

ENTERPRISE SYSTEMS IMPLEMENTATION: MANAGING PROJECT AND POST PROJECT STAGE – CASE STUDY IN AN INDONESIAN COMPANY

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ABSTRACT

The research reported in this paper aims to get a better understanding of how the implementation process of enterprise systems (ES) can be managed, by studying the process from an organisational perspective. A review of the literature on previous research in ES implementation has been carried out and the state of the art of ES implementation research is defined. Using several body of literature, an organisational view on ES implementation is described, explaining that ES implementation involves challenges from triple domain, namely technological challenge, business process related challenge, and organisational challenge. Based on the defined state of the art and the organisational view on ES implementation developed in this research, a research framework is presented, addressing the project as well as the post-project stage, and a number of essential issues within the stages. System alignment, knowledge acquisition, change mobilisation are the essential issues to be studied in the project stage while institutionalisation effort and continuous improvement facilitation are to be studied in the post-project stage. Case studies in Indonesian companies are used to explain the framework.

KEYWORDS

Enterprise systems, Implementation, Project, Post-project, Institutionalisation

1 Introduction

“As the relative importance of physical assets to a company is decreasing, the importance of information, processes, and people is rapidly increasing--a source of competitive advantage and management focus.” [1] Being

aware of the strategic impacts of information and processes, many organisations have focused on improving their business processes by implementing standard integrated information systems (IS) packages that are, nowadays, more commonly referred to as “enterprise systems” (ES) or enterprise resource planning (ERP). Enterprise systems are packages that support the organisations to manage their resources across the enterprise and enable integration of many different business functions [2]. In relation to IS, enterprise system package is “a configurable IS package that integrates information and information-based processes within and across functional areas”[3]. ES implementation process is in this research defined as the process that begins with the managerial decision to install an ES package and is complete when the system is used and operating as an integral part of the organisation’s IS (adapted from [4]).

Implementing an enterprise system is a complex task. Many choices and changes have to be made, not only regarding the information technology, but also concerning the way people and processes are to be arranged and aligned to the ERP systems ([4], [5], [2]) ES implementation is different from traditional system analysis and design projects. Among the significant differences are the scale, complexity, organisational impact, and the cost of the project [6]. ES projects are almost always associated with the reengineering of business practices [5]. Implementing an ERP system is “[...] a matter of repositioning the company and transforming the business practices [7]. In practice, although many companies have spent millions on ES packages and their implementation, there is extensive evidence (e.g. [2], [8]) that only a limited number of them have been successful with the

implementation. In the literature, the blame for such debacles is placed on the technical challenges of rolling out ES, since they are profoundly complex pieces of software, and installing them requires large investments of money, time, and expertise. However, greater than the technical problems, are the business problems, as companies fail to reconcile the technological imperatives of the ES with the business needs of the enterprise itself [2], and a host of historical, cultural, structural, managerial and organisational problems. (e.g. [5], [9]). Realising the potential benefits offered by ES implementation and the high failure rate found in practice, the study reported here aims at studying ES implementation process to get a better understanding of the process can be managed to bring the benefits for the implementing organisation.

2 The State of the Art of ES Implementation Research

In response to problems mentioned in previous section, a substantial body of research has been concerned with ES implementation and its success (e.g. [5], [10]). Authors make a distinction between the factor (variance) stream and the process stream while categorising the research approach used in the management and social science field (e.g [11], [12]). The factor approach in IS implementation research attempts to identify those factors which have the greatest influence on IS success [13], and the main goal of research in this stream is to predict outcomes based on antecedent conditions ([11], [12]).

Most of the factor studies concentrate on ES projects, and focus on how the process has resulted in short-term achievements. Some of the research, studying factors critical to ES implementation project success, identifies the following as the most common factors influencing ES projects: top management support of the ES project team and the implementation process, effective full-time project teams staffed with top business and information technology (IT) people, and commitment to change throughout the organisation ([4], [7],[10], [25]). Within these studies, several authors stress the relationship between the implementation process and the organisational change it requires (e.g. Appleton, 1997; [4], [5], [9]).

The factor research stream on ES implementation often reaches conclusions that most failures were caused by organisational issues, especially people related issues, rather than technical problems (e.g. [5], [10]). However, many things remain unclear about the factors and their influence on the process.

Although much ES implementation research has used the factor approach, this approach has been criticised within the IS implementation literature. [13] gave three explanations for criticism on factor research in IS implementation. Firstly, the factor approach tends to view implementation as a static process instead of a dynamic phenomenon, and ignores the potential for a factor to have varying levels of importance at different stages of the implementation process. It also fails to explain the relationship among the factors. Secondly, there has been a lack of consistency in IS research and very few factors have been shown to be important across multiple studies [14]. Thirdly, the factor research approach is based on an underlying mechanistic view of IS implementation.

A smaller number of ES research have used process approach. The goal of these studies is to better understand how change actually emerges, develops, grows, or terminates over time ([12], [15]). Process studies of IS and ES implementation view the implementation efforts as “consisting of a sequence of generic stages, each of which must be attended to if implementation success is to occur” [14], or as “sequences of discrete events that lead to outcomes of particular interest” [15]. In the process stream, the research has mostly studied the various stages of the implementation process. In terms of the stages studied, studies inclined to neglect the stage in which the new system is operational and running. Ignoring this stage of the IT-enabled change process is, according to [16], the main reason why organisations are not able to gain the full benefits of IT projects. Thus there is a need to incorporate the planning and post-project phases in studying the ES implementation process when considering the actual benefits expected from the use of ES. Further, there is a lack of research that relates the process view of the ES implementation process, which is in the form of stages, and the important factors (issues) for the individual phases defined.

Considering the gap found in previous research, the main question addressed in the research reported here is therefore: “*under which ‘project’ and ‘post-project’ conditions can enterprise systems implementation contribute to the improvement of the organisational effectiveness?*” The research aims to fill the gap by developing a framework that can help to explain the ES implementation process and the accompanying challenges in both the project and the post-project stage, from an organisational perspective. Organisational perspective is used given that previous studies have shown that organisational issues, are among the important explanations for failure in managing ES implementation. In the research, the

developed framework is used as a basis for developing a model which is a combination of process and factor approach for studying ES implementation process and its outcomes, and to differentiate the more successful and less successful implementation cases.

