ISSN: 1978 - 8282

# MULTI-FACTOR ENTERPRISE METHODOLOGY: *AN APPROACH TO ERP IMPLEMENTATION*

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Diterima : 10 Juni 2011/ Disetujui : 20 Juli 2011

***ABSTRACT***

*As further investigation on the Information and Communication Technology (ICT) investment especially in Indonesia showed that a larger capital of investment does not automatically bring more benefit for the company, for example Enterprise Resource Planning (ERP) system implementation. The present research was aimed at developing a methodology for ERP Implementation which was fundamental problem for achieving a successful implementation. This methodology will be contained some factors that influenced ERP implementation success (technical or non-technical) as an activity each phase. Because, some of methodologies that common used by consultant more concentrating on technical factors without considering non-technical factors. Non-technical factors were involved in the new proposed of ERP implementation methodology, such as: top management commitment, support, and capability; project team composition, leadership, and skill; organizational culture; internal/ external communication; organization maturity level; etc. The conclusion of the study was expected to be useful for private or public sectors when implementing ERP in order to gain optimal return value from their investment.*

*Keywords: Enterprise Resource Planning (ERP), Methodology, Return value.*

## INTRODUCTION

Enterprise Resource Planning (ERP) is one of the integrated information systems that support business process and manage the resources in organization. This system integrates a business unit with other business unit in the same organization or inter-

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organization. ERP is needed by organization to support day to day activity or even to create competitive advantage.

In the ERP implementation, a business transformation is always made to align ERP business process and company's business strategy. This transformation consists of company's business process improvement, cost reduction, service improvement, and minimizing the effect on the company's operation (Summer, 2004). Consequently, there needs to be an adjustment between the business process that the ERP system has and the business process that exists in the company to give value added for the company.

There are some ERP systems that are currently developed. In the study conducted by O'Leary (2000) it is shown that SAP (System, Application, Product in Data Processing) is a system that has the largest market share in the world, which is between 36% to 60%.

Different from information systems in general, ERP is an integration of hardware technology and software that has a very high investment value. However, a larger capital investment on ERP does not always give a more optimal return value to the company. Dantes (2006) found out that in Indonesia, almost 60% of companies implementing the ERP systems did not succeed in their implementations. While Trunick (1999) and Escalle et al. (1999) found that more than 50% of the companies implementing ERP in the world failed to gain optimal return value.

Various studies have been conducted to find the keys to ERP implementation success, while some other studies also try to evaluate it. Some factors that influence the organization to choose ERP system as a support, such as: industrial standards, government policies, creditor-bank policies, socio-political conditions, organization maturity level, implementation approach or strategic reason. Finally, we found that the choosing of ERP adoption does not exactly base on organization requirement, especially in Indonesia.

On the other hand, Xue et.al. (2005) found that organization culture & environment and technical aspects influenced ERP implementation success. Others research also shown that 50% of the companies implementing ERP failed to gain success (IT Cortex, 2003), while in China, only 10% of the companies gained success (Zhang et.al, 2003). These continuing study on the success of ERP implementation show how critical ERP implementation is yet in IT investment.

Related to this study, Niv Ahituv (2002) argues that ERP implementation methodology is the fundamental problem in implementation success. In line with this, the present research is aimed at developing ERP implementation methodology, taking into account the key success factor (technical or non-technical factors) that will be included in ERP implementation methodology.

## THEORETICAL BACKGROUND

One of the major issues in ERP implementation is the ERP software itself. What should come first, the company's business needs or the business processes available in the ERP software? The fundamental invariant in system design and implementation is that the final systems belong to the users.

A study by Deloitte Consulting (1999) indicated that going live isn't the end of ERP implementation, but "merely the end of the beginning". The radical changes in business practices driven by e-commerce and associated Internet technologies are accelerating change, ensuring that enterprise systems will never remain static.

Because of the uniqueness of ERP implementation, methodologies to support ERP systems implementation are vital (Siau, 2001, Siau and Tian 2001). A number of ERP implementation methodologies are available in the marketplace. These are typically methodologies proposed by ERP vendors and consultants. We classify ERP methodologies into three generations – first, second, and third generations (Siau, 2001). Each successive generation has a wider scope and is more complex to implement.

