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Choon Ling Sia
City University of Hong Kong, iscl@cityu.edu.hk

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“IMPACT OF ORGANISATIONAL RESOURCES ON IMPLEMENTATION OF ERP BY AN SME FIRM: AN EXPLORATORY STUDY”

Abstract

SME firms have limited resources which imposes a constraint on their ability to successfully implement Enterprise Resource Planning (ERP) software. In this research we investigate problems faced by two subsidiaries of an SME trading firm in their move towards ERP. Our findings indicate that the nature of problems differ for the three different stages of ERP implementation life cycle- (1) pre-implementation, (2) customization, reengineering and installation, and (3) post-implementation usage and monitoring. SME firms lack resources to address some crucial problems in each of the three stages. Our findings also indicate that problems in the initial pre-implementation stage may have a ripple effect on the following stages, affecting successful implementation. Theoretical and practical implications of the findings are discussed.

Keywords: SME, ERP Success, ERP life-cycle, change management.

1 INTRODUCTION:

Enterprise resource planning (ERP) systems are computer-based information systems that enable integration of application programs for various business functions or processes such as sales, purchase, financial accounting, manufacturing, human resources etc. Different business applications can all use a common database that serves as the integrating mechanism. Infor ERP LX, JD Edwards EnterpriseOne, Lawson M3 for Process Manufacturing, SAP's mySAP ERP, SSI's TROPOS are some of the popular ERP packages.

A standard ERP system imposes its own structure on the company (Davenport, 1998), and it becomes an organizational infrastructure that affects how people work (Hanseth and Braa, 1998). The introduction of ERP forces the firm to change or re-engineer its processes, sometimes drastically. The imposition of different knowledge structure influences an organization's ability to internalize the knowledge into its business routines (Lee and Lee, 2000). Inability to manage the complex process of internalization of new knowledge has led to several instances of failures of ERP in large firms (Bingi et al, 1999; Griffith et al 1999; Hayes et al, 2001; Mandal and Gunasekaran, 2003; Vogt, 2002). Since SME firms do not normally have the resources of large firms in terms of technical expertise, financial strength, professional management etc. it is logical to assume that they would have greater problems in managing the critical success factors of implementing an ERP system (Olsen and Saetre, 2007). In addition, most SME firms rely on their own idiosyncratic processes that enable them to meet customer demands in a flexible manner. The structure imposed by an ERP threatens such idiosyncratic methods of functioning and is likely to lead to resistance and non-acceptance of the new system. In this research we therefore try to investigate the nature of the problems and the ability of an SME firm with its limited resources to manage the problems and pave the way for successful ERP implementation. Specifically, we try to investigate the following.

1. 'What' major problems may be faced by a typical SME firm in implementing an ERP system?
2. 'How' and to 'what extent' can an SME firm address the problems with its resources?

It is important to investigate the above issues because ERP systems were designed for large firms who continue to be major users of such systems. Most prior research on ERP implementation and success has therefore been in the context of large firms. However, now there is increased awareness of ERP in the SME market and ERP vendors have started paying attention to this market segment for business growth. With limited resources and idiosyncratic ways of functioning, SME firms are likely to face more challenge in ERP implementation compared to larger firms with professional expertise. Thus the implementation and usage of ERP systems in SME firms is worthy of investigation. To answer the above questions, we conducted an in-depth exploratory study of ERP implementation in an SME firm in Hong Kong, involved in different types of garment manufacturing. The company is representative of a typical SME trading firm with trading operations controlled in Hong Kong and manufacturing facilities in some low cost locations. The respondent was a key person in the organization responsible for the ERP project. The first interview was conducted in October 2006 at a stage when the firm was in the midst of implementing two modules of an ERP in one subsidiary that was the trading arm of the company. It was the first implementation site. The second interview was conducted in Feb 2008 when implementation of some modules was under way at the second site, a subsidiary unit with manufacturing operations.