3 ES Implementation from an Organisational Perspective

Implementation of IS in general or ES in particular, is a process of change that requires conscious management of mutual adaptation between technology, organisation, and business processes [17]. Implementing ES implies adapting the current business processes to the best business process standards. Therefore, although ES do have a great influence on the organisation than other information technologies, organisational processes and outcomes are not necessarily determined by how the companies deal with the technical IS application package. On the one hand, implementing ES is a process that is closely related with the ES themselves, which can be separated into two main elements: the ES application (“container”), and the assumptions about the way that organisations run the business (“content”) embedded in the systems. On the other hand, the implementation process is constrained by context, and shapes context, either in the direction of preserving or altering them.

development theory in general, use a life cycle oriented method and describe the process as a sequence of activities, starting with planning and initiation of the project, followed by definition of the existing and desired situation, definition of the requirement for an ES package, selection of a package, preparing and carrying out the technical customisation as well as the necessary changes in the organisation structure and procedures, the conversion from the old system to the new system, and post implementation review. These frameworks have their roots in the development of IS which is often a predictable project that can be managed using strict controls. These frameworks can be very useful for scheduling and controlling activities in an implementation project, and are very relevant for understanding the sequence of ES implementation activities [18]. However, phased implementation models drawn from IS development theory are prescriptive. The reason for this is that they are designed for software development, which involves relatively stable projects. They often claim to ensure the quality of an implementation. The implementation of an enterprise system contains many more perspectives that are less stable. Human and organisational change aspects are little covered by IS development theory. Therefore this theory is considered useful only for understanding the sequence of activities in ES implementation.

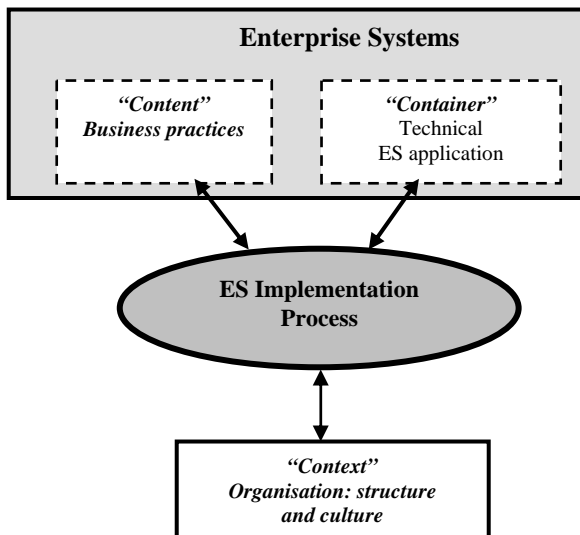


Figure 1: Organisational View of Enterprise Systems Implementation

3.1 ES implementation as a process

ES implementation is commonly seen as an IS development process. Implementation models rooted in IS

From a different perspective, the implementation of ES can be seen as a process of organisational change ([4], [7]). It is not simply a matter of installing an ES; organisational and process changes must also be made. Organisational change represents a huge part of a successful ES project given that people, and the way they do things, need to be changed at the same time as all the computers and the software are changed, although the change process is often executed using an evolutionary approach [18].

[19]’s model of the change process describes a change as a process that moves, over time, from a present state to a vision that energises motion to the future. Reaching the vision requires managing the transition. Considering ES implementation as an organisational change, the implementation process can be seen as a transition process from an old, non-ES-based organisational practice to an improved, ES-based organisational practice. [16] divides transition activities into planning, implementing, and institutionalisation tasks. Many IT-enabled projects do not realise, or have a delay in realising, the potential benefits offered because the change processes do not recognise the institutionalisation

phase. Figure 2 illustrates the ES-enabled change process based on this understanding.

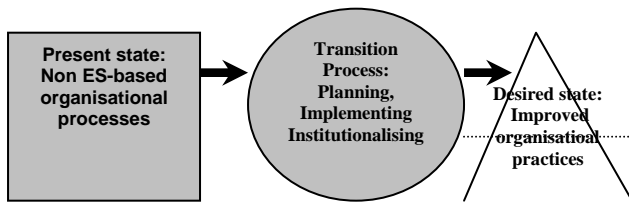


Figure 2: ES Implementation as a Transition Process

ES implementation process can be seen as an ES-enabled change process. The mutual adaptation concept of organisational change argues that the process of change moves an organisation from an old state of relative equilibrium to a new one [20]. Therefore it is important to understand how all the organisational elements need to change and what actions and resources will bring them to a new equilibrium. The equilibrium model of IT-enabled change from “The Management in the 1990s Program” describes five elements that need to be in balance: strategy, technology, individual roles and culture, management processes, and structure [20]. It concludes that a lack of attention to the later three is the primary reason that IT implementation has had poor results. [20] suggest that a simpler equilibrium model proves useful in describing the change process. This model emphasises that a change effort must focus on what must change, most specifically in the areas of technology, business processes, and organisation.

ES implementation can also be seen as a reengineering process. Both the reengineering literature and the ES literature, suggest that an ES alone cannot improve organisational performance unless an organisation restructures its business processes [7]. ES implementation should involve the analysis of current business processes and the chance of reengineering, rather than designing an application system that makes only the best of bad processes. Therefore, ES implementation and business process reengineering (BPR) activities should be closely connected. Lack of understanding of how enterprise applications change business processes often leads to problems and failures of ES implementation, especially in the usage stage.

ES implementation has also been seen as innovation adoption. [21] identified – based on 3,000 studies- five general stages through which an innovation proceeds: knowledge and awareness, persuasion, decision, implementation, and confirmation. Based on ([14], [21]) defined the following stages through which an IT innovation proceeds: *initiation* that results in a match

between an IT solution and organisational need, *adoption* that results in a decision to invest organisational resources for the IT application, *adaptation* that results in an available IT application for usage, *acceptance* that results in conditions in which IT application is employed in the work of the organisation, *use and support* that results in IT application no longer being seen as an out of the ordinary way of working and used to its fullest potential.

