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Abstract

ERP system often produces the intangible benefits and the implementation problems are related to social factors and human factors. Implementing an enterprise system in an organization is a complex process. ERP evaluation should consider the human and social effects and the broader organizational consequences. The interpretive approach adopted here by virtue of an in depth case study provides an understanding of the context of the ERP system implementation, the process over time of mutual influence between the system and its context, how political action takes place, and how cultural attitudes and values were changed during the ERP implementation. Data were collected by interviews with staff at various levels of the subject organization and by examining the archived records when available. It was found that ERP implementation improved business processes, communication and the interaction between users and customers. This study makes a contribution by evaluating the organizational change associated with ERP implementation in a Taiwanese organization. This research suggests that human resource management require deep consideration in the implementation processes.

Keywords

ERP, Organization Change, Case Study, Taiwan, Human and Social Effects

Introduction

The Factors Affecting ERP Implementation

Companies began to adopt enterprise resources planning systems (ERPs) to integrate various organizational functions during the 1990s. A number of potential explanations for ERP implementation failures have been offered and these may broadly be classified as human/organizational (e.g. a lack of strong and committed leadership), technical (e.g. problems in software customization and testing, and lack of technically knowledgeable staff), and economic (e.g. lack of economic planning and justification) (Sarker and Lee, 2003). In more recent years an increasing emphasis has been given to the importance of the human factors, over technical and economic factors, as being critical to the success of ERP projects (Nah, Lau and Kuang, 2001; Wang and Chen, 2005).

One frequently noted shortcoming in the management of many projects has been that organizations underestimate the amount of commitment and effort required for the project, and this translates into inadequate time and resources for design, testing and change management (Girard and Farmer, 1998). The most common problems in ERP implementation have centered on networking issues, knowing when to allow users to modify the packaged software and user training. The main hurdle faced by all the companies has been resistance to change. Employees are often either reluctant to learn new techniques, or the IT department is reluctant to change due to attachment to its existing product. The human and organizational change aspects, and resistance to these changes is inevitable (Gowigati and Grenier, 2001). Hence, some researchers regard that human factors, more than technical or economic, are critical to the success of ERP projects (Nah, et al., 2001; Alvarez and Urla, 2002).

The importance of human factors makes good sense in hindsight. ERP implementations involve broader organizational transformation processes involving business processes, with significant implications for the organization's management model, organization structure, management style and culture, and particularly for people (Wood and Caldas, 2001; Pawlowskei et al., 1999). The often massive organizational change involved in ERP implementation results from the shift in a business design from a fragmented, function-based organization structure to a process one served by an integrated system (Davenport, 1998; Dechow and Mouritsen, 2005).

Information System Evaluation

Most of the literatures on information system evaluation are quantitative process of calculating the preferred choice and evaluating the likely cost/benefit on the basic of clearly defined criteria. Given a review of the literature on IS evaluation, it is suggested that various issues have generated the need for new directions on IS evaluation. It seems that that IS evaluation requires a richer examination of the organizational situation than has traditionally been made (Serafei, Smidis and Smithson, 1998; Symons, 1990; Walsham, 1995). Researchers have also argued that the IS evaluation process and content are closely intertwined with each other and also with the context of the organizational change associated with the development and introduction of a new information system. IS evaluation approaches are needed to support a richer examination of these intangible aspects, particularly socio-technical issues.

Walsham and Waema (1994) designed a framework specifically for understanding organization change associated with computer-based information systems. The first component of the framework is about 'content'. Content includes planned changes to products and services, business processes, formal organization structures and roles, and human perceptions. The second main component in the analytical framework is the social context. This includes the social relations between participants concerned with the information system, the social infrastructure available or necessary for its support, and the history of previous commitments made in connection with computer-based systems. The third component of the framework is concerned with social processes, and involves taking both a cultural and a political perspective. The cultural perspective emphasizes how the information system is related to the maintenance and change of subcultures, the interaction at the boundaries between subcultures, and the multiple meanings ascribed by different groups to the same events and actions. This can be contrasted with the political perspective which emphasizes that surrounding the implementation of the information

system are processes of control and domination, as well as purported moral issues such as the quality of work life, and having a part to play in the dynamics of managing the balance between autonomy and control in the organization.

