Awareness of Organizational Readiness in ERP implementation process: results from case studies

Capaldo Guido¹, Rippa Pierluigi¹

Abstract The literature on ERP (Enterprise Resource Planning) systems implementation is replete with stories of unsuccessful project outcomes. One of the issues that have attracted relatively little research is the level of firm’s awareness about organizational problems that can occur in the course of the implementation process, and that represents one of the main reason of the large amount of unsuccessful implementation project. The goal of this article is to explore this issue through the use of three case studies from the US realized in the course of a visiting research period the authors were involved in. The data from the case studies is used to demonstrate whether the implementation teams had been aware, before the implementation project started, of the organizational problems and how they were able to measure the organizational readiness of the firm. Based on the unique patterns of the implementation process in each of the three different case studies, broader issues of ERP implementation are explored and directions for future research on change management in ERP implementation are proposed.

Keywords
ERP implementation, Organizational Critical Factors, Change Management, Case Studies

¹ Department of Business and Managerial Engineering, University Federico II of Naples, IT
1. Introduction

Information Systems literature [1, 2, 3, 4, 5] has highlighted numerous cases of failure amongst companies that implemented Enterprise Resource Planning (ERP) systems.

Although literature is full of articles related to change management issues in ERP implementation, the same literature cites inadequate changes within organization’s structure, culture and management process and fragmented approach to change management (CM) practices as major reasons for ERP failures [6, 7, 8].

Therefore, though ERP systems could be implemented successfully from a technical perspective, success may depend on employees being willing to use the delivered system. In fact, organizational change perspectives have tended to see adverse reactions to change (including resistance) as problematic, even pathological, but as amenable to solution through change management interventions such as employee communication and involvement techniques.

Above all, as literature highlighted, implementation process failed because managers of IT aren’t aware of the importance of such problems, they underestimate them, and a low level of project management skills in the early stage of the implementation project is one of the main reason of the high rate of failure [9].

Thus, change management is a particularly important factor in the adaptation and acceptance phases of ERP systems implementation [9]. CM can be defined in its simplest terms as: “… a process which is used to develop a planned approach to the people aspect of technological change in an organization” [10]. CM should focus on creating an environment where the change can be implemented [11]. Suggested activities include project championship, training, communication of system features and benefits, communication of new business processes and organizational structure, and rewards and incentives.

The major objective of this article is to offer a contribution for the representation of the awareness of problems related to organizational factors in ERP implementation process, and to explore the extent to which such awareness can impact the manner in which ERP projects are managed, the ways in which they affect employee, and the influence that change management intervention has on the ultimate outcome of the ERP project. Because our study is case-based and interpretive, our goal is not to test the premise that change management activities makes a difference to ERP implementation but rather to use the case data to demonstrate how implementation team face with organizational problems before the implementation starts, and whether such activities is the result of a planned approach or if it is simply the result of “day by day solution to each problem”. In this way, the data from the case studies is intended to help generate new hypotheses beyond the central premise of this study.
In this paper, we present three case studies to demonstrate whether the implementation teams had been aware, before the implementation project started, of the organizational problems. The data is presented and interpreted from a change management perspective, with the goal of gaining a broader understanding of the issues that relate change management intervention and the success of the implementation process. The discussion section explores the implications from the case studies to broader issues of ERP implementation across cultures, including the development of new hypotheses that emanate from this research.

2. Literature background

Before we consider the role that organizational factors play in ERP implementation and the possible impact of change management interventions, it is important to define what an ERP system is. We define ERP systems as integrated enterprise computing system that consist of applications such as manufacturing, logistics, distribution, accounting, marketing, finance, and human resources.

Following Robey, Ross, and Boudreau [12], we make a distinction between two types of approaches to research on ERP—the variance and process approaches. The variance approach, which has dominated the ERP literature in the past decade, focuses on the variables that affect or are affected by the ERP project, while the process approach deals with the manner in which the ERP implementation process unfolds throughout the life of the project.