Adopting ideas from knowledge transfer management theory [22]. ES implementation can be considered as a knowledge transfer process, either a transfer between internal IT specialists and business people working together in the process, or a transfer from source organisations such as ES suppliers and consultants to destination (user) organisations. [22] define the process as a continuous, complex process of human interactions – they argue that ideas travel best in the minds of people. From a study and cluster analysis of many cases, they identified some best practices for a knowledge transfer process including facilities like hands-on workshops and real life demonstrations, interactions for data exchange between involved stakeholders (people), and early involvement in the project.

3.2 Technological challenges

The technological challenges when implementing ES are great [2]. The companies are facing challenges with respect to the complexity of the enterprise system itself, problems with configuration, and complexity of customisation. The way a system is configured can cause problems in the later stages because once configured, it can be very difficult to change it. The configuration of a system can be a disabler for organisational change. An over-customised system can lead to a very difficult adaptation, and further can make integration with other systems more difficult.

Configuring an enterprise system is a matter of making compromises between the way the organisation wants to work, and the way the system allows them to work [2]. When implementing an enterprise system, an organisation has to decide which modules are required. When that is decided, the organisation has to decide whether or not they want to accept the process assumptions embedded in the software and adjust the system using configuration tables to achieve the best possible fit with processes. There are a vast numbers of configuration tables; in SAP R/3, an ES package made by a vendor from German, more than 3000 tables exist, and going

through them is very time consuming. If the available configuration tables do not fit the organisation processes, the systems can be customised to some degree, but the options are limited. [23] argues that instead of "going to war" with the package, and trying to make it meet its process requirements, which can lead to huge cost overruns and project failure in some cases, the company should re-engineer its processes to be consistent with the software (and so avoid customisation). The more customised a system becomes, the less it will be able to communicate seamlessly with the systems of suppliers and customers, and thereby it will make collaboration in the supply-chain difficult. If the system is over-customised, it can be difficult to change it in the later stages of the system's life cycle.

The integration within enterprise systems depends greatly on configuring the system in particular ways [8]. Configuration means choosing which package modules to install, and setting software parameters to represent the company's product and the specific arrangements for a company's business processes such as centralised, or decentralised, warehousing and purchasing. Despite the promise of integration, with ES, companies still have to integrate the application software with a package of hardware, operating systems, database management systems, software, and telecommunication infrastructure, appropriate for the organisation's size, structure and geographic distribution. In other words, what comes integrated is not the software only. Much work still needs to be done to integrate the ES software with the other components of the total system as also mentioned above. Besides, in many cases, organisations that adopt ES also need to interface the package with the organisation's own legacy systems. This interfacing issue is also unavoidable in the case where an ES application is used to support not all of the organisation's business processes, or, if the organisation adopts a "best-of-breed" strategy in which organisations try to integrate several enterprise packages from different vendors.

3.3 Business process challenges: "content related issues"

The design of ES reflects a series of assumptions about the way companies operate in general. "An enterprise system, by its nature, imposes its own logic on a company's strategy, organisation, and culture" [2]. One key premise underlying ES is that they embody best practices in their reference model ([2], [3], [7]). The reference model reflects preferred business models including underlying data and process models as well as organisational structure [3]. The system is therefore forced to function based on predefined models and rules about what to do in specific situations. A significant issue in ES implementation is determining the extent to which

organisational processes are to be adjusted to the standard best practices embedded in ES.

The knowledge embedded in business processes is both explicit and tacit. It is possible that business process tacit knowledge, especially related to the context in which the business is executed, is not appropriately addressed in the proposed best practices. It is possible that the best practices offered are not compatible with the organisation's business environment and other elements of the organisation's context. Therefore a clear view of the business processes, and the relationship with organisational structure and culture are needed while determining the extent of best practices adoption. Vendors often accelerate the implementation of their ES by the use of business process modelling tools that link business models to the software and templates for industry-specific business practices. To realise the advantages of the best practices embedded in ES, most adopting organisations need to commit themselves to some degree of business process reengineering. In reengineering the business, sometimes organisations go through business process redesign (BPR) efforts.

Research shows that the most important criterion used in selecting an IS is best fit with current business procedures [24]. Hence compatibility with the business procedures is the major issue for companies when deciding on a new system. Although ES vendors have given much attention to allow easy configuration of their packages to match existing business processes, several studies have shown that configuring and implementing ERP systems can be costly, and may even require reengineering entire business operations. Therefore choosing the ES software that best matches the organisational information needs and processes is critical to ensure minimal modification, and successful implementation and use.

Many companies change their organisation to match best practices, partly because their own processes are usually sub-optimal, partly because changing the ES is expensive and risky. Few organisations claim to have redesigned all their business processes for cross-functional efficiency and effectiveness—which was the stated purpose of business process reengineering. But, if firms are to compete in global markets, they must adopt and adapt technologies and approaches that are most suitable for their unique context and environment, rather than attempting to imitate a best practice template [25].

"Enterprise systems are a structured approach to optimising a company's internal value chain" [26]. ES

stress the need for business process integration. An important underlying assumption of ES is that the integration of business processes may lead to a better organisational effectiveness. For this a company should regard the implementation of an ES in strategic and organisational terms. It should stress the enterprise and not the system. This means that the first step should be a thorough analysis of the business the company is in, the key processes and the way these processes could be enforced using IS. If a critical business requirement cannot be met by the enterprise system, the company may choose to install a third-party solution or develop an application in-house, in order to keep its competitive advantage [2]. Thus, it is stressed that integration means that ES does not only supports the data and information from one department to be transferred to other departments, but that it implies a tightly integrated business process among the departments that may lead to more efficient organisational operations. Managing these changes can be difficult, and often neglected by companies when implementing ES. Regarding the needs of the business, implementation of ES should be planned, prioritised, designed and built according to the organisation's needs and strategy.