Research Objectives

Implementing an ERP system is deeply interconnected with organizational change, and, for the lifetime of the system, it remains a large part of the organization's formalized internal framework. Within such a context, evaluation should be performed continuously, combined with process reviews and organizational development which aims to obtain the desired alignment and fit over time (Hedman & Borell, 2004). The evaluation may relate to the social, political, economic environments in which an organization operates and/or the organizational and cultural characteristics, related methodologies and processes (Serafeimidis and Smithson, 1999). ERP systems impose their own logic on a company's strategy, culture, and organization (Davenport, 1999). For many organizations, implementing ERP means moving from a confederation of loosely coupled systems to a tightly coupled one (Gattiker and Goodhueb, 2004). Managers as well as scientists in many cases attribute the problems associated with the development and implementation of ERP to aspects of organizational culture. Some researches studied how management information systems influence the organizational culture (Robey and Azevedo, 1994; Daily et al., 1996; Hibbard, 1998; Newman and Chaharbaghi, 1998; Olson, 1982). These studies also suggest that there is indeed a dyadic relationship between management information systems and organizational culture. And other research focuses on this dyadic relationship and identifies the need to understand organizational culture and to manipulate it to support the implementation of management information systems through cultural change programs (Avison and Myers, 1995; Claver et al., 2001, Umit, 2006).

In summary, it suggested that ERP systems have the potential for a significantly positive impact on the overall performance of an organization. This study attempts to explore the organizational changes associated with an ERP implementation in a Taiwanese organization through the conduct of an in-depth case study. This study is to understand the context of the ERP system implementation the process over time of mutual influence between the system and its context to answer the following specific questions, as shown in following:

1. How and why political actions take place?

2. How cultural attitudes and values are maintained and changed over time?

Methods

Case Study

Case study research is the most common qualitative method used in information systems (Orlikowski and Baroudi, 1991; Alavi and Carlson, 1992) also suggest that the case study research method is particularly well-suited to IS research, since the object is the study of information systems in organizations, and "interest has shifted to organizational rather than technical issues". An in-depth case study can aim to understand the context of the information system and the process over time of mutual influence between the system and its context.

Data Collection

ERP systems are and have been designed to solve the fragmentation of information, particularly in large corporate organizations (McAdam and Galloway, 2005). Here, the selected case study organization was considered appropriate because of its size and hence presumed complexity in terms of potential issues. The ERP implementation cost for the case organization was $15 million USD. It was touted as the biggest IT project since 2000 in Taiwan and the implementation period was particularly long. It was judged that the case was therefore both significant in scale and in terms of complexity and hence potentially a rich source of data. For commercial reasons, the original identity of the company is concealed and is referred to as "Shine" in this paper.

Both primary and secondary data was collected over a four-year period between 2000 and 2004 and was used in writing the case study. The primary information source was via semi-structured interviews, mostly face to face, but including several telephone and email communications. Initially, interviewees were selected from different hierarchical levels including senior managers, managers, end users, and project team members, and across different business functions (MIS department, production department, accounting department, and human resource department). All interviewees were asked who else in their organization could provide insight into the success of the ERP implementation. Hence, the sampling approach could be characterized as consistent with a "snowing ball sampling technique" (Knoke and Kuklinski, 1982).

Interviews were typically two hours or so in length and some ERP project team members were interviewed more than once to clarify and discuss aspects of the project as they progressed. Most of the interviews were taped-recorded and subsequently summarized and transcribed. Other sources of data included documentary evidence: corporate annual reports, organizational charts, system training manuals, design documents, and internal correspondence about the system and company web-site data. As well, searches were made of published materials about the company in newspapers and magazines.

Data Analysis

The study attempted to gain a deeper understanding of the context of the ERP system implementation, the process over time of mutual influence between the system and its context, the political ramifications of the process, and how cultural attitudes and values were of relevance throughout the ERP implementation. The theoretical framework developed by Walsham and Waema (1994) was used to describe the case and provide a basis for the presentation of a broader analysis on ERP implementation.