The major findings from the variance approach relate to the factors that lead to successful outcomes and the nature of the outcomes. A large part of the studies on ERP implementation are the result of exploratory case studies [11, 13]. Many of these studies were based on different types of samples and different research settings, which may have placed more emphasis on some critical success factors (CSF) more than on others [14].

The most cited CSFs related to ERP implementation are these in the following issues:

1. Inadequate requirements definition. Research studies suggest that inadequate definition of functional requirements accounts for 60% of implementation failure [15, 16, 17];

2. Legacy status and ERP customization. The complexities of existing business legacy systems must be successfully managed. Customizing an ERP system has been associated with increase in IT costs, longer implementation time, and inability to benefit from the vendor’s software maintenance and upgrades [8, 18, 19, 20, 21, 22, 23, 9];
3. Absence of strong commitment on the part of top management. Strong commitment on the part of top management is crucial to ensure a successful implementation of projects that must be aligned with the strategic future direction of the company [24, 25, 26, 7];

4. Lack of clear strategy relating to redesign of processes. The introduction of an integrated platform is a strategic choice, and, as such, needs to be evaluated by top management. The objectives of the whole organization, as well as an inter-functional and unifying overview, need to be worked out and publicized [26, 27, 15, 22];

5. Resistance to change and lack of involvement on the part of end-users. Resistance to change is often the result of lack of end-users involvement in defining the implementation process [28, 7, 17, 9, 21];

6. Inadequate qualification of end-users. One of the reasons why implementation projects are often unsuccessful is the lack of adequate preparation and attention given to staff training. ERP implementation courses are extremely important for employees to learn about the new software interfaces as well as the processes affecting the functioning of the whole enterprise [28, 7, 17, 8].

As for the outcomes or benefits that companies derive from implementing ERP systems, the findings from the literature show that clarification of managerial objectives, development of structures to manage across functions, and the emergence of accountability processes within the organization are the major benefits that companies report that they derive from their ERP projects.

In contrast to the variance approach, the process approach to ERP research focuses on understanding how the change process triggered by the implementation of ERP systems unfolds over time [29]. This approach considers ERP implementation a sequence of stages or phases in which related activities occur [30, 31, 32]. The stage models share explicit assumptions about the nature of change, namely, they all assume the existence of an underlying form, logic or program that regulates the process of change.

What is in evidence is how companies generally tend to underestimate the difficulties related to the organizational implementation of ERP systems, and focus rather on the problems concerning technical implementation. This represents a serious risk for successful ERP implementation process. If both technical and organizational problems are not properly identified and anticipated, they may arise once work is under way, reducing the effectiveness of ERP adoption [14].

Following these considerations, the authors developed, in previous researches, a methodological approach aimed at representing organizational capabilities of the firm before the implementation process starts, and aimed at helping managers in selecting the most suitable implementation strategy. It goes beyond descriptive analysis, however, and offers prescriptive advice on how to address the potential challenges prior to and during the implementation processes.
The methodological approach was the result of a research project involving DIEG (Department of Business and Managerial Engineering of the University of Naples Federico II) and an industrial partner, a shared service company founded by two big Italian Groups aimed at supporting all the firms of the groups in the management of the Information Technology (implementation, adoption, maintenance, etc.).

Such researches were focused on the development and test of the methodological tool. Since the methodological approach has been successfully tested [14], in this paper we will adapt it in order to evaluate and measure the level of awareness of the firm about the organizational readiness for the ERP implementation.

According to this approach, capabilities and indicators to assess organizational issues are subdivided into two categories:

- **Business Process Reengineering (BPR) Propensity**: ERP systems are process oriented; therefore only in a process-based organization they can completely express their integration potentiality. In this way, criticalities such as resistance to change and difficulties in redesign the process are reduced.

- **End Users Propensity**: the level of readiness of the end users is a critical issues where, if well managed, won’t determined lengthiness in the effective use of the system.

