ERP Implementations – a never ending story?

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Abstract. ERP (Enterprise Resource Planning) systems integrate software solutions that support the integration of all information flows leading to organizational changes. This paper outlines a research proposal concerning the implementation and use of ERP systems in organizations. Taking an information and knowledge perspective on organization from the management and consultant perspective, we present issues that are of interest when ERP systems are implemented and used. The paper ends with discussion concerning future work.

Key words: ERP Implementations, Organizational adjustments, Action Research, knowledge management
Introduction

Information systems is the overall name for systems that handle, store and distribute information. Today, development is turning to information and communication systems. Processing data and using information effectively is essential for all types of organizations. In their day-to-day operations, organizations use information for functions such as planning, controlling, organizing, and decision-making. Information is unquestionable a critical resource in the operation of all organizations. Speed and vast quantities of information are key issues. Many companies today choose to implement ERP (Enterprise Resource Planning) systems not only to support the daily operations but also to handle information, building services to customers etc. This leads to organizational change for example, implementing new ways to process and disseminate information between different departments and between individuals. The need for information in organizations today is vital for their survival and the need for speedy access to the “right” information in a timely, accurate and easy manner is growing. In order to provide this, many organizations implement ERP systems to support various functional areas. This paper presents an attempt to formulate a research approach, proposing that adjustment has to be made not only in the implementation process but also in the organization itself. Today, organizations make adjustments to fit in the ERP system and its processes but there has to be a limit in how much the organisation can change. It would be interesting to investigate what happens in the organisation when an ERP system is implemented and used. When traditional system development processes are being performed the process follows pre-defined stages, ending with the implementation of a system for the organization to maintain. ERP implementations do not follow the traditional approach preferring an on-going style, making the organization change as the use increases. The organization may have to change their work processes on a continual basis as the ERP system is complex and contains a lot of parts that will be used as the knowledge increase. The changes in organizations can be viewed from both the organizational perspective and the user or employee perspective. One question that can be raised concerns the “loss” of individual knowledge when best practice in the ERP system is adopted on the work processes. This is connected to the adjustments the organisation has to make when the ERP System is implemented. At this early stage we have formulated the following proposal: We want to clarify what kind of adjustments are made towards the ERP system and identify the consultants role in this by taking the organisational perspective and examine these changing factors in the organization. The structure of this paper is as follows, we begin by trying to give a theoretical frame to the problem situation. Then we present an informal meeting with a small company using an ERP system in their organization. Some research is performed within the problem area is then presented and thereafter
suggestions for research design are formulated. Finally, we conclude and discuss how the proposed research can be designed and performed.

**Theoretical framework**

An ERP system is an integrated software solution that supports the integration of all the information flowing through an organization (Wong & Scarbrough, 2005). Before the millennium, several companies felt that new information systems had to be implemented in order to support their business processes. Now, many of these systems are replaced by ERP systems with the purpose of increasing the efficiency in their business processes. According to Sumner (2005), the ERP market is one of the fastest growing markets in the software industry and this development will create changes in the information systems development process. Davenport (2000) discusses the future of Enterprise Systems where there is a gap between the capabilities which will be valuable in the future and the capabilities currently available for ES. As this was stated five years ago, we can today assume that this was a correct statement. From the information systems development perspective there are both human and organizational aspects of information systems e.g. ERP systems (Avison & Fitzgerald, 2003). Avison and Fitzgerald also express that information systems are useful, usually improving the effectiveness in the way that the organizations operate and that information systems do not exist for their own sake. This can be applied to ERP systems as well, and we believe that the implementation and use of ERP systems in organizations should be considered in new perspectives as it effects every individual in the organization and most of all the organisation itself.

**ERP and Information**

The interpretation of information and knowledge as concepts differ in many ways. Castells (1996) express “information is organized and communicated data” and knowledge is “a complex of organized expressions or ideas that is conveyed to others in a systematic form”. He also express that the information society is one where information and communication of knowledge are the ground source for productivity and power. Information plays an important role for development. The implementation of ERP systems has effects on both the organization itself and the members who work in it. The use of the ERP system to disseminate information can create a flow of internal information, accessible at every level and to everyone in the organization. We believe that the information is not always analyzed before it is disseminated in the ERP system and can probably create an overload of
information that is time consuming, and the opposite effect from the expected is achieved. It can also create a frustration not knowing were to find information that is useful and needed. Orlikowski (1994) argues that an understanding of people's interpretations of a technology is critical to understanding their interaction with it. To interact with technology, people have to make sense of it. In this sense making process, they develop particular assumptions, expectations, and knowledge of the technology, which then serve to shape subsequent actions toward it [ibid.]. Allwood (1998) suggested that a user’s acceptance of the system and of the process of computerization itself depends on the degree to which he or she views the system as a threat or a resource.