Data was analyzed through the use of qualitative analysis techniques. Tapes from interviews were transcribed and these repeatedly scrutinized on an issue by issue basis. They were supplemented by notes taken during interviews. As described above this allowed the data collected from the various sources to be coded to identify important content, context, and process elements of ERP evaluation and implementation in two periods.

A combination of historical reconstruction and longitudinal analysis was used to interpret events and actions over a period of a number of years. The interview data were collected over 3 years from 2002 to 2004. Thus many interviews also focused on events that could have taken place one or two years before the interviews. The paper does not claim to present how "things really went" but rather to address issues of organization changes associated with the ERP implementation.

Table 1 A Summary Direct Contact Data Collection

Interviewee	Number of people in this category	Number of formal interviews	Number of informal Interviews (including telephone interviews and e-mail changes)
(1) Senior managers	3	4	1
(2) Project managers	2	4	1
(3) MIS manager	1	2	2
(4) Module leaders	1	2	2
(5) Production manager	1	2	5
(6) Accounting manager	1	2	0
(7) HR manager	1	1	3
(8) Project members	2	3	6

Case Study and Analysis

This section contains a description and analysis of the case organization, presented using the Walsham and Waema (1994) framework. Background material describing the history of the case company in the 2000s within the context of the major changes in the semiconductor industry prior to and during that period is provided for the purposes of contextual orientation. In so doing, events are structured around the two main leadership periods of the project. The first of these periods was under the first project leader – Dr. Fen (pseudonym) and the second project leader – May (pseudonym).

Review of Events and Actions

Prior to the implementation of its ERP, Shine carried out its operations with several information systems like Material Requirements Planning (MRP). Each system worked efficiently, and was flexible, and friendly to individual functional departments, but overall there was little integration. The lack of integration became an increasingly important issue with development from a local company to a global company. Recognizing the limitations of its legacy systems, Shine began to investigate ERP options in 2000. Dr. Fen was appointed to the ERP project. He was highly informed on information technology and change management and had successfully introduced two ERP projects previously. Although Dr. Fen was professionally very competent in terms of IT systems, he was, unfortunately, not totally conversant with Shine's culture and, being new to the company, had an imperfect knowledge of the organizations business processes; and hence what was required in the future. Without appropriate resources it was impossible to even scope the overall project. Furthermore, senior managers began to express doubts in the project overall and in its conduct. Dr. Fen left Shine in February 2003. The process of implementation was already troubled and in March 2003, a new project manager, May, was appointed. May was an in-house appointment having previously been Assistant to the CEO. Her style was to aggressively pursue the project blueprint and she quickly gained the support and trust from managers most relevant to the project. She raised in the organization an explicit understanding of the importance of the project and built up operational mechanisms to fulfill the potential of the project. A go-live date was originally set for September 2003 but due to quality concerns, system scope

concerns (legacy system integration), business concerns (the busy season), training concerns (head count of end users was over 300) and other requirements, the "go- live" date was delayed to January 2004.

Content – First Period

Though the project started in 2000, during 2000-2002, the project team struggled in terms of achieving a competitive advantage and the development of a good business model. Dr. Fen's information system strategies were globalization and centralization. He developed a five year plan for Shine's group information system. He attempted to establish a core and corporate business process. Lacking solid organizational support, Fen was forced to compromise the ideal and rather than reengineer and completely redesign the process, he opted for a more gradual improvement approach.

However, the vision or the 'to-be' component of the approach was always problematic for Fen to deal with. Basically the 'to–be' position was dependent on the top management's vision. Unfortunately their vision was different to that held by Fen. Importantly, top management was responding to a general trend in the semiconductor industry towards declining prices for products and services of a given technology over time So, due to the characteristics short cycle time in the industry, top managers were understandably eager for short term profits.

Social Process under Dr. Fen

This section analysis involves cultural and political perspectives on the process of organizational change associated with the implementation of the ERP system.