3.4 Organisational challenges: "context related issues"

In general, processes of change are both constrained by context and shape context, either in the direction of preserving them or altering them. More specific to ES implementation, although ES have a greater influence on the organisation than most other information technologies, organisational processes and outcomes are not necessarily determined by the ES itself. [27] argue that when an enterprise system interacts with the actors of an organisation, the outcome of the interaction is only partly predictable and seeing the enterprise system as a deterministic technology is not valid. Social systems do not follow fixed patterns, but are continually being recreated and never reach a stable state. Therefore the relationship between ES implementation processes and its context in which the process takes place is addressed in this research..

This emergent nature of change in organisations has been addressed in relation to IS-induced organisational change processes (e.g. [28], [29]). [29] illustrated how the implementation and improvement of groupware technology in a large software company involved a number of organisational transformations over time. These changes occurred at both the institutional level, which is here interpreted as "structure", and the level of everyday actions, and changes in each were influenced by and had an influence on the other. In Orlikowski's terms, the transformations were situated in their context.

Analysing the implementation of a Lotus Notes solution effectively, [28] found that rather than dealing with these changes proactively and in a structured manner, the company showed a rather improvisational approach.

The importance of an organisations' structure in the IT implementation process has also been reflected in models that link IT and organisational change, such as the MIT'90 IT-enabled change model and the Leavitt diamond [20]. Studying these models, it can be concluded that the term "structure" is not strictly defined, and therefore open for multiple interpretations. Adopting the idea of structure and its dual relationship with human actions [29], in this research structure is interpreted as the organisation's arrangements that structure human actions, recognising that this structure exists in a dualistic relationship with the human actions, which transform it.

Organisational culture is the way that an organisation's members relate to each other, their work, and the outside world. The ability of an organisation to deal with changes effectively depends on the way members of the organisation participate in the process. Members throughout an organisation are involved in the implementation of ES. Organisational members involved in the implementation include top management, implementation team members from the business and IT community, and also end users of the application. Consulting partners and software vendors often assist these members in the implementation process. Regarding culture-related change, general and company specific changes occur due to the implementation of any enterprise system. General changes occur as a rather direct consequence of ES implementation in any organisation. Examples are the immediate and personal accountability, the increased integration of procedures and systems between departments (crossing the boundaries), and changes in the degree of formalisation and power distribution (empowerment). Specific changes accompanying ES implementation refer to new ways of working or changed responsibilities that apply to a certain organisation. For example, an organisation may choose to redesign its processes and IT systems in such a way that the use of organisation resources are visible to smaller groups of people or even individuals, whereas before this was only visible to functional departments.

In some cases, the software and the information that an enterprise system provides leads to a different culture by themselves. In other respects an organisation, and its employees, must change to take advantage of the new information environment [30].

Change is difficult when new ways of working challenge the basic assumptions of a business culture [26]. This is why management needs to give support to the new culture. An institutionalisation process that supports the new way of working is often neglected in an IT implementation project, and this is the main reason why organisations fail to benefit from IT implementation projects [16].

4 A Framework of ES Implementation from an Organisational Perspective

The conceptual research framework developed in this research is based on the following underlying assumptions:

- (1) Although project success, which means bringing the project in on time and on budget (short-term performance) is important, companies are interested in the improvement to organisational effectiveness and business performance (e.g. [8], [30]). Success is not defined as the project success, but extended beyond the project into refinement and organisational transformation [31], which sees the project as only a part of the process. The model is aimed towards a concept of success, which considers the contribution of ES use to the improvement of organisational effectiveness. Improved short-term performance (project success) may or may not lead to improved long-term performance (improved organisational effectiveness).
- (2) Studying previous research into ES implementation it can be concluded that studying the process of ES implementation and relating the phases with specific organisational factors (issues) may lead to a useful scientific contribution to the IS and management field [32].

4.1 Defining implementation stages and outcomes

To move from an “old state” using “non-ES based” organisational practices, to a new, “desired state” the transition process needs to include not only implementation project activities, but also careful planning and institutionalisation activities. To address the project phase and the post-project phase separately, the whole process is divided into two different phases: a “project phase” and “post-project” phase. Analysing the IT implementation model by [33], linking it to Lewin’s change model explained in [34], and the stages of transition model by [16] the following table shows the association between the stages used in this framework and the previously mentioned four models.

Table 1: Comparison of Stages used in Lewin’s (1951) Change Model, [33] Model, [16] Transition Model, and Stages Studied in this Research

Change model Stages (Lewin, 1951)	Transition model stages [16]	IT Implementation model stages [33]	ES Implementation stages study in this research
Unfreezing and Change	Planning and implementation	Initiation	Project phase
		Adoption	
		Adaptation	
Re-freezing	Institutionalisation	Acceptance Routinisation Infusion	Post-project phase

The outcome of a process in the project stage, which is an intermediate outcome, may determine the ability of the organisation to benefit from the use of the application in the next stage. In order to gain a better understanding of the transformation process, the two stages, and important issues within the phases, will be addressed below.

4.2 Project stage

The objective of the ES project is mainly to plan and develop the new system while, at the same time, preparing the users to adopt and use the system optimally in post-project stage. The project phase in this framework covers the adaptation process in [33] stage-based innovation model. Referring to [33], in this phase the ES application is selected, customised, and installed. Organisational procedures are revised and developed. The changes are communicated to the organisation’s members. Organisational members are trained and educated both in the new way of working and in the IT application.

The ES project aims at integrating the ES within the organisational structure and processes. [35] argues that effective implementation rests on the integration, and business, organisational and technical strategies. He suggested the following three components are essential for integrating information technology and the organisation:

- a. Alignment of the three elements of the strategic triangle: business, organisation and the technology
- b. Commitment of employees and support of stakeholders
- c. Competence/mastery by employees

In line with [35] suggestion, the following three main efforts are identified as being important in the project phase:

System adaptation (alignment). The mutual adaptation (alignment) of the organisation, technology and business processes is the central issue in IT-enabled projects [20]. More specifically for ES projects, implementing an ES involves reengineering the existing business processes to the best business process standard and one major benefit of ERP comes from reengineering the company's existing way of doing business [7]. When business process change takes place, process changes do need accompanying changes in the arrangement of formal structures comprising work tasks, work contents, work environment, and performance measures [2]. Further, because the process change has its impact on job design, job range, job depth (related to job autonomy and job stress reduction), job satisfaction and job performance which are of much concern to computer systems users, people capability and attitudes, and the social and psychological work environment of systems users, need to be adapted. Thus the focus of the adaptation (alignment) process is on creating a better IS environment, and intended to align the ES and the organisation (processes and structure).

