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Learning from ERP Implementation: A Case Study of Issues and Challenges in Technology Management

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Abstract

Purpose: ERP implementation comes with huge business competitive advantages nevertheless it also has its difficulties and challenges. This paper presents the findings of field work and interview conducted on issues and challenges of ERP implementation on small and medium enterprises (SMEs). It proposes implementation strategies at each of the implementation stages for a successful ERP implementation within SMEs.

Design/methodology/approach: The study employed both personal interview and observation methods.

Findings: The findings revealed that reengineering (organization and infrastructures), top management commitment, funds, skilled manpower, implementation time and data fill-in were the critical issues and challenges faced by SMEs during ERP implementation. Hence, these factors were identifies as ERP implementation successful factors to be considered by SMEs. Also the study proposed three implementation strategies stages which will enhance successful ERP implementation in the SMEs.

Originality/value: This study identified funds, skilled manpower and data fill-in as part of critical factors for successful ERP implementation in SMEs. Therefore, the study was used to generate successful implementation strategies for SMEs.

Keywords: ERP; ERP implementation; implementation strategies; SME

Abstrak

Cadangan: Pelaksanaan ERP dapat memberikan kelebihan daya saing perniagaan yang sangat besar, namun ia juga mempunyai kesukaran dan cabarannya. Kertas kerja ini membentangkan hasil dapatan kerja lapangan dan temu duga yang dikendalikan mengenai isu-isu dan cabaran pelaksanaan ERP pada perusahaan kecil dan sederhana (PKS).

Kaedah metodologi: Kajian ini menggunakan kedua-dua kaedah temubual dan pemerhatian.

Dapatan: Dapatan kajian menunjukkan bahawa kejuruteraan semula (organisasi dan infrastruktur), komitmen pengurusan atasan, dana, tenaga kerja mahir, masa pelaksanaan dan kemasukan data adalah isu-isu utama dan cabaran yang dihadapi oleh PKS dalam pelaksanaan ERP. Oleh itu, kajian ini telah digunakan untuk menjana strategi pelaksanaan yang berjaya bagi PKS.

Ketulenan: Kajian ini diakhiri dengan perbincangan mengenai implikasi untuk kajian lanjutan mengenai pelaksanaan ERP.

Kata kunci: ERP; perlaksanaan ERP; strategi perlaksanaan; PKS

■1.0 INTRODUCTION

Information technology plays a major role in improving the competitiveness of an organization. There are numerous enterprise information software packages available in the market. One of them is enterprise resource planning (ERP). ERP is business management software that allows an organization to use a system of integrated application to manage a business. ERP software integrates all facets of an operation, including product planning, development, manufacturing processes, sales and marketing. Generally, ERP offers companies three major benefits: business process automation, timely access to management information, and

improvement in the supply chain via the use of E-communication and E-commerce.

ERP has provided significant improvements in efficiency but only when it is implemented correctly. Otherwise, the system could be a curse and drag the whole enterprise into spiraling inefficiency and wastefulness. Hence, planning for ERP systems and their implementations requires an integrated systematic approach to meet the requirements of various functional concerns and need. Consequently, there have been arguments in recent time on the need to further strengthen existing framework of ERP implementation. Study [1] suggested the need to creating less complexity and complications in order to enhance smooth and successful Implementation. Also study [2] pointed out that ERP abandonment occurs in SMEs because many consultants and project managers tend to adopt implementation framework that are designed for Large Enterprises (LGs). Hence, they call for the need to further investigate issues leading to abandonment of ERP in SMEs. Likewise, study [3] argued that complication and complexity of ERP implementation is due to lack of detailed explanatory and understanding of Critical Success Factors (CSF) that are particular to SMEs. These researches have pointed out there is need to further investigate issues and challenges being faced by SMEs. Also, there is need for a step-wise detailed ERP implementation strategies in the SMEs. Therefore this study will explores ERP implementation issues and challenges that are being faced by SMEs. The study will propose implementation strategies that can be to achieve ERP implementation in SMEs.

■2.0 LITERATURE REVIEW

2.1 What is ERP?

ERP is a system that brings lots of competitive edge to any business that correctly and successfully implements it. This system can be defined as a complex software system solution that ties together and automates the basic processes of a business [23]. ERP can be seen as an automated spreadsheet that can manage and analyze a company's resources such as commitments, cash and inventory, despite the source of input of the data. Similarly, [4] viewed ERP as a packaged, customized, integrated software-based solution that handles the mainstream of an enterprise's system requirement in all functional areas, such as finance, accounting, sales, marketing, manufacturing and human resources. The systems provide a seamless integration and coordination of all the information flows in a company to eliminate cross-functional management issues in the business process [5].