In the next section, we discuss prior literature on critical success factors of ERP implementation and develop a framework for our investigation. We then discuss the research methodology, followed by analysis of the problems and the manner in which the SME firm tried to resolve the problems in two subsidiary units of the company. In the final section we discuss the overall findings and draw conclusions from the research.

2 THEORETICAL BACKGROUND:

In this section we review past literature on the critical success factors (CSF's) of successful ERP deployment. Among the main CSF's in prior literature are the selection of the right ERP package matching organizational needs (Nah & Lau 2001; Kunda and Brooks, 2000; 31-Rolland and Prakash, 2000; 15-Holsapple and Sena, 2003; Okunoye et al, 2006; Wu et al, 2007), ability to integrate existing organizational knowledge with ERP processes (Newell and Huang, 2006); and managing disruptive changes to business processes and linking them to the ERP project life-cycle (Rao, 2000; Soh et al, 2000; Holsapple and Sena, 2005, Wu and Wang, 2006; Aloini et al, 2007). Effective communication (Nah & Lau 2001), project management and software design skills (Sumner, 2000), systematic incorporation of knowledge created in each phase of the ERP implementation life-cycle [Sarvary, 1999; McGinnis and Huang, 2007), and top management support (Sumner, 2000) are other factors discussed in prior research.

There is also evidence that the CSF's pertain to different stages of the ERP life-cycle. In one research on ERP adoption in an educational setting, a pre-implementation stage has been conceptualized. This stage is characterized by a set of activities comprising a detailed review of exiting processes and their shortcomings, ability of existing systems to meet changed optimal processes and evaluation of ERP packages in terms of the ability to meet changed organisational needs (Okunoye et al, 2006). Prior research indicates that this is a crucial stage and one in which problems may be as difficult to resolve as the later stages. For example, a common problem in this stage is the ability to choose the right ERP package. Misfits between the ERP chosen for implementation and the adopting organization's requirements in terms of the organizational goal, operational functions, data, and output have been identified. (Wu et al, 2007) that could lead to failure of implementation [Holsapple and Sena, 2003; Kunda and Brooks, 2000; Rolland and Prakash, 2000]. While data and output misfits such as reporting from the package) are normally customizable easily as add-ons to the ERP package, goal and functional (scenario) misfits are difficult to customize and when done, lead to complications in implementation of the package. (Wu et al, 2007). Following the pre-implementation planning stage, a stage of customisation and business process re-engineering is discussed in prior literature in which specific problems of eliciting relevant knowledge from the existing process and integrating it synergistically with the process that comes with the ERP package are mentioned (Newell et al; 2006). A third stage in ERP implementation is also discussed, in which performance outcomes are measured for the implemented modules of the ERP. Even when ERP modules are implemented, performance outcomes are often not up to expectations. For example, in a study of ERP implementation in Swedish manufacturing firms (that are known to have industry maturity), the most frequently implemented modules, order processing and financial management were found to deliver the poorest performance (Olhager and Selldin, 2003).

Two themes emerge from the above review. The first is that in order to understand successful implementation of ERP, the ERP project must first be well-defined in terms of the three stages - a pre-implementation stage, a stage of customization and re-engineering of processes and installation of the ERP modules; and a third stage of post-implementation monitoring and corrective actions. The second is that the natures of problems differ in the three stages. There is indication in prior research that

overall success of complex systems such as ERP may need to be understood in terms of success at each stage of the ERP implementation life cycle. Success at one point of time or in one phase may not always have high correlation with success at another point in a following phase (Markus et al, 2000). Thus in order to understand the problems in ERP implementation that SME firms may encounter and how they may resolve them, it becomes necessary to delineate the implementation life-cycle into the three stages and investigate the SME firm's ability to address the problems at each stage of the life-cycle with its limited resources.