<table>
<thead>
<tr>
<th>Critical Areas</th>
<th>Capabilities</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Reengineering (BPR) propensity</td>
<td>Process orientation of the organization</td>
<td>Orientation of organization and structure toward process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Level of organizational flexibility</td>
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<tr>
<td></td>
<td></td>
<td>Cross functionality of the individual objectives and performance</td>
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<td></td>
<td></td>
<td>Resources and systems to monitor processes quality</td>
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<td></td>
<td>Project management capability</td>
<td>Cross functional project team</td>
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<td></td>
<td>Availability of potential project manager</td>
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<td></td>
<td>Capability to monitor the risk related to BPR</td>
<td>System to monitor resistance to change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skill development and job conversion activities</td>
</tr>
<tr>
<td>End Users propensity</td>
<td>End users profiling</td>
<td>Educational background</td>
</tr>
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<td></td>
<td></td>
<td>Experience in the use of Information Systems</td>
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<tr>
<td></td>
<td>Availability of change enablers</td>
<td>Frequency of job rotation</td>
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<td></td>
<td>Human Capital</td>
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<td></td>
<td></td>
<td>Commitment of Top Management</td>
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<td></td>
<td></td>
<td>Incentives towards innovative attitude</td>
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</tbody>
</table>
Table 1 – Hierarchy of Organizational Issues (see [14] for further details)

The result of the level of capabilities of the firms to deal with BPR propensity and End Users Propensity are finally represented in the Organizational assessment matrix (Figure 1). Whether both areas are high, maybe the firm is ready, form an organizational point of view, to adopt the system following a Big Bang strategy.

![Organizational matrix of strategic choice](image)

The other three boxes in the matrix represent three different implementation strategies, and the position of the firm depends on the level of capabilities of the firm to face with organizational critical areas:

- **Incremental with major change management interventions (lower-left corner):** Human Resources (HR) development activities and BPR interventions are critical to pursue a successful implementation project. Examples of CM interventions could be the creation of a steering committee, the definition of coordination and communication systems, incentive awards, and so on;

- **Incremental with minor change management interventions (lower-right corner):** redefinition of organizational processes, roles and responsibilities. Examples of CM intervention could be process monitoring systems, interfunctional team, coordination systems;

- **Big Bang after change management interventions (upper-left corner):** competencies evaluation and recruitment of employees with high project management experiences, where examples of CM intervention could be individual involvement, organizational climate monitoring system, building user acceptance, and so on.

The methodological tool earlier presented will be used, in this work, to analyze and validate the results of the case studies will be presented in the next session.

In conclusion, this methodological tool is useful in the assessment phase in order to increase the level of awareness about the adoption strategy. Moreover, it helps managers in the definition and application of the CM politics.
3. The filed study

According to the aim of the research, the field study has been conducted following these steps:
1. Firms’ selection (*sample and interview structure*);
2. History of the ERP implementation process and recognition of the organizational problems occurred in the course of the implementation process (*data collection and analysis*);
3. Application of the organizational assessment matrix and discussion of the results with the firms and discussion about the usefulness of such tool in increasing the awareness about the organizational problems (*experimental design*).

3.1 Sample and interview structure

The data that forms the basis for this “work-in-progress” article are case studies on ERP implementation collected in the US. Different size organizations were identified in different industries to preserve, in these preliminary and exploratory steps of the research, a certain level of variance. All the organizations implemented an ERP system, they all completed the implementation process by the time of the interviews, and they all implemented (more or less) the same modules of the system (production, sales, personnel and inventory management and further minor modules).