One important issue in the alignment process is the selection of an appropriate ES package. The characteristics of the ES have to match the criteria for selecting the companies' current information processes (such as low cost, user-friendliness, fit the business procedures, scalability, support, and training). Results show that the most important criterion used in selecting an IS package is best fit with current business procedures. Other important selection criteria are flexibility, cost, and user-friendliness of the system, and to a lesser extent scalability and supplier support [24].

In order to minimise the risks associated with a lack of alignment of the ES systems and business processes, an organisation needs to develop detailed implementation plan and requirements specifications, conduct system testing prior to implementation and closely monitor the system performance [6]. Involvement of a large number of stakeholders is mentioned as one important factor for alignment in ES implementation because the knowledge gap among implementation personnel is usually significant [36]. Few users understand the functionality of ERP enough to appreciate the implication of adoption. Similarly, few ERP consultants understand their client's business processes sufficiently to highlight all critical areas of mismatch [36]. A good relationship (communication) between senior management and the IT manager could result in a better decision-making process regarding the needs of business and the support of IT, and thus could support the alignment effort. Further, frequent

communication between business managers could achieve an integrated effort among departments, and thus could facilitate the appropriate alignment.

Change mobilisation. Change mobilisation is used to refer to efforts mainly aimed at gaining employees commitment (ownership) and support of the involved stakeholders. Support and ownership of the involved employees and other stakeholders are essential in integrating technology and the organisation [35], and specifically for ES projects to succeed [6]. User participation and involvement are essential because users have the detailed knowledge and first hand experience of the strengths and weaknesses of the current processes. ES implementations are usually contingent innovation-decisions (See types of innovation-decisions, [21]), initially made by top managers of companies. However, the project teams and individuals in the organisations have considerable influence on the decision whether and how to carry out the implementation and the changes needed by the implementation process. They may adopt the decision enthusiastically, or they may comply with the suggestions reluctantly and without committing themselves to the proposed implementation projects. After the initial authority decisions to implement ES packages have been made, project team members and the users have to commit themselves to support the implementation process. For ES implementations, the process can be successful if most of the users are involved and agree to adopt the changes. This condition can be achieved by having the users participate in the development of the systems, and therefore change mobilisation is an important issue. Further, communication is often a very important mechanism for mobilising a change in organisations.

Knowledge acquisition. ES implementation can be considered as knowledge transfer from source organisations such as ES suppliers and consultants, to destination (user) organisations. It implies that the implementing (user) organisations need to develop the in-house knowledge necessary for systems usage, maintenance and even improvement. Training that is available through the consultants, the vendor, or through third parties, provides a valuable resource to develop skills that are lacking in-house ([2], [6]). Moreover, a close working relationship between consultants and an organisation's project team can lead to a valuable skill transfer in both directions [6].

4.3 Post-project stage

This phase can be associated with initiation, adoption and adaptation stages of [33]'s model. Associating this stage with the [33]'s model, in the post-project

stage, organisational members are expected to commit themselves to ES application usage. Usage of the ES application is encouraged as a normal activity. Increased organisational effectiveness is obtained by using the ES application in a comprehensive and integrated manner that supports higher-level aspects of organisational work. Management can encourage the appropriate use of the new application through institutionalisation efforts. Besides having the system use as a normal activity, in this stage, organisations are supposed to improve the operations of the systems as well as the organisation processes. Thus, efforts to institutionalise the use of the system and facilitate continuous improvement process have to be managed if organisations are to benefit from ES usage.

Institutionalisation effort. In any organisation, tensions will arise as a consequence of the 'lack of fit' between the institutional order and its material condition [37]. The material condition is constituted by technology, techniques, and methods of production, whereas the core institutional order will be integrated by the values, beliefs, and norms already institutionalised in the organisation. One of the reasons why IS do not achieve their goals is the lack of fit between the new meanings arising from the new IS, and the prevailing organisational rules and norms. Institutionalisation is the process through which a social order of pattern becomes accepted as a social "fact" [38]. An innovation is first adopted and diffused partly for its technical merits, and partly under the influence of powerful actors. Subsequently, through institutionalisation, an innovation is adopted and maintained because of its required legitimacy, irrespective of whether or not it produces its promised technical value, and without having to rely continuously on powerful personalities. Information system institutionalisation can be seen as a process to stabilise an IS [37].

An IS becomes institutionalised when it is no longer considered as an innovation, but as unnoticed tools that people feel comfortable to work with. Most actions regarding an institutionalised IS will become predictable. Users will operate the system by applying knowledge that they take for granted. To be fully institutionalised, all procedures and activities related to IS should become habits. Actions will be standardised, and those performing the actions will play a role defined by the nature of the activities. Institutionalisation is in this research used to refer to issues related to providing support for the new culture after the initial flurry of implementation success [16]. Facilitating mechanisms such as supporting policies and changes in measurement systems may facilitate the institutionalisation of the new way of working [30]. Companies may also support the institutionalisation effort by providing opportunities to enhance the skills of the employees through mechanisms such as training

opportunities on a continuous basis to meet the changing needs of the business and employees [7].

Improvement support. To realise the benefits offered by IT-enabled projects, organisations should put effort into continuous improvement processes after the systems have become operational in the organisation [16]. IS improvement efforts in the usage stage may involve many stakeholders, management, users, IS specialists, and even customers. The role of users and management in analysing the use of the current systems in relation to the changes in business processes and changes in business environment determine the improvement efforts enabled by ES. Post implementation review ([6], [16]), regular audit and workshops [26], the existence of an executive in charge for problems and improvement ideas [30], providing additional training for key users and IT specialist [30] are among others ways to facilitate ES-enabled continuous improvement efforts in organisations.