3 METHODOLOGY:

We chose the case study method because our aim was to explore 'what' problems are crucial in an SME firm's endeavor to implement an ERP package and 'how' they address them. Case studies are appropriate when little is known about the phenomenon as well as when the investigation entails a 'how' aspect, signifying a process orientation (as opposed to factor orientation). We try to understand the problems by investigating two ERP projects in two different subsidiary units of an SME firm with different functional roles – a trading arm and a manufacturing unit. Both units had implemented one or more modules of the same ERP package. The research method was semi-structured interview with the Project Manager of the ERP implementation team at both sites. Questions were framed based on the interviewee's perceptions of problems faced as the firm moved from one stage of the ERP cycle to the next stage. Our investigation is therefore informed by prior research that provides a framework for the analysis as well as our analysis of the interviewee's perceptions of the problems and the constraints faced in addressing the challenges. Thus we have both, deductive as well as inductive elements in our analytical approach. Initial coding of the case narrative was done by the first author. As the first author collated segments of data, the contrast between the two case-sites and the possible explanations/causes were developed. The case repository was passed on to the other co-authors for cross-validation.

4 CASE FIRM DESCRIPTION

The case firm is a garment trading firm that has both trading and manufacturing operations. There are five subsidiary units. The trading arm is located in Hong Kong is the main office, which manages the trading function of sales, purchase, and shipment to the customers. This trading arm also controls manufacturing operations which is located in China. The other subsidiaries are factories located in low cost centers such as China and Malaysia. The Hong Kong Main Office has 30 employees, and one manager. Prior to ERP implementations, only bulk production orders and a fabric library system existed. All purchase orders, shipping consignments/packing list and production orders were filled out by hand. The factory unit in China manufactures only knitted clothing. It has 30 employees and one manager. There are about 200 employees in the factory with 4 managers. This unit also has sales, purchase and shipping, in addition to production. Prior to ERP implementation, there was a computer system that was widely used for sales, inventory tracking and shipping. Only purchasing and cost calculation was done by hand.

As on the date of reporting, implementation of ERP was being carried out only at these two sites, the main office in Hong Kong (called Unit 1) and the factory in China (called Unit 2).

5 REASONS FOR THE ERP PROJECT MOVE:

The group as a whole did not have a policy for implementing computer systems at its subsidiary units. As a result, each of the five subsidiary units developed their own systems. For example, one subsidiary had their systems developed in VB on a PC LAN. It catered to merchandising. After some usage, these systems were abandoned in 2003 and work was done manually. Another subsidiary units had developed software for sales and merchandising on the AS 400 platform. The fourth unit had a system written for them by the HK Bureau of Commerce. Like other systems, this system was also geared towards the merchandising and warehousing function. In addition, a common stand-alone accounting package was used by all subsidiary units.

The management at each of the subsidiary units relied more on gut feel and out of date manual Excel reports rather than information from computer systems to control and manage the operations. The group as a whole derived little benefit from disparate systems in terms of an overall understanding of the cash flow, production costs etc. Management at the group level felt the need to streamline the computer operations for the subsidiaries and improve information management and dissemination. A new MIS officer was hired in Dec 2004 to investigate how the problems could be addressed. The MIS officer started with investigation of the existing computer systems in Unit 1, the trading arm of the group. To aid the implementation process, two teams were formed; a steering committee with the head of the group and the heads of the subsidiaries as well as the MIS officer for overall co-ordination at all subsidiaries and site specific implementation teams with key users of systems and the MIS officer. It was agreed that payments for the project and approval of cost over-runs would be decided at the steering committee level. Allocation of work and other detailed project level decisions was to be made by the implementation team or the MIS officer as the project team leader. Problems not easily resolved by the team or problems that were seen to have direct impact on information flow for the group as a whole were to be discussed and resolved at steering committee meetings.

Several shortcomings in the operations of the company's five subsidiaries were noticed by the MIS officer. In Unit 1, financial reports did not provide enough information for the management to have a clear idea of the accounts receivables, payables, cash flow etc. Information was fragmented and often there were instances of double-payment and missed payments due to lack of control over A/P. Colleagues who left the company did not maintain systematic records as a result of which it was hard for the sales people in the merchandising department to track down and reuse old information for repeat orders, creating unnecessary burden and workload on colleagues who took over. In Unit 2 (a factory in China), the accounting system was inadequate, so cost of production (in terms of man hours and material) could not be monitored properly in a timely fashion. Disparate systems in the subsidiary units led to high system maintenance cost and lack of information sharing amongst the units.