According to [6] ERP systems are generic representations of the ways a classic company should operates business. ERP attempts to integrate functions and departments across a company onto a single or stand alone computer set that supply all of the other departments' particular needs. Likewise, [7] explains ERP as the amalgamation of business processes, software, and hardware, optimized to classify a common solution for all aspects of a company's business from order entry to invoice and everything in between.

Connectively, [8] argued that ERP is an integrated computer system that employs relational database management system and client server network architectures which integrate different systems, standardize functional individual valuable information flow and capture management data. Equally, [9] explained that ERP systems is an integrated software solutions used to manage and analyze a company's resources and activities. Through implementing ERP system, a company can exchange information with customers and suppliers to trim down the overall costs and make accurate data available in real time [10, 9]. Therefore, a firm

implementing an ERP system can have benefits such as quick and accurate information gathering, improved interaction with customers, improved product quality, low inventory cost and speedy decision making.

2.2 ERP Implementation Strategies

To ensure completion and successful implementation of ERP system, it is vital to employ the right and precise strategy. One of such strategy is known as the big bang. This is the strategy that ensures that all ERP unit modules are installed in a single instant. Company using this strategy usually cast off old systems and implement the ERP across the entire department at once [6]. [24] argued that this strategy tends to reduce cost. However, [26] disagreed that although it reduces cost but it creates less time for users to acquire skill and knowledge to successfully maintain the system. There is also omission of the use of vital details due to the instantaneous implementation. Additionally any sectional failures in the system will breakdown the entire process of implementation.

Another implementation strategy is best of breed which is based on purposive deployment of ERP modules [11]. The system implementation is done by sectional deployment of different functionality modules. This strategy is found to be similar to phased rollout strategy. Phased rollout strategy is when implementation takes place in phases or sectional but not purposively. The difference between the two strategies is that one takes place in a defined order base on functionality requirement (best of breed strategy) while the other does not have a defined order of implementation but only based on the consultant directive (phased rollout strategy). These strategies are found to limit the risk of overall break-down of the ERP system due to sectional failure as in the case of big bang strategy [24]. However, [25] argued that due to lack of shared database there is possibility of repetitive data at the entry stage of these strategies hence, it produces simulated system. This argument was supported by [6] that these strategies demand lots of careful planning and implementation to avoid errors and mistakes.

Parallel adoption is another ERP implementation strategy that involves the transferring of old system to the ERP system by running both simultaneously for certain duration of time. After the ERP has met the required expectation and the system is successfully implemented then the old system is disabled to allow full operation on the implemented ERP. [12] maintained that this strategy is time consuming and require careful preparation and control to achieve the desire results. Similarly, [13] observed that is expensive to implement because it requires addition staff and skill to run both systems simultaneously.

■3.0 METHODOLOGY

3.1 Research Method

This study employed single-case study. Single-case study was used due to its uniqueness as noted by [14, 15, 16] that for an sufficiently and in-depth comprehension of phenomenon, case-study research design with face to face interview and observation research techniques are very useful. Hence, toeing this line, this study employed a case-study research design with a face-to-face interview and observation research approaches. Key personnel from purchasing and IT departments were interviewed. Company AV was chosen for the in-depth interviews.

3.2 The Company

The company was selected based on its experience in ERP implementation which offers special insights. Company AV, is a manufacturing company categorized under aerospace industry. Since its inception in year 2000, the company, which is a joint venture between Boeing, Hexcel, and local companies served as Malaysian development towards aerospace industry through various strategic business operations. Today Company AV prides itself in producing of wing parts of Boeing aircrafts such as B737, B767, B777, B747 and B787-9 supported by robust operating system. For purchasing and inventory management, Company AV had implemented a conventional system. The old system was expensive to operate and difficult to maintain and develop. It did not provide accurate, consistent and accessible data that was required for good and timely decision-making and performance assessment (e.g. delivery performance, quality metrics). The old system also is not integrated between all the functional areas. Many manual analyses had to be done for reporting and decision making. This system often did not relate fully to a modern manufacturing environment.

3.3 Research Design

This study research design was based on [17]. The company was first contacted for their cooperation on the research. Where the purpose of the research was explained and their response was documented. Appointment was made by the company, where the interview lasted for about two hours with each respondent. A semi-structured interview guide was used to probe issues and challenges on ERP implementation in the company. To ensure reliability, the same interview protocol was used for different interviewees for triangulation purposes. The need for triangulation arises from the ethical need to confirm the validity of the data obtained. Each interview was recorded and transcribed. The respondents involved key personnel in the company that directly involve in the implementation of ERP. They were questioned with regard to their actual experiences. For consistency in the data and its interpretation, the interview structure was provided.