Most existing ERP implementation methodologies belong to the first generation ERP methodologies. These methodologies are designed to support the implementation of an ERP system in an enterprise, and the implementation is typically confined to a single site. Methodologies such as Accelerated SAP (from SAP), SMART, and Accelerated Configurable Enterprise Solution (ACES) are examples of first generation ERP implementation methodologies.

Second generation ERP methodologies are starting to emerge. They are designed to support an enterprise-wide and multiple-site implementation of ERP. Different business units can optimize operations for specific markets, yet all information can be consolidated for enterprise-wide views. A good example is the Global ASAP by SAP, introduced in 1999. This category of methodologies supports an enterprise-wide, global implementation strategy that takes geographic, cultural, and time zone differences into account.

Third generation ERP methodologies will be the next wave in ERP implementation methodologies. The proposed methodologies need to include the capability to support multi-enterprise and multiple-site implementation of ERP software so that companies can rapidly adapt to changing global business conditions, giving them the required agility to take advantage of market or value chain opportunities. Since more than one company will typically be involved. The methodologies need to be able to support the integration of multiple ERP systems from different vendors, each having different databases. The multi-enterprise architecture will need to facilitate

the exchange of information among business units and trading partners worldwide. The ability to support web access and wireless access is also important.

When we see more specific into some of methodology that we review from literatures. All of them more concern about technical factors with less considering of non-technical factors into an ERP implementation methodology.

As explained above, Niv Ahituv et.al. (2002) proposed an ERP implementation methodology with collaborating Software Development Life Cycle (SDLC), Prototyping and Software Package. The methodology contains four phases, namely: selection, definition, implementation and operation.

In line with Niv Ahituv, Jose M. Esteves (1999) divided an ERP Life cycle become five phases, such as: adoption, acquisition, implementation, use & maintenance, and evolution & retirement. And one of famous ERP product, SAP proposed well-known methodology namely Accelerated SAP (ASAP) that contains five phases: project preparation (change chapter, project plan, scope, project team organization), business blueprint (requirement review for each SAP reference structure item and define using ASAP templates), realization (master lists, business process procedure, planning, development programs, training material), final preparation (plan for configuring the production hardware's capabilities, cutover plan, conduct end user training), go live & support (ensuring system performance through SAP monitoring and feedback).

However, Shin & Lee (1996) show that ERP life cycle contained three phases, such as: project formulation (initiative, analysis of need); application software package selection & acquisition (preparation, selection, acquisition); installation, implementation & operation.

In general, all ERP implementation methodologies above have a similar concept. But there are only more concerning on technical factors than non-technical factors.

## RESEARCH DESIGN

Methodology is a fundamental problem on ERP implementation (Juhani et. al, 2001). When the organizations were successful in implementing ERP system, it can improve an organization productivity and efficiency. The conceptual framework will be used in this research, describe in figure 1.

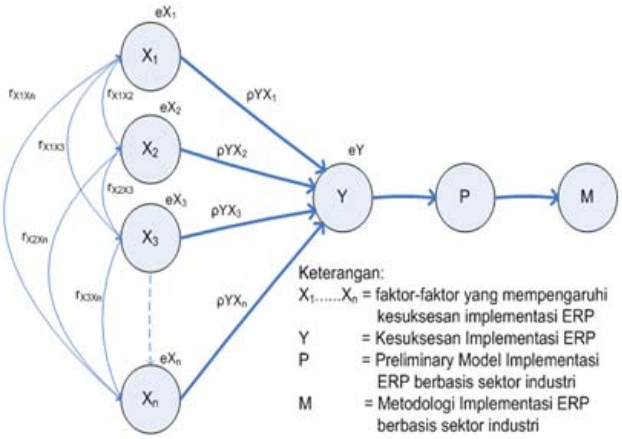


*Figure 1. The conceptual framework for ERP implementation Methodology*

Variables on this research contain of independent variable, such as: ERP implementation success factors ($X_1..X_2$) (i.e. organization maturity level, implementation approach, top management commitment, organization culture, investment value, etc.) and dependent variable is ERP implementation success.