<table>
<thead>
<tr>
<th>Item Title</th>
<th>Item Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details about the organization</td>
<td>Size, number of employees, finances, structure</td>
</tr>
<tr>
<td>Environmental context</td>
<td>Customers, competitors, technologies, major business processes, corporate strategies, external environment of the company</td>
</tr>
<tr>
<td>Environmental conditions of ERP system</td>
<td>Motivation to purchase the system, expectations from the system, the system’s major components, expectations about the performance of the various components and their links with each other, the use of consultants, the role of the consultant in the implementation project</td>
</tr>
<tr>
<td>ERP implementation strategy and assessment</td>
<td>Analysis of the organizational readiness, level of assessment of the organizational problems, planning the implementation process</td>
</tr>
<tr>
<td>Actual process of adopting and using the ERP system</td>
<td>Acquiring the ERP system, changing business policies and practices in accordance with the system, changing the business structure and operations, changing the IS role within the firm.</td>
</tr>
<tr>
<td>Consequences of adopting and using the ERP system</td>
<td>Users’ reactions, management reactions, strategic impacts, perceptions of benefit from the various components of the system</td>
</tr>
<tr>
<td>Simulation of an assessment methodology</td>
<td>Test of a methodology to assess ERP implementation strategy based on organizational assessment</td>
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</table>
Based on [33], an interview schedule, which included a range of open-ended questions, was used. Table 3 below contains the interview structure employed in this research.

### 3.2 Data Collection and Analysis

In all the cases all key managers of the functional areas relevant to the implementation were interviewed. Three interviews were conducted in each organization. During the interviews, issues outlined by [33] were explored. All interviews were tape-recorded and transcribed for later analysis.

Each interview lasted about an hour and produced about 30 pages of transcribed text (about 360 pages of text in all). The transcribed text was analyzed in two “rounds”: Sections with references to Change Management categories in different colors, for example, a reference to a business process reengineering category was highlighted in blue, a reference to the communication category was highlighted in red, etc. At their request, the identity of the three companies has been kept confidential. In the cases, they are referred to as Firm 1, Firm 2, and Firm 3.

#### Table 3 - Case studies details

<table>
<thead>
<tr>
<th>Firm</th>
<th>N. of Employees and average revenues</th>
<th>Type of production and market</th>
<th>Selected ERP and number of implemented modules</th>
<th>Implementation strategies and length of the project</th>
<th>Level of success of the implementation process</th>
<th>Reasons for the implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>10400 More than $1 BL</td>
<td>Food and Beverage West US cost</td>
<td>SAP FI-CO, MM, PP, SD, LE, PM, SCM, BW</td>
<td>Incremental (the first implemented modules were the one supporting the core activities). The project ended six months later than the time scheduled</td>
<td>Low in the first period. The main benefits arrived after a couple of years</td>
<td>The growing strategy needed to be supported by a unique information system</td>
</tr>
<tr>
<td>Firm 2</td>
<td>120 About $20 ML</td>
<td>Korean fabricator International</td>
<td>QAD All</td>
<td>Big Bang The project ended several months later than the time scheduled</td>
<td>Low in the first period. The main benefits arrived after a couple of years</td>
<td>Additional functionality promised by the ERP, and the poorly performance of the old legacy</td>
</tr>
<tr>
<td>Firm 3</td>
<td>25 About $5 ML</td>
<td>Hardwood distribution International</td>
<td>MAS 90 8 modules</td>
<td>Phased Approach The project ended two months later then the time scheduled</td>
<td>After two years</td>
<td>Obsolescence of the previous ERP system</td>
</tr>
</tbody>
</table>
In the next table, the main organizational problems occurred in the firms analyzed during the implementation process are reported. We asked to the managers if organizational problems occurred in the course of the implementation process and the level of awareness about the expectation that such problems may occurred. We asked the level of expectation as low, medium or high, and the influence that such problems had in the final ERP implementation outcome.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Organizational problems occurred in the course of the implementation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm 1</td>
<td>Resistance to change from employees in the bottom line</td>
</tr>
<tr>
<td></td>
<td>Difficulties in reengineering the process</td>
</tr>
<tr>
<td></td>
<td>Low skills in information systems</td>
</tr>
<tr>
<td>Firm 2</td>
<td>Lack of understanding of system capabilities</td>
</tr>
<tr>
<td></td>
<td>Lack of experiences in the implementation process</td>
</tr>
<tr>
<td></td>
<td>Lack of understanding of Best Practices</td>
</tr>
<tr>
<td></td>
<td>Lack of skill in Information Technology</td>
</tr>
<tr>
<td>Firm 3</td>
<td>The primary users were expecting the same process routine with the ERP</td>
</tr>
<tr>
<td></td>
<td>General managers had limited “performance metrics range”</td>
</tr>
<tr>
<td></td>
<td>Lack of understanding of the ERP transaction processes</td>
</tr>
<tr>
<td></td>
<td>Lack of experiences in project management</td>
</tr>
</tbody>
</table>