4.4 A conceptual framework

In summary, ES implementation is in this research seen as a process of change induced by ES adoption. The process can partly be seen as an IS development process that requires an on-going dedication to the improvement process [39]. The ES-enabled change process can also be seen as a transition towards a new way of doing business ([2], [19]) and the conscious management of mutual adaptation between technology, organisation and business processes ([20], [35]). Since implementing ES implies adapting the current business processes to the best business process standard, the implementation process can also be associated with business reengineering processes ([2], [7]) the organisational learning process ([40], [41]) and the knowledge transfer process [22].

The conceptual framework developed in this research is illustrated in Figure 3. The decision to adopt or not a ES package is not part of the study. The implementation process consists of two stages: a project stage, and a post-project stage. The project stage begins when an ES adoption decision made and ends when an implemented system is ready for usage. In this phase, alignment (adaptation) process, change mobilisation, and knowledge acquisition are three important issues to be managed. The post-project stage begins when system use takes place as a normal activity, and the implemented IS becomes an integral part of the organisation's operation. Considering ES usage as a phase in which organisational learning and continuous improvement efforts should take place, institutionalisation effort and continuous

improvement facilitation are two issues to be studied in this stage.

The ultimate goal to be achieved through ES implementation is an improvement in organisational effectiveness. Here it is argued that the outcome of process in the project stage, which is an intermediate outcome, may determine the ability of the organisations to benefit from the use of the application in the next stage, and therefore influence the improvement of the organisational effectiveness. Thus it is asserted that effectiveness of the enterprise system implementation process is defined as a multidimensional concept. The analysis of the implementation effectiveness is done at two levels: 1) short term implementation effectiveness, which is analysed by studying the outcome of the project stage (intermediate outcome), and 2) the long-term implementation effectiveness, which is analysed by studying the results of activities during post-project stage. The final outcome is here modelled as a state called “improved organisational effectiveness”, which can be analysed after quite a period of time during which the systems have been operational.

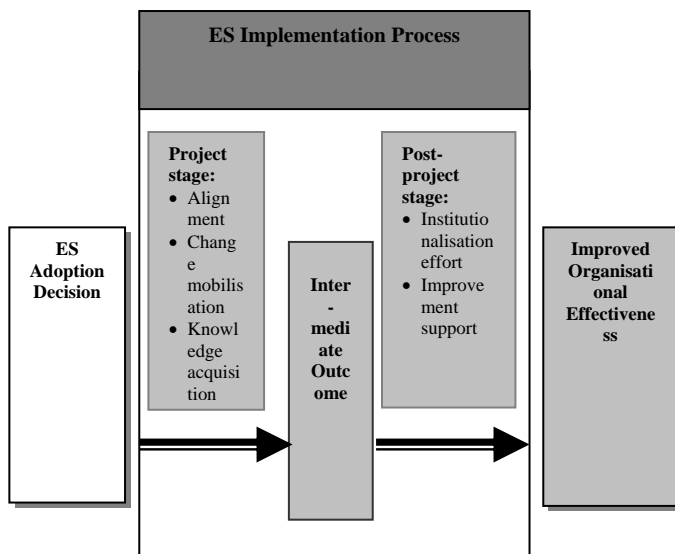


Figure 3: A Framework of Enterprise Systems Implementation from an Organisational Perspective

5 Methodology

Before developing a conceptual research model, this study used a preliminary empirical study to gain a more comprehensive understanding of things found in practice. The finding of this preliminary single case study will later be used as a basis for developing the final conceptual model. Using the developed conceptual model as a basis,

to be able to work in an empirical study, the research model needs to be further operationalised.

There exist various strategies of empirical research or ways of collecting and analysing empirical evidence. Generally researchers agree that in order to answer the research questions formulated in this study, an in-depth understanding of the implementation process, rather than the testing of hypothesis based on variance study is needed ([11], [12], [42]). For this reason case study method such as [43] case study approach is considered appropriate for this research, in which "how" and "why" questions are asked [43]. Based on case studies findings cross-case analysis will be carried out. Finally, conclusions and recommendations will be raised.

6 Case Study At TelCo

TelCo is a state-owned company providing domestic telecommunication services. The case study was executed in DIVRE IV which is a Regional Division. When discussing the motivation behind ERP adoption, one of the business planning managers (joint operation partner) stated, “We need to streamline our operations and progress towards a world best practice business model if we are to achieve the desired operational performance. For that we are committed to investing in new systems for DIVRE IV in the areas of network management, customer care systems and business support systems (ERP)”

In the April 1997 TelCo decided to adopt and implement SAP R/3. In May 1997 the company invited selected competent companies to participate in the tender for SAP implementation project. They looked for implementation partner that is familiar with SAP R3 and has the knowledge about the specific industry. Besides, they set the business process re engineering and change management capabilities of the implementation partner as important criteria for partner selection. The top management from MGTI and the IT manager finally chose Price Waterhouse (PW) consultant as the implementation partner.

6.1 Project Stage and Intermediate Outcome

The project organisation includes people from PW consultant and TelCo. Steering committee was formed, consisting of two consultant representatives, one SAP representative, TelCo GM and several senior managers. Two project managers were assigned, one from consultant and one from TelCo. Team leaders

for each business area, several key users, system analysts, and IT programmers skilled in existing systems were available. In general the project team members that comprises of people from related business departments, IT department and consultant representative, work in the following four teams: Finance team, Logistics team, Technical team and Change management team

The SAP R/3 modules implemented were the Finance and Purchasing modules. Inventory control for the Logistics department will be implemented in a later phase. The first stage of the project was started on 24 November 1997. The primary aim of the project is defined as 'completely re-engineering existing business processes and make a quantum leap towards worlds best practice in terms of business process efficiency and management information availability'. For the project, TelCo selects their best staffs to become the member of the project team. MGTI/KSO IV and the consultants define the duty statements of the required project team members including pre-requisite skills. Based on that, project team members are selected and assigned, mostly on a full-time basis.