Referring back to final product, this study used a literature review methodology. The developing ERP implementation methodology is academic activities that need a theoretical exploration and a real action. Furthermore, the planning and developing this methodology, we need to identify some problems and doing a deep analysis for some factors that influenced ERP implementation success. These factors can be used to develop a preliminary study of ERP implementation methodology. The phases that have to be done in this research are: justification of ERP implementation success factors (technical or non-technical) from literatures review, and the developing of preliminary model.

## RESULT AND DISCUSSION

In this study, we found out that some factors that influenced an ERP implementation success can be shown on table 1. These factors (technical or non-technical) will be used to develop a new ERP Implementation methodology. Non-technical aspects were important thing that always forgotten by organization when adopt ERP system as support for their organization. A lot of companies were failed to implement ERP system because of it.

**Table 1. Factors that influence an ERP Implementation Success**

| Classifications | Indicators | Variables ($X_1..X_n$) |
|---|---|---|
| **Organizational Factor** | **Top Management** | Support[BP,HL,EP,PS,RO,AL], Commitment, Capability |
| | **Project Team** | Composition[DV,EP], Leadership[DV], Skill |
| | **Business Vision**[HL] | |
| | **Project** | Scope[EP], Schedule/Plan[HL,EP], Role[EP] |
| | **Organization Maturity** | |
| | **Change Management**[BP,EP] | |
| | **Culture** | Organization |
| | **Business Process Reengineering** | |
| | **Functional Requirement Build**[MC] | |
| | **Training program** | |
| | **Communication**[AL] | Internal, External |
| | **Budget of Investment** | |
| **Technology Factor** | **Legacy System**[HL] | |
| | **Software Configuration**[HL,EP,MC] | |
| | **Implementation Strategy**[AL] | Step by Step, Big Bang, Roll Out |
| | **User** | Involvement[EP,RO] |
| | **ICT Infrastructure** | |
| | **Hardware** | |
| | **Consultant** | Skill |
| | **Data Conversion** | |
| | **System Integration**[MA] | |
| **Country / External Organizational Factor** | **Current Economic & Economic Growth**[HP] | |
| | **Government Regulation**[HP] | |
| | **Political Issue** | |

Legend:

[BP] Brown & Vessey, 1999, 2003
[HL] Holland & Light, 1999
[EP] Esteves & Pastor, 2000
[PS] Parr & Shanks, 2000
[MC] Murray & Coffin, 2001
[RO] Roseman et al., 2001
[TS] Tsai et al., 2005
[AL] Allen et al., 2002
[MA] Al-Mashari et al., 2003
[UB] Umble et al., 2003
[SN] Somers & Nelson, 2004
[GB] Gargeya 7 Brady, 2005
[MT] Motwani et al., 2005
[OR] O'Kane & Roeber, 2004
[SH] Soh et al., 2000
[HP] Huang & Palvia, 2001
[DV] Davidson, 2002
[MR] Martinsons, 2004
[RE] Reimers, 2003
[LA] Liang et al., 2004
[RS] Rajapakse & Seddon, 2005

## ➢ ERP Implementation Success Factors

Related to the literature review which is focused on discussion and need assessment for ERP implementation in private or public sector, we can conclude that some factors influence the ERP implementation success, we can classify into three aspects, namely: Organizational, Technology and Country (External Organizational).

### • Organizational Aspects

The organizational aspect is an important role in ERP implementation. Related to it, there are some activities that are supposed to be done on ERP implementation methodology, such as: (1) identification of top management support, commitment and capability; (2) identification of project team composition and leadership; (3)

identification of business vision; (4) preparing of project scope, schedule and role; (5) identification of organization maturity level; (6) change management; (7) Business Process Reengineering (BPR); (8) building of functional requirement; (9) preparing of training program; (10) build a good internal/external factor; and (11) identification an investment budget.

- **Technology Aspects**

This aspect contains software, hardware and ICT infrastructure. Technology aspect needs to be identified before we implement ERP system. We can divide this aspect become certain activities that important for ERP implementation methodology, such as: (1) identification of legacy systems; (2) software configuration; (3) choosing of implementation strategy; (4) motivating of user involvement; (5) identification of hardware and ICT infrastructure; (6) identification of consultant skill; (7) data conversion; and (8) systems integration.

- **Country/External Organizational Aspects**

ERP implementation as Enterprise System is very important to consider a country or external organizational aspects. Viewed from a literature review, we can describe some activities that support for ERP implementation methodology, such as: (1) identification of current economic and economic growth; (2) aligning with government policy, and (3) minimizing a political issue that can drive ERP implementation.