**Table 4 - Awareness about the organizational problems**

Although large part of the reported problems were expected by the management, the impact on the success of the process was generally high. But a poor level of change management interventions directly referred to such problems were planned. And, all the change management interventions realized in the course of the implementation projects weren’t the result of a planned strategy. On the contrary, large part of the change management interventions were been realized as the organizational problems occurred. Following, a brief detail summary for each firm will be presented.

**Firm 1**

Firm 1 planned an incremental implementation strategy, where the go live was six months later than the scheduled time. Although some change management interventions were planned, benefits of the system were achieved two years later the go live. Among the interventions planned in the course of the implementation phase, we revealed, in the course of the interviews, the following: improvement of the coordination among department, staff the organization with an appropriate mix of workers, education about the benefits of the system, creation of resource flexibility system. Such interventions were the reaction to the organizational problems as
illustrated in table 4. Thus, it is assumable the utility of an assessment before the implementation started.

**Firm 2**
Firm 2 followed a Big Bang approach. Where no change management interventions were planned, the go live came several months later then the scheduled time. Benefits of the system were achieved some years after the go live. The interviewers said that among the change management intervention realized (but not planned) in the course of the implementation process there were: steering committee, creation of a sense of community across all units, clearly definition of each workers’ actions and outcomes. Building user acceptance, planned communication, investment in HR development, support from senior management. In this case too, a well planned assessment of the organizational situation would have suggested some change management intervention to avoid the risk of organizational problems in the course of the implementation process.

**Firm 3**
Finally, firm 3 has a situation similar to firm 1, where some change management actions were well or poorly planned. But as the interviewed managers said, the change management interventions were planned just on the basis of the perception of the Top Management, and in the course of the implementation stages. Above all, some change management interventions were realized: creation and reinforcement of a sense of community across the organization, coordination systems, opportunity for cross-functional collaboration.

### 3.3 Experimental simulation

As a further step of the research, we asked the interviewers to use the ERP assessment model previously introduced.

By using the organizational assessment matrix developed by Capaldo and Rippa [32, 14], we were able to position the interviewed firms as illustrated in the following picture:
Since this is just an experimental simulation, our aim was not to test the position of the firm, but to show interviewed people if an assessment tool could be useful to increase the awareness about the organizational problems firms face with in the course of an ERP implementation project.

As a validation exercise, based on the perception of the interviewers, first of all the interviewed people recognize their firm in the position represented in the matrix. Then, they said the model would had help them in better recognize and be aware of organizational problems. In a certain sense, the aid of such kind of model can be useful in assess change management intervention in order to reduce the risk that the final outcome of the ERP implementation process could be a failure.

4. Discussion and conclusion

Although three case studies are to low to obtain useful information, some indication emerged looking at the results. Whether or not change management activities are planned to implement an ERP system, it is crucial that Top Management correctly identified the organizational problems to face with during the implementation process.

As Capaldo and Rippa [14] stated, managers should carefully analyze and manage the organizational factors that may be critical in the course of the implementation process analyzing organizational configuration of the firm before the implementation process, understanding the sources of the critical factors, identifying the more appropriate strategy on the basis of such characteristics, and making project review time explicitly available for developing plan to cope with that factors.
Based on the results, two main observations can be revealed. First, as the organizational assessment matrix is used, CM intervention can be planned before the implementation process starts, by avoiding the risk that organizational problems can occur in the course of the implementation process.

Secondly, the tool can be useful to plan extra CM intervention, and identifying, where it is the case, CM intervention that probably could not be useful to the aim of a successful implementation.

References