Knowing how to create information that people can use and rely on is within an area that has come to be known as knowledge management (KM). Knowledge management supports the creation, archiving, and sharing of valued information, expertise, and insight within and across communities of people and organizations with similar interests and needs (Rosenberg, 2001). From the KM perspective organizations need to archive and store knowledge created in both internal and external communication processes to facilitate knowledge creation and sharing. In ERP systems there are parts supporting knowledge management. The organizations should be aware of and have interest in using this parts of the ERP system so they can benefit from using it. An important issue is to build linkages between knowledge management and the knowledge work process it is design to support (Davenport & Prusak, 1998).

ERP Implementation and Changes

The implementation of ERP systems in organizations new information architectures have emerged without being planned for. And new functions within these architectures have emerged. When we use the term emergent we refer to tasks and positions in the expressed environment that occurs without any considerations during and after the implementation process. The need for information in organizations today is vital for their survival and the need for access to the “right” information fast is growing (Castells, 1996).

Information systems today are moving towards ERP systems where every process in the organization is integrated. Small and large organizations integrate all processes such as communication, business operations, administration and so on into ERP systems. ERP systems are on-line, interactive systems that support cross-functionally processes and data integration (Brown, Vessey, Powell, 2005). This creates changes in Information systems development according to Hedman (2003). Hedman presents a framework with key characteristics as an enterprise system life cycle supporting our suggestions that a holistic perspective should be addressed to the implementation and use of ERP systems.
From a similar perspective Wong, Scarbrough, Chau and Davison (2005) presents critical failure factors identified in their study concerning ERP implementation problems and ERP implementation failures. The fourteen critical failure factors were analyzed and three common failure factors were examined. The three common factors were poor consultant effectiveness, project management effectiveness and poor quality of business process re-engineering (Wong, Scarbrough, Chau and Davison, 2005). The result stresses the importance of the consultants role in the implementation and maintainance of the ERP system. The consultant should not only have knowledge concerning the system but also have communication skills, good language capability, industrial knowledge and business analytical skills according to the results from Wong, Scarbrough, Chau and Davisons study. Their results suggests that the role performed by consultants is important to fill the knowledge gap within the different phases of ERP implementation.

Another issue stressed by performed research is that the success of ERP systems implementation depends on its use by the end-users (Nah, Tan & Beethe, 2005). Therefore they stress that it is important to understand the phenomena underlying the end-users acceptance of ERP systems. A lot of research concerning users adoption of new technology has stated and confirmed that end-users acceptance is one of the most important issues if a information system development is going to be successful (Davis, 1989; Davis, Bagozzi & Warshaw, 1989). Evaluation research in the information technology area concerns often the efficiency and the effectiveness. In the efficiency perspective, the focus is on the operations of the system itself, while in the effectiveness perspective; the focus is on how well the use of the technology serves the need of the organization and its employees according to George (2000). According to this, the ERP system has to fulfill both the efficiency and the effectiveness perspective in order to serve the organization as it was intended when the ERP system was implemented.

The SECI model

Providing a theoretical framework for the development of knowledge management within this structure, the SECI model (Nonaka et al 1998) is a spiralling process of interactions between explicit and tacit knowledge, leading to the acquisition of new knowledge. It highlights the importance of relating the development of information systems to users and ensuring that they are engaged at appropriate stages throughout the process.

| Tacit Knowledge | Tacit Knowledge |
The Socialisation stage or “originating ba” is the world where individuals share feelings, emotions, experiences and mental models, sympathising and/or empathising with others and removing barriers between self and others. Operating in an unfamiliar environment can produce “entrainment” (Condon 1976) and improvisation, providing feelings of care, love trust and commitment. In this case, the issues here are primarily of being able to engage with theoretical tacit knowledge already in place to the new everyday practice. Of importance here is learning how to relate to other employees in the organisation, adopting accepted codes of practice in terms of behaviour, approach, etiquette and communication. Changing the way of performing work and how to communicate by using the ERP system has an impact on employees through their behaviour.

The externalization process or “interacting ba” follows where tacit knowledge becomes explicit. As such, it is important that all ideas are positively encouraged however they may be initially communicated, encouraging individuals to engage jointly in the creation of meaning and value. During this phase, the individual within the organization becomes “one of the group”, accepting standard practices and adopting accepted practices. This section represents quite a challenge and also varies depending on the individual’s personality and their willingness and ability to be reflective in accepting practices and adjusting accordingly.