Cultural Perspective

To enable its turnkey strategy, which consisted of the integrated packaging, testing, and shipment of semiconductors to end-users designated by the customers, Shine started to centralize its administration departments and information systems in 1999. Shine defined the ERP project as "GRP" for "Group Resources Planning". Then, the implementation of the ERP system demanded new methods of designing tasks, jobs and work modules and led to new work structures and procedures. Both sites provided their requirements in business process design, but the requirements were often perceived to be in conflict.

As well as inter-site conflict, there was interdepartmental functional conflict in regard to the necessary requirements. Due to a lack of business transaction and system understanding, there were ongoing difficulties in cross-departmental communication.

Further, the various functional managers retained an ignorance of the impact of the project. In fact, they preferred to remain largely ignorant of the project altogether and to focus on short term accountability goals. Accordingly, they rejected the

notion of the change to current processes. Each essentially wanted customization of the *status quo* for their function and maintained that position at all costs. The project was recognized by team members as lacking senior support. This gave rise to doubts about the project's prospects:

"We heard the project will be cancelled." [Project team member]

Political Perspective

The politics surrounding the project were multifaceted and generally disruptive. Because of the rapidly changing demands of the semi-conductor industry, Shine also needed to retain flexibility, including flexibility of structure. From Shine's perspective this was flexibility, from the consultants it was more like instability. Likewise, the project ownership was unclear. Although of obviously strategic significance and operationally important, the project was originally seen as an MIS project. It was not until 2001 that users received a clear message from the top management that they "must do it". Even then senior managers preferred to disregard the project.

"Most functional managers just wait and see. They do not think GRP will be successfully implemented." [Project team members]

Dr. Fen lacked the authority to mandate action. His substantive level was only equivalent to that of other functional directors. The lack of cooperation from other directors related to the ownership and the basis on which they were likely to be rewarded. The GRP project was seen as just an IT project and the various directors did not envision that their support of the GRP project could improve their department's performance.

"ERP is your project. I am doing you favor, if I support you." [Director of Manufacture department]

Even attempts to communicate the project became politicized. For example, the weekly formal meetings were undermined. Dr. Fen was not familiar with Shine's culture and conflict of authority. Unwittingly he became embroiled in a power struggle. The politics resulted in poor communication about almost every aspect of the project when Dr. Fen was heading it. There was considerable dissatisfaction with Dr. Fen's leadership.

"Shine's organization is complicated. We need a project manager to coordinate different functional departments and resolve the conflicts." "ERP is an organization change project, not an IT project. You need to let your users understand the project impact. Unfortunately our project manager was afraid of users' resistance and ran the project in a black box." [MIS director]

Content - March 2003 ~ July 2004

When Dr. Fen left, there was little enthusiasm among the existing management cadre to take on the GRP project. May was assigned to the project.

"Why May? She is from the pricing department. She understood the business operation processes. Being the CEO's assistant, she is clear about the company vision and strategy. She knows what the top managers want. She has the full support of the CEO." [Administration manager]

In contrast to Dr. Fen's change management strategy, May focused on project management. She made the project a competitive imperative. Meeting the 'go-live' date was her driving target. She made a lot changes and in the first instance

restructured the project team. She applied project management approaches in the ERP project: to its time management, human resources management, resources management, and quality management. She reviewed the coding status and brought together internal and external expertise including IT members and consultants. She changed the method of communication in terms of frequency, directness when necessary and by supported face to face contacted with daily progress status reports. Her leadership role was acknowledged, at least by some.

"She is much better. The most important thing is that she defined the project scope." "She can resolve the conflicts between the departments." [MIS director]

In terms of her motivational ability the following sentiment was expressed:

"A project manger's strategy affects project team members' determination. Though the team members in the second period were junior they were filled with ambitions." [MIS manager]

Although there were some problems immediately after the implementation, May thought the ERP project was successful by the end of the research period in 2004.