When started the project, the company and consultant agreed that there will be no 'modification' (code changes) to the SAP software. Training for end users was executed using "train-the-trainer" approach. A number of trainers (8-10) participated in the train-for-trainer training sessions given by the consultants. Procedure and user manuals were developed in English language. These documents were translated to Bahasa Indonesia by staff of MGTI/KSO IV. The "help desk" facilities were established in the project and run just when the usage starts. The implementation had a delay of four months. Interview with one business development manager and IT manager suggest that this was mainly caused by unrealistic plan and low level of IT skills in the Finance department.

The SAP implementation effort is actually a part of a big change management project called "Borobudur" which was started in 1996. That big change project started with Pandawa project (SAP implementation). The reason was that they didn't want to alert the employees with a major restructuring project, but wanted to show small steps at a time.

In the project, change management was planned quite well in the project. The implementation documents and interviews with several project members show that the need to have the users and other actors (stakeholders) involved understand how they will be impacted with the project and what supports needed from the involved people, during the transition from the existing to the new processes and systems, were highly realised. One of the

aspects of the project is that they promote the attention to the people affected by the implementation through a well-planned communication strategy. The strategy focuses on communications targeted at users and interested parties involved. It does not focus only on functional or technical consultation that is part of the normal work activities associated with implementation.

The responsibility for making the planned communication strategy lies on the project managers and change management teams. The actual communication was planned to be executed through formal communication, informal communication by the project team members and participative events for stakeholders and users. Methods of formal communication which were used during implementation are newsletters, leaflets, letters and memos (electronic based -- Intranet), briefings and presentations ("direct" and "cascading"), survey to the related organisation's members and regular departmental meeting. In December 1997 – February 1998, the change management team conducted interviews with the implementation stakeholders in an activity title "awareness and expectation survey".

The objective of the survey included identifying the expectation of the members. Survey participants are 36 employees from TelCo. The surveys came out with results such as the need for more clear and intensive communication and the most effective and trusted information source for the users. Users also shows the content of communication they expect, such as the information of how the project will change their work culture, what business processes best practice will be adopted and how they will be implemented. Further, they also want to know "what is it for me" and how their contribution/work effects the whole system.

Members of the PANDAWA project team also communicate messages about the project to other members of TelCo through their contacts. The informal communications by the team members reinforced the positive messages conveyed by formal communications, and had indeed minimised the development of negative perceptions about the project. The general philosophy which underpins this communication strategy is that people will be less resistant to change if they understand what is happening, why it is happening, when is it going to happen, how are the changes relevant to them, what to expect, and how they will be supported during and after the changes. They publicise the kind of information people will receive and when. They tried to make sure that the changes did not come without warning or support. This has created an excellent

impact that can be seen through frequent contact and consultation people make in the early stages of the implementation. The users embrace the change because they are in some way involved in the change, their feelings are acknowledged and they are given time to adjust. In the beginning, there was a high resistance to change. After extensive training and formal and informal communication activities, the resistance diminished and the employees were becoming happier about the project.

As the results of the project, most interviewee perceives a significant improvement in the quality of information, technical quality and functional quality, after SAP implementation project. The system has better functional features than the old systems and provides them with better and more complete and accurate data. SAP has led to more formalisation. Procedures have been standardised, which is considered to be very important. There has been a change in job-descriptions due to the implementation. The users have received adequate training and are able to operate the system without much trouble. The IT specialists have some knowledge about the system, but not enough to customise it. The IT people gain new way of thinking regarding system design and implementation, gain more understanding about the organisation's business processes, gain much knowledge about new data base system architecture and management, and might contribute to an easier system development in the future.

6.2 Post-project Stage and Improved Organisational Effectiveness

The go-live moment was at 01.08.98, the change management efforts continued until July 1999. In the usage stage the implemented systems was used without major technical problems. In usage stage, for the system maintenance and up-grade, an on going service agreement was established, that provides any additional support required by the organisation. Interview with IT manager, IT specialists and key users in Logistics suggest that IT organisation showed a rather low intention to achieving the enterprise system business results in usage stage. Even though the number of IS specialists was enough, their low ownership has led to unwillingness for realising the system improvements. Example of this is they refusal to customise the ES to comply to a new tax-regulation. Now this had to be out-sourced and the costs is considerably high.

Most of users adopt the new systems. But, a few users in Logistics department still worked with the old systems due to some unclear reasons. The interviewees report that there has been change in the people within TelCo. They use a more analytical approach while making decision. The discipline in the organisation has increased considerably as a result of the implementation. Interview

with IT manager suggested that opportunistic behaviour were reduced by the use of the new systems. Examples are the abuse of information available, the dealing with suppliers, etc that all show the improved transparency in the organisation. The new system has strict procedures, protected information and has lowered the opportunity for unfair behaviour among the employee.

About culture, one Business and Development manager remarked, "SAP allows for a much stricter control of the units. Behaviour has improved, since discipline is enforced. Discipline on the side of the people (individual level) and discipline on the processes (process level) are improved. This behavioural change took quite sometimes, about 1 year". But he mentioned also that though the normal use of the system is good, creative use of the system (e.g. creating new reports for management) is below expectations.

7 Analysis and Recommendations

In the following section, analysis will be presented for each project and post-project important issues as mentioned in the research framework.

Alignment Effort

As can be seen in earlier section, regarding alignment effort, the case at TelCo has shown that the company had shown good results in term of quality of the new IS application implemented. However, beside aligning the organisational IS application to the tasks to be performed in the organisation, there are other potential elements of an organisation that must be aligned to support the appropriate use and improvement of enterprise systems within an organisation that include.