The combination phase or “cyber ba” follows where the combining of new explicit knowledge with existing information and knowledge generates explicit knowledge through the organization (Condon 1976). This is the section where individuals start to learn and adopt new practice, putting their theoretical knowledge into use with regards to reforming existing real-life practice, suggesting new methods of operation while also recognizing that sometimes existing practices are in place based not just on ideals but from experienced points of view. This can cause frustration and requires careful management to ensure that positive lessons are learned to enable the employee to continue to progress and develop.
The internalization phase or “exercising ba” allows the conversion of explicit knowledge to tacit knowledge. Focusing on training with senior employees, this consists of exercises that form certain patterns and disciplines. Therefore, the internalization of knowledge is continuously enhanced through the use of formal explicit knowledge in real life or simulated applications. This represents the most exciting phase from an employability point of view, providing them with the valuable insights of how their previous knowledge can be further developed and applied to this new opportunity. It enables an appreciation of how the knowledge can be put into practice and understood fully, demonstrating the impact of the knowledge framework on their individual knowledge process.

The understanding and interpretation of knowledge always depends on the individual. In Western cultures, explicit knowledge management is promoted whereas in Japan, tacit knowledge management approaches are the main focus (Nonaka et al. 1998). Knowledge is manageable as long as leaders embrace and foster to enable it to be created. Consequently, the role of the manager is crucial in order that the employees adopt expected practices, are able to acquire the necessary skills and are encouraged to display and develop their individual creativity. Their role is therefore to manage emerging knowledge by supporting the changing process with vision while also committing time and influence. Knowledge needs to be nurtured, supported, enhanced and cared for and the users of the ERP system should feel that their knowledge and experiences are considered and has a value when work processes change. Knowledge activists support the concept of ba by demonstrating commitment to ideas, experiments and human beings through acting as catalysts of knowledge creation and connectors of initiatives and foresight. With their commitment, the vision on the type of knowledge to create and how this is best supported for emerging ba act as a driving force for all organizational members. This type of knowledge management provides space for knowledge creation processes to emerge, opening the door to a new type of creative, inspiring and imaginative management.

Information Quality

It is important to have quality information within the ERP system and all information should be used. A framework with four IQ categories, developed through empirical studies (Huang, Lee et al. 1999), could be applied here. The first category is intrinsic IQ which denotes that information has quality in its own right. Contextual IQ highlights the requirement that IQ must be considered within the context of the task at hand; that is, information must be relevant, timely, complete and appropriate in terms of amount so it adds value. Representational IQ and accessibility IQ emphasize the importance of the role of the systems and the systems must be accessible but secure. The systems must present information in a way that is interpretable, easy to understand, and concisely and consistently represented. These four categories should be considered in information consumer’s
as in the employees, perspective which is all individuals at every level in the organisation. The organisational change affects the knowledge possessed by the users and it should be captured, developed and used together with the processes within the ERP system. The ERP system should support and enhance the creation of new knowledge and by applying the SECI-model this could perhaps be supported. The next section will present and discuss the SECI-model and its relevance in our proposal.

Initial interview

To apply this model to a real-life situation, a contact was made with a small company using an ERP system in their business. The company develops and delivers a product on customer demand. The purpose with the meeting was to capture overall opinions, positive and negative effects of the use of the ERP system. And also to identify how the ERP system was used in their operations and how their further development of the use of the ERP system progressed. The interview was performed as an informal meeting with three participants; the manager, the production manager and the IT-manager. In this initial interview the participants were asked to describe and “tell the story” about the implementation and use of their ERP system. The company expressed that the ERP system has changed their way of performing their work processes to some extent. All of the participants expressed that there was several modules in the ERP system that they did not use. They also expressed that it is easier to use the old systems and modify them to the new ERP system. An explanation to this was that if processes are time consuming to put in the ERP system the choice was made to use the old system and convert the information into the ERP. So, they expressed that the ERP system was almost used as a database at some level. All three managers expressed that there is a strong need for the IT-people to have very good insight and knowledge concerning the organization to be able to maintain the ERP system. They expressed that they have ideas on how to increase the use of the ERP system but that they do not have the time available at the moment. In the interview the managers indicated that they still have yearly costs for consultant support which confirms our assumptions. The change is an on-going process since they still, after some years are dependent on the consultant to support the ERP system and the employees using it. This indicates that there is no defined end of the process. The weakest link in the system always needs further development and new ideas for how processes can be improved by using the ERP system are constantly growing.
Research Design