■4.0 RESULT AND DISCUSSION

4.1 ERP Project Implementation

The main reason of company AV's decision to implement ERP system is to increase efficiency and accuracy of their operations. In the first phase of the ERP implementation project was a short intensive study to set the scope of the project and provide an outline plan and costing. A steering committee was formed to administer the financial guidance of the project. An 'ERP Core Team' was also formed to control and oversee the actual implementation process. During the second phase, a detailed plan was created and a prototype system was installed. The ERP core team has to consider the various business processes within the scope of the project. Series of workshops tagged 'Business Simulation Workshops' were conducted comprising of 20 key personnel of the company. This was used to forge a strong relationship between the ERP core team and line personnel and avoid possible pitfalls, such as initiative fatigue or lack of co-operation. Activities carried out during the second phase of the project included:

- Preliminary design review- developing a design and implementation strategy, defining the scope of the project, and developing the business process model.

- High level design review- analyzes the enterprise model, and develop prototype.
- Critical design review- detailed design and customization of the prototype.
- Implementation realization- integration testing.
- Technical/operation review- user acceptance testing
- Post implementation reviews- system deployment, system conversion, user training before the 'Go Live'

Go-live defines the moment of completion of the ERP implement but the beginning of the post implementation where users' feedbacks are obtained to validate the system. When a new system is planned, the most difficult part of the implementation process is transferring of data from old systems. The shear volume of data that has to be transferred is far greater than any normal transaction load that will be carried out by the system thereafter. In order for this process to be successful the data must be kept in a 'stable' state for a period of roughly 10 weeks. The initial data to be transferred includes some transaction data and master data, for example, lists of suppliers and bill of materials. If any changes occur to the data on the old systems after the transfer, they are logged and then passed through to the new system. The remaining data was loaded in after the 'Go Live'

The next step during the 'Go Live' process involved running the MRP system to initialize the system. Purchase order and purchase requisitions was not transferred from the old system, instead the MRP run should create them fresh. The whole 'Go Live' process took roughly two weeks to complete, and during this time the new system was 'off the air'. Immediately after the 'Go Live' the existing system was switched to view only mode. The view only mode enabled comparisons to be performed between the old and new systems.

4.2 Issues and Challenges in ERP Implementation

From the interview, the major issues and challenges facing ERP implementation were identified. The respondents provided insight into the difficulties experienced during ERP implementation. These issues and challenges were categorized into six major themes namely reengineering (organization and infrastructures), top management commitment, funds, skilled manpower, implementation time and data fill-in.

4.2.1 Reengineering

One of the major issues raised was on the need to reengineer the organization for the smooth fill-in of ERP. It was concluded that implementing an ERP system involves restructuring the existing business process to the best business process standard that will accommodate the ERP. One of the respondent said "*one major benefit of ERP comes from reengineering the organization's existing way of doing business*". Another respondent pointed out that "*all the process in an organization must conform to the ERP model to ensure smooth running and productivity*". Similarly, it was mentioned that "*An organization has to change its processes to conform to the ERP package, customize the software to suit its needs*". This is because ERP package has been found not to be able to suit some organization structure and the cost to customize the package to suit these organizations might be high. Likewise this view was supported that "*the more the customization, the greater the implementation costs*". It was further added that "*to reduce the costs of customization and future maintenance and upgrade expanse we decided to reengineer our structure and process*". Hence, the organization only has the alternative to reengineer and

restructure her procedure and processes to suit the ERP in order to save cost on ERP customization.

This finding collaborate [18, 19] argument that reengineering is the process of fixing the organizational procedure into the newly installed ERP to ensure efficiency and productivity. To achieve the desire competitive advantage, the organization must be willing to restructure her process and ways of doing business to accommodate the innovation provided by the ERP. These changes should be done within an overall Business Process Management Methodology in order to achieve desired competitive advantage. However, these studies only argued on reengineering as to business process and procedure while this paper argues that for reengineering to be robust and comprehensive there is need to consider both the organizational process and infrastructure together.

4.2.2 Top Management

Similarly, respondents identified top management commitment as part of the issues and challenges facing successful ERP implementation. Implementing an ERP system is not a matter of changing software system, rather it is a matter of repositioning the organization and transforming the business practices. Due to enormous impact on the competitive advantage of the organization, management must be involved and cooperation in every step of the ERP implementation is highly important. This was pointed out by a respondent that "*ERP implementation is about people…not system nor technology*". During ERP implementation it could be seen that the organization goes through a major transformation, and the management of this change must be carefully planned (from a strategic viewpoint) and meticulously implemented. Many parts of the business that use to work in silos now have to be tightly integrated for ERP to work efficiently.