Social Process under May

Culture Perspective under May

The project process was affected by the social climate of the ERP project team. May's reflection on the social climate on her arrival is described below:

"When I came to the GRP project office, I felt the atmosphere was strange. "Too quiet" A project office should be filled with sounds. They needed communication and discussion directly, but at that time their communication channel was via e-mail. E-mail is the worst communication tool. It doesn't present feeling."

May was aggressive and ambitious. She defined her role as "a manager and a communicator "in this project.

"Most process improvements were designed before I took over this project. My duty was to focus on human resources management. I was responsible for communicating to the owner directors to push end users training. IT professional knowledge is not so important on ERP projects. Communication is more important. You need to convince users to accept it."

Again according to May (with some pride), four fundamental human resource management approaches were used to change the project team culture - appoint the right people, put them in the right positions, encourage them to work effectively and build work team.

"We built up the cooperation tacit understanding and a revolutionary sentiment in our project team."

However, a somewhat depressed module leader provided an opposing perspective which reflected an enduring expectation that the ERP was a temporary phenomenon and doomed to failure. Even though the ERP system has been fully implemented for a few months; some users asked when the company will give up the system.

Political perspective under May

May managed to achieve 'real authority'. She achieved communication between ERP project team and functional departments. To some extent she did this by referent authority. She nominated the CEO as the project leader and the CEO contributed by regularly joining meetings with function directors. May's summation of this was:

"*Most directors are at a higher level in the organization structure than me. It is difficult to drive them unless you get fully support from the top manager.*"

An indirect outcome of the ERP project and the involvement of the CEO was the modification of the structure of the organization and the replacement of some senior managers.

The project module leaders and some project team members received promotions and salary increases after the ERP system was deemed to be successfully implemented. At other levels different responses and outcomes occurred. Most IT members stayed in the team for the other site's projects. Key users went back to their original function departments. However, a lot of project members had already left Shine during the implementation process. This may have been because Shine didn't announce any transition process plan for the project team members post the implementation period. As a result, staff seconded to the project felt insecure:

"I already left my department for a long time. Someone took over my work. I am not sure if I can go back to my original position or not." [Project team member]

ERP implementation required some business processes to be changed. ERP implementation also reflected that some senior managers were not qualified for the current positions. Hence, Shine still continued process improvements and organization restructuring after the ERP system went -live.

Table 2 Content and Process in Shine

Shine under Dr. Fen 2000- February 2002	Shine under May March 2002-2004
Context	**Context**
Management solution instead of technical solution and BPI instead of BPR	May focused on project management. She made the project a competitive imperative.
Dr. Fen focused on business Process optimization more than ERP implementation.	She changed the method of communication in terms of frequency, directness when necessary and by supported face to face contacted with daily progress status.
	Four fundamental human resources management approaches were used to change the project team culture - appoint the right persons, put them in right positions, encourage them work effectively and build the work team.
Process	**Process**
1. Culture	1. Culture
Different perspectives on the subculture existed in different sites and different departments of Shine	The territorial wars were between the different functions that occurred during project implementation and continued to post implementation.
Most ERP project team members were young and junior in the organization structure	Depressed module leader provided an opposing perspective which reflected and enduring expectation that the ERP was a temporary phenomenon and doomed to failure.
Due to a lack of business and system understanding, there were ongoing difficulties in cross -departmental communication.	
The function managers preferred to remain largely ignorant of the project altogether and to focus on short term accountability goals.	2. Politics
	May defined her role "a manager and a communicator "in

Most project team members held doubts about project certainty.	this project.
	The project module leaders and some project team members received the promotions and salary increases after the ERP system was regarded as successfully implemented.
2. Politics	
Shine needed to retain flexibility, including flexibility of organization structure.	Shine didn't announce any transition process plan for the project team members post the implementation period. As a result, staff seconded to the project felt insecure:
The project ownership was unclear. Although of obviously strategic significance and operationally important, the project was originally generally seen as an MIS project.	In post implementation period, Shine still continued processes improving and organization restructuring.
Dr. Fen lacked the authority to mandate action.	
The politics resulted in poor communication about almost every aspect of the project when Dr. Fen was heading it. There was considerable dissatisfaction with Dr. Fen's leadership.	