In March 2005, the MIS officer recommended that an ERP system be used to replace all the systems in the units. Modules of the same ERP system would be used in all the units as per their requirement. The recommendation was approved by the board of the group. Cost reduction and information flow ranked as the most important factors that weighed with the group in approving the ERP project. Customer satisfaction and support for merchandising was also a major deliverable expected from the ERP, in terms of offering customers more transparency of manufacturing and development status. Management of all five companies decided to share the cost on per user basis.

6 PRE-IMPLEMENTATION STAGE:

6.1 Selection of the ERP package:

Because of the diversity of products in each of the subsidiary units, it was extremely hard to find “one” ERP product that fitted the requirements of all units. The team looked at a number of ERP products but eventually narrowed it down to two ERP packages - Microsoft’s Axapta and Intentia. The reason for the final two choices was that these two ERP packages had fashion modules developed for their system and were seen to be flexible enough to develop an add-on module to fit the diverse needs of the different subsidiaries. It was found that Intentia was not flexible in terms of modification and changes to codes. Axapta was finally chosen because it allowed easy modification of codes. Availability of source codes of the software layers external to the core system was seen as a facilitator of easy customization.

6.2 External Consultant Chosen for Implementation

An external consultant was hired for implementation. The understanding with the external consultant was that all subsidiaries would provide domain knowledge in garment manufacturing to facilitate the development of the garment add-on module to the external consultant. Since Axapta was designed for electronic goods manufacturing and accounting, there was a need to develop an add-on garment trading module with major modifications to existing modules of the AXAPTA, for which this domain knowledge was needed. The external consultant quoted a lower cost for this project because it had an interest in developing a garment trade version of the ERP software. So it was a kind of win-win situation. The Axapta system was easy to modify, and work was expected to be completed on schedule without any major problem. Since all subsidiary units operated as independent profit centers, a decision was taken to share the cost of the package and implementation cost on a per user basis.

7 CUSTOMISATION AND INSTALLATION STAGE:

After signing the contract with the external consultant, a phase-wise implementation was decided upon, starting with Unit 1, the trading arm of the group. Unit 2 and other units had existing computer systems that encompassed most of their company’s operations and so it was not considered feasible to disrupt the systems and start with modification of Axapta’s modules for these companies. All departments of Unit 1 participated in a walkthrough of the ERP package to understand the changes needed in the ERP package as well as the changes required in the unit’s business processes. However the scope of the changes was not known with certainty. At this stage, the implementation team discussed with the external consultant the changes that had to be made to the sales, purchase and accounting modules of the ERP package to match the garment trading and manufacturing process. The walkthrough was done for a period of six months. At the end of five months, in July 2005, the external consultant who was leading the project unexpectedly left the site because he found a better job opportunity. Knowledge transfer from the present consultant to the new incumbent was fraught with problems because of informal methods used by the project leader to gather and document information and lack of time for the transition. Though the consulting company agreed to accommodate the extra cost involved, the implementation team members and other members who participated in the walkthrough were clearly not keen on going through the walk-through process again. They were loaded with daily routine work and did not have spare time for another walk through with the new consultant. Thus there was a gap in the knowledge transfer. Actual customization was delayed and

started in November 2005. After four months of coding, the financial and merchandising (sales) and shipping module was installed at Unit 1 on April 2005.

Implementation in Unit 2, a factory located in China, started in February 2007 and was completed in October 2007. The implementation experience with sales and shipping in Unit 1 helped in quick deployment of these modules and training of users in Unit 2. The extent of customization for these modules was minimal. In regard to the manufacturing module, the knowledge of extant processes could be elicited much faster due the fact that this site was already well-versed with computer systems usage and the work flow was structured. Also, having learnt from the implementation in Unit 1, the steering committee asked for a team of 4 external consultants for walk through and customization, so as to have a back-up from customer turnover, as it happened with implementation in Unit 1. The manufacturing module however needed extensive customization to suit garment manufacturing. As on March 2008, the manufacturing module was rolled out and post-implementation procedures were taking place.