It was argued that "*many ERP projects are abandoned due to the fact that many board members are of the view that IT engulfs lot of fund with little to compensate for it*". This was supported by expressing that "*lack of close monitoring and commitment to ERP projects by top management members are part of the factors for abandonment*". Hence, the success of a major project like an ERP implementation completely hinges on the strong, sustainable commitment of top management. This commitment when percolates down through the organizational levels results in an overall organizational commitment. An overall organizational commitment that is very visible, well defined, and felt is a sure way to ensure a successful implementation.

This conclusion is consistent with [20, 21] argument that top management commitment is a factor that determines successful ERP implementation. However, these studies pointed out that top management commitment is less vital compare to other factors. This paper maintained that top management is key and vital as other factors in the implementation of ERP within the SMEs because the level of commitment and dedication given by top management goes a long way in determining the completion of the implementation. Their dispositions on the project have a huge effect in the abandonment or completion of the system.

4.2.3 Funds

Collectively, both respondents identified fund as a major issue and challenge facing ERP implementation especially in its early phase. One of the respondent added that "*ERP package is so complex and vast that it takes thousands of ringgits to roll out*". This concern usually divides management where some are calling for the need to inject more fund into procurement of new technologies to gain competitive advantage over their competitors. Others usually argue that new technologies engulf lot of fund with little to compensate for it. A respondent reported that "*IT department is the only part of the organization that don't bring revenue but engulf many funds for her operations*". Therefore, when it comes to ERP implementation management determines extensive preparation to deflect wastefulness.

However, this finding contradicts [22] argument that fund is purely as a function of top management commitment. They discussed fund under top management commitment factor and concluded that fund factor of ERP implementation depends on top management commitment. This concern was equally raised that "*…how invested funds can quickly lead to additional business value and profitability is our greatest worries*". Additionally, it was claim that "*when the board members finally agreed with the plan of the I.T department on ERP implementation… we were worried on how to raise fund for the project*". Consequently, it can be seen that there is difference between top management commitment and fund. This is because the top management might be willing to implement the project but cannot proceed in the absence of adequate funds. "*Funds allocation to ERP implementation is the most critical decision to be taken by our organization executives*" as argued by a respondent. Therefore, fund factor is a critical factor which should be separated from top management commitment.

4.2.4 Lack of Skilled Manpower

Furthermore, lack of skilled manpower was equally identified as a key issue and challenge to ERP implementation. Although, it was revealed that organization intending to implement ERP system should be willing to dedicate some of their best employees to the project for a successful implementation. It was suggested that "*internal staffs should be allowed to head the implementation team…because they possess a good knowledge of the organizational structure and need*". Internal staffs on the project will exhibit the ability to understand the overall needs of the organization and can play an important role in guiding the projects efforts in the right direction. However, insufficient knowledge of ERP implementation amongst the employee of the organization posts a major challenge to successful implementation.

Similarly, some ERP constants lack in-depth knowledge of ERP implementation which is needed to sufficiently support the organization. It was observed that consultants were unable to sufficiently train organization employee on the system. This factor hinders the smooth running of the IT department. Also, it was found that in the organization most of the older employee displayed lack of interest and willingness to learning the new skills which have huge negative impact on the operation of the organization. This was communicated that "*there is lack of competent consultants with the ERP market while the competent ones are too expensive to engage by the SMEs*". It was equally maintained that "*finding the right manpower and keeping them through the implementation is a major challenge*". Therefore, ERP implementation demands multiple skills–functional, technical, and interpersonal skills. Consequently, individuals with specific industry knowledge are fewer in multiple. Hence, getting the right manpower and consultants with all the required skills might be challenging.

Therefore, Training and updating employees on ERP is a major issue and challenge. People are one of the hidden costs of ERP implementation. ERP systems are extremely complex and demand rigorous training. It is difficult for consultants to pass on the knowledge to the employees in a short period of time. This "knowledge transfer" gets hard if the employees lack computer literacy or have computer phobia. In addition to being taught ERP technology, the employees now have to be taught their new responsibilities. With ERP systems one is continuously being trained. Hence, the need to provide constant training opportunities on a continuous basis to meet the changing needs of the business and employees is highly challenging for organization.