Discussion

The above case study analysis reveals the context of the ERP system implementation, the process over time of mutual influence between the system and its context. This section attempted to explore the organization changes combined with the ERP implementation.

Culture Attitude and Value Change

Individual Attitude and Value Change

Before the implementation of the ERP, some users could work carelessly but had developed counteracting methods to overcome these errors. However, in the ERP system, all systems were integrated and such local compensations were not workable on a system wide scale. Users needed to learn a new way of working. Change requires organizational members to understand a new way of performing processes, as well as how and why their processes have changed (Jamieson and Handzic, 2003). This meant that people must change the way they think about their work and their organization, how they feel about their enterprise and the type of relationships they develop within and across organizational boundaries (Lengnick-Hall et al. 2004). The users need to learn the new ways of operating the system effectively and corporate in a network system. If ERP only changes tasks and the procedures people used to do their work, it is unlikely to provide long-term competitive benefits. To promote a sustained competitive advantage, organizations must be able to use ERP in distinctive ways. Unfortunately, user training in Shine was insufficient and ignored teaching users about the processes.

Human behavior was a key factor in ERP implementation. As Dr. Fen said *"ERP is a human problem, not a technology problem"*. Orlikowski (1992) argued that technology is the product of human action, while it also assumes structural properties. As well, technology is physically constructed by actors working in a given social context, and technology is socially constructed by actors through the different meanings they attach to it and the various features they emphasize and use. To the technicians, including project managers and project team members, the ERP implementation was a mission to be accomplished. The ERP "going live" meant that the ERP implementation was successful for them. However, for users, ERP implementation affected their work tasks. ERP was just an information system but related to their real life. Due to their loss or gain in power through the ERP implementation, different interest groups defined ERP implementation into their particular outcomes on the basis of its direct effect on them. Individual values therefore need to be considered in ERP implementations.

Management Model Change

The ERP implementation challenge in Shine was complicated by the change management model. The integrated information systems enabled standard operation processes and decreased the importance of individual action. ERP systems increased organizational formalization and controls. As well, users were required to comply with ERP process requirements and organizational activities were required to conform to ERP system requirements. Thus, both diversity and free choice become more limited (Lengnick-Hall et al., 2004). ERP led Shine to transform from human management to systems management. This new organizational form challenged the traditional management model in Shine. The culture could not be dictated, but needed to be managed (Walsham and Waema, 1994). Organizations need to learn how to manage and control the new centralized and standardized operation systems.

Communication Model Change

These communication changes include better communication and interaction between different functional users. In Shine, although it took time, eventually new relationships between different functional users were built and a shared view of requirements obtained throughout different functions and sites. ERP implementation provided a communication and knowledge sharing opportunity for different functional users.

Political Issues

Political issues were significant in the Shine ERP implementation. The stakeholders' values needed to be considered in the implementation processes as noted above. Functional managers were concerned at losing power and sought to sabotage the project. There was employee resistance because the project meant change. Politics is intrinsic to all human activity and needs to be actively managed to maintain the precarious balance between autonomy and control at multiple levels (Walsham and Waema, 1993). Power balances seem crucial for conceptualizing ERP in terms of its consequences (Boersma and Kingma, 2005). Unfortunately, Shine's ERP implementation lacked subtlety in relation to the management of political issues. So, while ERP implementation offers the potential for enhancing a firm's social and intellectual capital in ways that can lead to

effective and sustained advantages in the knowledge economy (Nahapiet and Ghoshal, 1998) such potential is not automatically achieved.

Conclusion

ERP implementation involves cultural transformation. Change is often more widely accepted in firms when organizational members are accustomed to change and view it as positive. Both individual and group resistance to IS implementation is very likely to occur. Without auditing and trying to forecast the cultural consequences of the organizational behavior linked to IS implementation, implementation is very likely to fail (Claver, 2001). In the case of Shine, political issues were problematic. Different ERP definitions were from different stakeholders. Understanding the values of individuals and groups, and managing the power balances were required.

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