAL USER SATISFACTION

It is based in the system testing (Nah et al. (2001), Kumar et al. (2002), Al-Mashari et al. (2003), Yusuf (2004) and pos-implementation

evaluation (Holland and Light (1999), Ross and Vitale (2000), Nah et al. (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003), Tarafdar and Roy (2003), Umble et al. (2003). It is highly related with the feedback we have obtained from the consulting firms operating in the Spanish market since they stress that it is very important to check that the software meets the needs of the whole company.

It refers to the participation in the system development and implementation by different representatives of the target groups. System implementation means a threat to users perceptions of control over their work and a period of transition during which users must cope with differences between old and new work systems. User involvement is effective because it offers perceived control by taking part in the whole plan.

Users can be involved twice when implementing an ERP system

- User involvement at a stage of definition of the company's ERP system needs,
- User participates in the implementation of the ERP system.

5. THE FINAL EXTERNAL USER SATISFACTION (FIRM'S CUSTOMERS)

It is inspired in the client consultation process Holland and Light (1999), Al Mudimigh et al. (2001), Al-Mashari et al. (2003), Mandal and Gunasekaran (2003). It has to do with the training programs for the users that the consultants surveyed have mentioned us.

A group of variables explaining final customer satisfaction of the ERP deliverables must be taken into account before implementing the ERP system. The ERP system implementation demands of great human and technical efforts to promote a desired situation in which the final external user feels much more satisfied.

Satisfaction and results are considered, variables of the greatest importance when defining different styles of internalising ERP systems in the firms. Maybe the most complete analysis is developed by Ives and Olson (1983) where they reach a complete methodology that allows measuring the user satisfaction in IT use. This approach has been mentioned in various analyses that study the impact of information and communication technologies in firms of different nature. It seems to be a useful tool to be applied to the case or ERP implementations due to the difficulty in measuring such abstract term as satisfaction.

CONCLUSION

ERP systems have a great potential to promote improvements in the competitive position of the firms. However, the obtained results when they start working in firms are not often as positive as some organisations could expect. When analysing the failures in the implementation of ERP systems, we can affirm that the way in which the process is understood and how the implementation takes place highly conditions the results of the mentioned process and its future performance.

The implementation of an ERP system is, above all, a project. This simple preliminary assumption allows extrapolating to the development of the process the main principles of project management, properly adapted to the specific features dealing with the daily operating of a system like this.

In this chapter we have proposed a model containing different critical success factors that can help to make the best of the ERP implementation and exploitation according to the objectives of the firm. The model is composed by five different aspects,

The decision-making policy of the firm in the ERP selection, implementation and use, we have included as main variables here the following ones,

- The existence of managerial support,
- The existence of clear procedures established for the required re-engineering of business processes in the firm
- The effectiveness of the project management
- The existence of a wide commitment in the different areas of the firm
- The existence of a wide commitment in the different stakeholders in the implementations (vendor support, external services)

The training characteristics of the people involved in the ERP implementation and final use. Training and personal education is very important. The training actions must take place in a permanent way, before the implementation and after their conclusion, and they allow people understand that apart of using software, they must have clear the way in which the processes in the system work. We have consider here as the main variables the following ones,

- Education: the information that the employees have received on the ERP system.
- Training: the sessions where the people in the firm learns about how the ERP system operates and how it affects the different firm's processes
- Ethical issues: the position of the people in the firm to make a good use of the system taking into account firm's values and proper codes of conduct

The organizational inertia in the firm. It has to do with aspects in relation to culture, values and ways of group expression in the organization. We have considered a shared group of values in the organisation and how they can promote or avoid a proper implementation and an afterwards degree of use. Unless a previous business process reengineering is developed before the implementation, it is difficult to obtain optimal results. New systems do not work with old rules.

New software demands of a new way of doing things. People and systems must be integrated around the logical and more rational processes required at each moment.

The final internal user satisfaction, this is a key question, the final employee satisfaction of the ERP use promotes the daily usage and the desire of improving it.

The final external user satisfaction, the reason of being of any ERP system in the firm is to provide best options that allow promoting the final customer satisfaction in the firm's deliverables

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KEY TERMS AND DEFINITIONS

Information and Communication Technologies: tools to treat information, they can be composed by telecommunications technologies, as for example telephone, cable, satellite and radio, and digital technologies, as for example computers, information networks and software

ERP System: Enterprise Resource Planning, a business management system that integrates all the facets of the business, including planning, manufacturing, sales, etc.

Critical Success Factors: (CSF's) are the critical factors or activities required for ensuring the success of your business

Processes: A series of operations performed in the making or treatment of a product or service

Change: To give a different form or appearance to; transform

Business Process Reengineering: it is a radical redesign of a process in order to reach great results

Managerial Support: help offered and promoted by the managers in a firm

Team: a group of two or more individuals who interact dynamically to achieve a shared objective