To understand in-depth the impact the implementation of an ERP system has on organizations and its users a framework will be constructed. Baskerville and Myers (2004) state that “action research aims to solve current practical problems while expanding scientific knowledge” (pg 329) which we believe could be applied on our study. The empirical work will be conducted using a case study approach. A case study allows an investigation to retain the holistic and meaningful characteristics of real-life cycles and organizational and managerial processes (Yin 1994). The study will be using interviews, document reviews, and personal observations as the main methods for information collection. The result will be evaluated and hopefully used in the participating companies.

Further work include companies and consultants using ERP systems in their daily activities and as the action research aims to solve current practical problems while expanding scientific knowledge (Baskerville & Myers, 2004) we believe that this could be applied. Baskerville and Myers (2004) describe action research as a two-stage process. First, the diagnostic stage involves a collaboration analysis of the social situation. This step will include the SECI model with an attempt to capture the individual knowledge and engagement in the use of the ERP system. The second step is a therapeutic stage involving collaborative change. In this case, it will create a creative collaboration between the researchers and the management in the companies that are studied. The researchers will bring knowledge into the companies and the companies will contribute with practical knowledge to the research. The participating companies will share their knowledge and experiences which will enhance their use of the ERP system in their organizations. Hopefully, the results can be useful for the companies to achieve a successful use of the ERP system in every level in their organizations. An interesting approach could be to use a modified version of TAM (Technology Acceptance Model) as a starting point to identify and capture relevant issues concerning user’s adoption of new technology. TAM is a model that is used to investigate the user’s acceptance of information technology. Nah, Tan and Beethe (2005) points out that TAM has limitations used in an ERP context and suggests that TAM has to be extended or revised on order to be suitable for explaining end-user acceptance of complex and advanced information technology (IT) in organizational settings. We have an idea of using TAM not to investigate the end-user but to put the organization as the end-user to identify the added-value and usefulness in the use of ERP systems. Viewing the organization as user could be an interesting approach since we are convinced that there is a need for a framework or a model to be used when ERP systems are investigated. Taking a holistic perspective on the use of ERP systems and not the end-user (e.g. individual level) will hopefully lead to useful results for the organization and the consultants working with implementation and maintenance of ERP systems.
Further work and Discussion

In the beginning of this paper we started by expressing that the market of ERP systems is growing fast and this needs some attention and further research. Traditional system development theories focusing almost on the development of new technologies, e.g. information systems, today ERP systems are already developed and include different software. The implementation process of ERP system concerns how the organization should adjust and change in relation to how much the ERP system can be modified to suit the organization. We have also presented research concerning how important it is that new technologies are adopted and accepted by the users in organizations. A lot of research the last years has been focusing on the end-user level and we believe that the management level needs some attention when ERP systems are used. In the background we mentioned Hedmans (2003) framework with key characteristics as an enterprise system life cycle and together with the results from Wong, Scarbrough, Chau and Davisons (2005) research where they identified critical failure factors we believe that this area needs some attention. The conclusions from the presented research confirm that the consultant’s role is vital for succeeding with implementation and use of ERP systems in organizations. Accordingly, these affect the information quality and manage of the knowledge within the organization. The presented SECI model could provide the organization with a perspective supporting them to create an on-going learning process between individuals supporting them to share experiences and knowledge anchored in real-life practices and put it into the ERP system. This could enhance the use of the ERP system and new functions and operations could develop adding a value both for the individual and for the organization. From the organizational perspective it would create an awareness of the opportunity to capture and manage the knowledge possessed by the users.

From this perspective we suggest that setting up a study including several companies and consultants could present relevant results both for the research community and the practitioners. The study could focus on how the implementation and use of ERP systems have affected the organization, how have the organization change and how many adjustments has been made towards the ERP system? It could also be interesting to investigate how the ERP system is used, what kind of operations is performed outside the system? Furthermore, what role has/have the consultant played in the implementation process and in their future work with the ERP system? We are aware that more work needs to be undertaken to establish how this theoretical model relates to real-life practice. In particular, emphasis needs to be placed on the impact of the individual on the knowledge management within the organization and the role that the ERP plays in shaping the transition and impact of this. Supporting knowledge management theories, it is our intention to
focus on the management level within the organization and also on the consultant’s role in implementing ERP system which we feel plays a key role in forming the strategy and operation of the organization and the use of the ERP system.

References