The investigation revealed that the leadership style for implementation in the two units also varied drastically. Though heads of both units were members of the same steering committee, they treated ERP implementation related problems pertaining to their respective units quite differently. The head of Unit 1 had a “hands off” approach to ERP implementation and passed on the responsibility to the Merchandising Manager to solve the problems and assist the implementation team. In Unit 2, the head was more “hands on” and liked to sit and discuss the problems. He personally organized his employees to help solve the problem before it entered a serious dead locked situation.

8 POST-IMPLEMENTATION STAGE:

In Unit 1, the lack of smooth knowledge transfer from the external consultant to the new consultant led to certain shortcomings in the implemented version of the ERP. The merchandising team, already saddled with daily routine work, and being used to working in their own idiosyncratic ways with a combination of manual and some computerised process in the old system, found the ERP system to be a burden. Most users were not comfortable using the ERP system. Most were old people and did not want to change to the new work process and system. They felt it exceeded the time to process a transaction. The ERP steering committee was aware of the problem but due to the sensitive customer-facing nature of the merchandising function did not want to exert pressure on the users. As a result, extra junior merchandisers were hired as well as the development of a Shanghai data centre was opened for the data entry work. The accounting department of Unit 1 also suffered from disorganization and a lack of man-power in the HK office but because of budget constraint they decided to setup a data centre in Shenzhen to handle the workload. The data centre uses a telecommunication link that provides virtual access to the ERP package and to post the transactions in real-time. Management in this unit still continues to go by gut feel because it does not have confidence in the ERP generated reports.

In unit 2, familiarity with the present computer systems led to easy customization and migration of work to the ERP modules. Users however still feel that the work load in the new ERP system and time to complete a transaction input is longer than before. The steering committee discussed the issue and data entry was off-loaded to the remote site in Shenzhen. However, unlike Unit 1 where reports are still viewed with skepticism, the management at Unit 2 uses the reports and derives benefits from better management of A/P and material and labor cost.

9 DISCUSSION AND CONCLUSION

Our findings indicate that lack of adequate financial, technical and management resources constrained the SME firm's ability to effectively manage the problems and that these resource constraints had different impacts at different stages of the ERP implementation life-cycle. For example, in the pre-implementation stage, lack of financial resources to form a pre-implementation team with adequate number of participants from the user side and inadequate technical expertise led to the situation where the selection of the ERP package had to be decided upon without a thorough benchmarking with other packages. Lean staffing prevented allocation of users to teams that could be dedicated for such benchmarking. The fall-out was extensive customization of the chosen ERP package. It also prevented the firm from benefiting from some industry best practices that may have been factored in the more well-known and widely used packages. The situation led to existing processes with their inefficiencies being coded into the ERP (not necessarily industry best practices). Some packages like SAP (mySAP), JD Edwards, Oracle etc. have a longer history and claim to have several industry templates available geared for SME firms. The case firm did not have technical and financial resources to undertake a study of such packages.

The problem of not being able to gauge and estimate the cost of customization led to a cost-overrun of 40% in Unit 1 and affected stage 2 of the ERP life cycle. This problem could have been avoided if the firm had the financial and technical resources to do complete walkthrough of a few packages. The scope of operations being small in an SME firm, this was feasible and could have been done but again due to lack of man-power this process could not be undertaken.

In stage 2, the problem was both technical and people oriented. The implementation team did not have team of dedicated people. In addition, the head of Unit 1 had a hands-off approach and passed on the ERP customization problems to the Merchandising Manager. The Merchandising Manager was more concerned with maintaining existing sales and satisfying customers with present practices. With the pressure and responsibility of daily routine, he could not afford to pull people away for a second walk-through when the first external consultant left. There was lack of the communication and this may be attributed to the lack of adequate human resources. A large firm normally deploys several members in the implementation team who work dedicatedly for the project. Here, the MIS officer was saddled with both technical responsibility and also managing attitudes of the user group.