- (1) *Structure to support collaboration.* At TelCo case, effort towards aligning the structure of the IT organisation was not found. There is a quite big gap between IT/IS people and business users. Boundaries between the business user groups and the IT specialists can be barriers to the high levels of collaboration needed to produce the beneficial system outputs. Thus the collaboration between the user department and the supporting IT group needs to be facilitated. Centrally decentralised IT organisation structure [6] with IT specialist representation assigned in user departments can be used for facilitating IT-business collaboration. Achieving high performance from IT is not just about the IT function's ability to build, maintain, and deliver

systems, but is an organizational wide activity requiring a strong business/IT partnership. The attainment of sustained IT based competitive advantage may be more a process of building organizational infrastructure in order to enable innovative action strategies...”

(2) *Aligning the IT management skill.* At TelCo, the improvement effort did not take place during the post-project (usage) stage. One potential source of the low improvement effort is the low level of IT management skill. Only *IT management skills* are likely to be a source of sustained competitive advantage, a position as the “management difference”. They describes IT management skills as:

- the ability of IT managers to understand and appreciate business needs
- the ability of IT managers to work with functional managers
- the ability of IT managers to co-ordinate IT activities in ways that support other functional managers
- the ability of IT managers to anticipate future needs

(3) *Aligning employee orientation.* Aligning orientation of people is very important thing to do, in “project” phase as well as the “post-project” phase. This effort is aimed at gaining ownership of the people towards the project as well as the implemented new systems that in turn may result in appropriate support during the process. In the “project” phase, efforts for mobilising the change may include clearly articulating new way of working expected with ES usage, socialising the new way of working through communication and team building, and having senior management involved actively in the awareness creation programs. During the system usage, it is important to align people behaviour toward a more data-oriented decision making, more transparent way of working, and more innovative and creative working style (see for example ([30], [44])). For aligning employee working and achievement orientation, it is important to prepare a control mechanism during the project stage, to be used (applied) during the usage stage. One of the control mechanism could be the regular measurement and evaluation of company key performance indicators (KPI).

Change Mobilisation

Most interviewees perceived low active change mobilisation efforts from top management. High reliance top management put on the assigned change management team was reported. As it is mentioned in the project plan is that “the responsibility for making the planned communication strategy lies on the project managers and

change management teams. Actual communication is planned to be executed through formal communication, informal communication by the project team members and participative events for stakeholders and users”. Here it can be seen the strong reliance of the management to the project team members, in mobilising the organisation’s members towards organisational change. And senior management involvement through communication and team building was perceived to be low. Senior management didn’t involve in the day-to-day operations of the project. This didn’t hinder the success of the implementation, due to the strong “follow the leader” culture of this organisation. However, because their socialising efforts are low, and they are more concerned with business processes than people, this has led to low active involvement of the organisation members for improvement effort during the post-project stage.

Knowledge Acquisition

In general knowledge acquisition was performed quite well at Telco. The ES customisation skill was not gain during the project because the responsibility of consultant to transfer the customisation knowledge to internal IT specialist was not mentioned in the contract. This may lead to inability for the organisation to perform small improvement in the systems. It means that the company’s dynamic capability will be limited. At TelCo, effort to assign best staffs to involve as the SAP project team members has a strong impact on the ability of the organisation to gain lots of knowledge from the implementation. The knowledge that might be coming from the consultants or knowledge about the package implemented is effectively transferred to the organisations during the project. Shortly, assigning best people in the project has contributed positively to the ability of the organisation in knowledge acquisition. However, it is even more important to make the cumulated knowledge available to be used during the project stage. One way to facilitate this is by assigning the ex-project team members to be involve actively in a ES support group during the usage (post-project) stage. This can be facilitated by the existence of an-hoc group or even a formal structure in the organisation. This way, the organisation could manage the knowledge flow from the project into the post-project stage.

The change mobilisation effort at TelCo was not effective in developing cross ownership between IS people and business users. The gap between IS people and business users in TelCo is still considered high and this may create problems when it is necessary for

IT people and business people to work closely internally during the usage stage. It may also hinder the active continuous improvement effort within the organisation.

Institutionalisation Effort

The organisation needs to pay more attention on the usage process. Effective use of ES information to manage the business requires a set of organizational factors to be present in addition to the technological capabilities. Institutionalisation the new way of working is necessary in post-project stage. Active monitoring of the application of the policy can have a significant effect on the changes in organisational practices and individual behaviour.

Besides, structural supports in usage stage could be provided by embedding ES/IS related measurements in the regular measurement systems (such as some proper set of key performance indicators) and create appropriate policy to institutionalise the new way of working to assure that the company gain business value from the implementation. Institutionalization can be seen as the process by which Information Systems (IS) can be made sustainable over time. [38] defines institutionalization as “the process through which a social order or pattern becomes accepted as a social ‘fact’. IT becomes accepted through socio-technical processes as a social fact and is maintained because of its legitimacy regardless of the evidence of its technical value. A socio-technical aspect leads to the stability of IT since it is absorbed and integrated within organizational structures and routine activities [38]. Through institutionalization, IT processes are carried out and sustained within organizations without dependence upon the initiative of a special group.

Improvement Support

During the post-project stage IT specialists need to have a close co-operation with users in order to be able to propose and realise improvement efforts, related to the business needs. Centrally decentralised IT organisation structure with IT specialist representation assigned in user departments can be used for facilitating IT-business collaboration. Besides, in order to support a smooth usage and to trigger necessary improvement efforts to take place during the post-project, it is considered good to assign some of key users in an ERP adhoc support group or a formalised ERP support structure in the post-project stage. This way, the knowledge accumulated during the project can be effectively utilised and transferred during the post-project stage.

8 Conclusion and Further Work

This study has built a research framework for studying implementation of enterprise systems, based on literature

study. In the effort for developing a research model, a single case study was executed at one Indonesian Telecommunication company having implemented SAP, using the framework developed as a guidance. The framework resulted was found to be helpful in studying important factors to be managed during the project stage and the post-project stage.

The findings from this case study will later be used in the development of the conceptual research model. The model will be developed in the form of a process model that will view the whole ES implementation process as at least two stages: project stage and post-project stage. Some propositions will be developed that will operationalise some important issues related to alignment, change mobilisation, knowledge acquisition, institutionalisation and improvement support discussed in Section 7, and link the issues with the stages of the ES implementation.

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