4.2.5 Implementation Time

In addition to skilled manpower, the issue of timing was identified critical in ERP implementation. This is because ERP systems come in modular fashion and cannot be implemented entirely at once. Organizations follow phase-in approach in which one module is implemented at a time. The problem with ERP package is that they are very general and need to be configured to a specific type of business. Thus, it was expressed that "*ERP implementation consumes lots of time… takes lot of effort in preparation too*". The customization section was identified the most critical because mentioned that "*the customization took a longer time… but must be done carefully*". It could be inferred that the more customization needed, the longer it will take to roll the software out and more it will cost to keep it up-to-date. Hence, implementation time is a critical factor in determining the success of ERP implementation.

4.2.6 Data Fill-in

Apart from reengineering, funds, top management commitment, skilled manpower and implementation time, another issue and challenge identified was data fill-in. Many of the respondents mentioned that "Go Live" was postponed because of data transfer activities. One respondent argued that "*it not just about workable ERP…but comprehensive database that must meet the organization need*". The safe and comprehensive transfer of data from old systems to the ERP is usually rigorous and delicates. It was similarly added that "*The shear volume of data that has to be transferred is far greater than any normal transaction load that will be carried out by the system thereafter*". Hence, in order for this process to be successful the data must be kept in a stable state and transfer in a safe manner.

■5.0 IMPLEMENTATION STRATEGIES OF ERP

Based on the findings, successful implementation of ERP is attributed to the three strategically stages namely, pre-implementation, implementation, and post-implementation strategies. These stage strategies can be summarized as.

5.1 Pre-Implementation (Planning) Strategies

- Incorporate the risk and quality management plans in the change management plan
- Breakdown the project into natural phases or subsystem for modular planning and for development of cross-functional communications.
- Consider a phase-based approach for gradual implementation rather than radical approach.
- Use appropriate planning styles for different tasks, detailed task plan for tangible tasks, iterative plans for evolving tasks, and personal communication plans for change management.
- Prepare plans for the recruitment, selection, and training of the necessary personnel for the project team.

5.2 Implementation Strategies

- Formulate a network for collecting user requirements and user feedback.
- Set-up monitoring and feedback network for collecting control information at each stage of the implementation process.

- Prepare to handle expected or unexpected crises and deviations from plans.
- Provide a strong leadership with concerns for the welfare of people and resource commitment.
- Provide a professionally stimulating work environment.
- Obtain top management support for the project and plan for an adequately resourced ad proficiently executed launch.
- Promote client consultation and user participation and obtain approval from parties for what is being undertaken throughout the project.
- Use pro-active communication to establish more realistic expectations about the technology capabilities while communicating in tailored way to each division or unit.
- Promote collaborative system development between users and developers.
- Use multi-functional project teams to bring complementary capabilities together during the total life of the project.
- Familiarize the staff about the incoming technology and train the people involve with the system.
- Use intra-project teams and intra- and inter industry networking for technology transfer.
- Provide stakeholders with a detailed plan of the implementation process, explain how it achieves business objectives, and keep them informed about the system and progress of its implementation.
- Propose possible ways for restructuring personnel and systems to accommodate the new technology including maximizing of system integration and interfacing.

5.3 Post-implementation Strategies

Post-implementation activities are critical for the acceptance (adoption) of ERP systems. Requirement of IT system and structures tend to change continuously even after the completion of a project. Post-project evaluation strategy could be followed in measuring the effectiveness of an ERP system, where questions such as listed below could be used for further improvement:

- whether the objectives of the ERP system were realized fully;
- whether the scheme option were considered adequately;
- whether the estimates and project information were accurate;
- whether or not the agreed practices and techniques were complied with;
- Any other factor which are considered appropriate.

Such evaluations could concentrate on, firstly, cost estimates against actual and reason for variations. Secondly, the evaluation could suggest any possible improvements to the IT system. Thirdly, the degree of staff consultation could be assessed and improvement suggested. Finally, post-implementation evaluation can suggest improved procedures in avoiding failure in similar projects in the organization.

■6.0 CONCLUSION

ERP implementation brings lots of benefits and gains to the organization however, it equally have it pains and difficulties. This paper had explored issues and challenges of ERP implementation faced by SMEs. Six issues and challenges were identified namely: reengineering (organization and infrastructures), top management

commitment, funds, skilled manpower, data fill-in and implementation-time. This study made use of single-case study and data were gathered during an interview session where respondents were asked to recall past events. The study proposed a step-wise detailed strategies to achieve a successful implementation of ERP in SMEs. These strategies were grouped into three stages namely, pre-implementation, implementation, and post-implementation strategies. Hence, the study suggests that a better comprehension and adherence to these strategies will enhance successful ERP implementation in SMEs. Further research can make use of cross-sectional and longitudinal methods where more than one organization can be studied. Also data collection should be done at the exact period that the organizations are carrying out their ERP implementations.

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