The steering committee did not foresee the problem of not having a back-up external consultant. Normally, such back-up of knowledge is available in large teams and is a part of contingency planning and risk management. In professionally managed project environments, system flow charts for processes change and required customisation of ERP are documented which enables knowledge transmission. It was difficult for one external consultant to cater to such documentation and modify the software at the same time. Lack of this documentation affected the project cost and time. Such documentation is also necessary for future maintenance. In the pre-implementation stage, the first consultant used all his time to understand the working of the garment industry and did not have the resource to document the required changes. This led to escalation of project time and cost when the second consultant had to spend more time to understand the changes required and to document them systematically as flowcharts. The documentation and flowcharts were prepared by the second consultant before the start of programming back in September of 2005.

In stage 3, the post-implementation stage, unwillingness of the merchandising team to use the installed ERP module was solved by technical means rather than people management skills. The organizational structure and dynamics warranted the technical solution so that there would be minimum disruption of work. Thus change management of attitude was not attempted. Work load was transferred to an off-site location. Thus, this indicates that there may be innovative solutions to problems at some stages.

In summary, the findings indicate that the natures of problems are different at different stages and they need different skills and organisational resources for their management. Some problems may also be difficult to manage and the best course is an optimal workable solution. The SME firm in our study was saddled with staff who lacked adequate education and training on the potential of technology and thus failed to appreciate the benefits from the ERP project. The same applies to management as well, who felt more comfortable using informal sources of reporting rather than computer generated reports. Thus education and training are major bottlenecks in SME implementations of packaged softwares such as ERP. While the decision to implement the ERP was appropriate, lack of financial, technical and management resources were severe deterrents to successful implementation. There is also indication that inability to address problems in the pre-implementation stage resulted in a ripple effect in the later stages. For example, lack of resources led to inappropriate selection of ERP package that led to extensive customisation at later stages. Similarly, improper knowledge transfer from the first to the second consultant in the pre-implementation stage resulted in coding extant 'as-is' practices into the ERP package rather than shortcomings in extant practices being addressed with business process re-engineering and arriving at 'to-be' best-practice solution and then customising the ERP for such best-practice. This was a 'lose-lose' situation for both the firm and the vendor. The firm lost on opportunities to benefit from best-practices and the ERP vendor was not able to capture domain knowledge of garment industry and develop an ERP package that catered to SME garment industry.

Our findings have both theoretical and practical implications. In terms of theory, there is evidence that resource constraints have different impacts at different stages of the ERP project. Future research may investigate CSF's at each stage, the causal associations between the types of resources in SME firms and their impact on successful ERP implementation at different stages of the ERP life-cycle. The impact of leadership styles in SME firms and its impact on ERP success at different stages is another theoretical pointer that emerges from this research. In terms of practice, there is evidence that SME firm must plan for implementation with a careful match of existing resources with the requirements at each stage of the ERP life-cycle. A crucial component in such planning is the ability to address the problems in the initial pre-implementation stage. Failure to do so may affect success at later stages even if appropriate resources are acquired and deployed at later stages. Considering the general lack of resources in SME firms, government led support initiatives may be of help in such technology moves by SME firms.

References

- Aloini D., Dulmin, R. and Mininno, V. (2007); Risk management in ERP project introduction: Review of the literature; *Information & Management*, 44; pp 547–567
- Davenport, T.H. (1998) “Putting the Enterprise into the Enterprise System”, *Harvard Business Review*, 76, (4); pp 121-131.
- Bingi, P., Sharma, M.K., Godla, J.K. (1999) Critical issues affecting an ERP implementation, *Information Systems Management Journal*, Vol. 16, No. 3, 7-15
- Griffith, T.L., Zammuto, R.F., Aiman-Smith, L. (1999) Why new technologies fail? *Industrial Management*, 41 (3); pp 29-34.
- Hanseth, O. and Braa, K. (1998); Technology as traitor: emergent SAP infrastructure in a global organization. In *International Conference on Information Systems*, Finland.
- Hayes, D.C., Hunton, J., Reck, J. (2001) Market reaction to ERP implementation announcements, *Journal of Information Systems*; 19 (1); pp 71-98.
- Holsapple, C.W., Sena, M.P. (2003); The decision-support characteristics of ERP systems, *International Journal of Human–Computer Interaction* 16 (1), pp. 101–123.
- Holsapple, C.W., Sena, M.P. (2005); ERP plans and decision-support benefits, *Decision Support Systems* 38 (4), pp. 575–590.
- Kunda, D., Brooks, L. (2000); Identifying and classifying processes (traditional and soft factors) that support COTS component, *European Journal of Information Systems* 9 (4), 2000, pp. 226–234.
- Lee, Z. and Lee, J.; (2000); An ERP implementation case study from a knowledge transfer perspective; *Journal of Information Technology* (2000) 15, 281–288
- Mandal, P. & Gunasekaran, A. (2003) Issues in implementing ERP: A case study. *European Journal of Operational Research*, 146; pp 274-283
- Markus, M.L., Axline, S., Petrie, D, Tanis, C.; (2000); Learning from adopters’ experiences with ERP: Problems encountered and success achieved *Journal of Information Technology*; 15, pp 245–265
- McGinnis, T.C. and Huang, Z. (2007); Rethinking ERP success: A new perspective from knowledge management and continuous improvement; *Information & Management*; 44 pp 626–634
- Newell, S.; Huang, J.; and Tansley, C.; (2006); ERP Implementation: A Knowledge Integration Challenge for the Project Team; *Knowledge and Process Management* 13 (4); pp 227–238
- Nah, F.H., Lau, J.L. and Kuang, S.; (2001); Critical factors for successful implementation of enterprise systems, *Business Process Management Journal* 7 (3), pp. 285–296.
- Olsen, K.A. and Saetre Per (2007); ERP for SMEs – is proprietary software an alternative? Working paper viewed at <http://home.himolde.no/~olsen/artikler/P81CompletePaper.pdf>
- Okunoye, A., Frolick, M. and Crable, E.; (2006); ERP Implementation in Higher Education: An Account of Pre-Implementation and Implementation Phases; *Journal of Cases on Information Technology*; 8 (2), pp 110 -133
- Olhager, J., Selldin, E.; (2003); Enterprise resource planning survey of Swedish manufacturing firms; *European Journal of Operational Research*; 146 ; pp 365–373
- Rao, S.S. (2000); Enterprise resource planning: business needs and technologies, *Industrial Management & Data Systems* 100 (2), pp. 81–88.
- Rolland, C., Prakash, N, (2000); Bridging the gap between organizational needs and ERP functionality, *Requirements Engineering* 5 (3), pp. 180–193.
- Soh, C., Kien, S.S., Tay-yap, J.; (2000); Enterprise resource planning: cultural fits and misfits: is ERP a universal solution? *Communications of the ACM* 43 (4), pp. 47–51.
- Sarvary, M; (1999); Knowledge management and competition in the consulting industry, *California Management Review* 41 (2), 1999, pp. 95–106.
- Sumner, M. (2000); Risk factors in enterprise-wide/ERP projects *Journal of Information Technology* (2000) 15, pp 317–327
- Vogt, C. (2002) Intractable ERP a comprehensive analysis of failed enterprise-resource planning projects, *ACM SIGSOFT* 27 (2), pp 62-68.

Wu, J.H.; Shin, S.S.; Heng, M.S.H.; A methodology for ERP misfit analysis; *Information & Management* 44 (2007) pp 666–680

Wu, J.H., Wang, Y.M.; (2006); Measuring ERP success: the ultimate users view, *International Journal of Operations & Production Management* 26 (8), pp. 882–903.