Some of activities that we need to give a stressing from an explanation above such as: organization maturity level and business process. Organization maturity level is important aspect before chosen one of ERP product that will be adopted by organization to support their operational (Hasibuan and Dantes, 2009). It can divide into three levels, namely: operational, managerial and strategic level. Each level can define by considering a role of IS/IT to the organization. For company that lied at operational level, the ERP system is only supporting a company operational. But the company that lied at strategic level can create a competitive advantage for organization.

The other activity that also important is business process. It involves in ERP product as best practices. A lot of organizations change the ERP business process to meet their organization business process. This affects to the failure of the ERP implementation. The changes in process give a more significant impact than the changes in technology. The process change in an organization has to be followed with "management change" implementation. And the technology changes usually will be followed by training to improve the employees' skill. Through this aspect, we can

describe two activities that give significant influence in the development of ERP implementation methodology, namely: change management implementation, and identifying the alignment of the organization business process with ERP business process.

## ➢ Comparison of ERP Implementation Methodology

A lot of ERP methodologies used by consultant/vendor to implement this system. But, in this study we will compare some of methodologies that common used, such as: Accelerated SAP (ASAP), ERP life cycle model by Shin & Lee, Niv Ahituv et.al and Jose M. Esteves et.al. In general, all of methodologies have similar component, namely: selection phase (how we compare all of ERP product and choose one of them that very suitable to organization requirement and budget), project preparation (this phase, we will prepare all of requirement for this project, such as: internal project team, consultant, project scope, functional requirement building, etc), implementation & development (how we will configure the software/ ERP product to suit with organization requirement), and the last part is operational & maintenance (in this phase, system will be deploy to production and try to support/ maintenance it).

Normally, all of methodologies that used by consultants were concerning about technical aspects without considering non-technical aspects. Through this study we try to indentify some of non-technical aspects that influenced ERP implementation success, such as: top management support, commitment and capability; project team composition, leadership and skill; business vision; organization maturity level; organization culture; internal/external project team communication, etc. All non-technical factors above we will used to build an ERP implementation methodology as an activities for each phase.

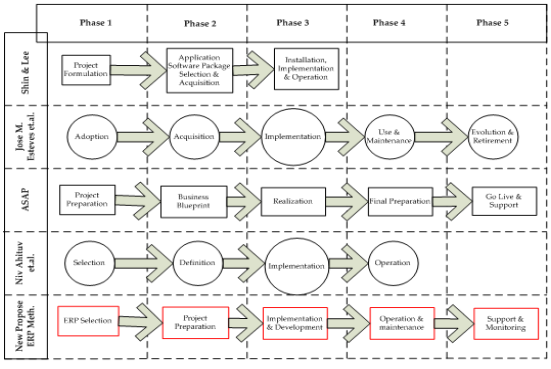


*Figure 2. Comparison of ERP Implementation Methodology*

➢ **Preliminary of ERP Implementation Methodology**

Based on the activities above, we can develop the ERP implementation methodology as a preliminary design. We can divide five phases of the ERP implementation methodology, such as:

(1) **ERP Selection Phase**, this phase will be comparing all of ERP product that will most suitable with the organization. It contains some activities, such as: aligning one of ERP product with an organization IS/IT strategy; aligning with government / company policy; matching with an industrial standard; business vision identification; suitable with organizational culture, identify a budget of investment, internal IS/IT (hardware and software) identification; ICT infrastructure identification, organization maturity level identification, identification of aligning between organization business process with ERP business process.

(2) **Project Preparation Phase** contains some activities such as: identification of top management support, commitment and capability; identification of project team composition, leadership and skill; identification of project scope, schedule, investment and role; function requirement building; identification of internal/external project team communication; identification of legacy systems that will integrate with ERP product; choose of implementation strategy; define a consultant skill; define a job description of project team members; motivate of user involvement.

(3) **Implementation & Development Phase** contains some activities, such as: developing implementation plan; ERP or software configuration; business process reengineering (BPR); data conversion; change management; system integration; penetration application; and training.

(4) **Operational and Maintenance Phase** contains some activities: operational and maintenance of software package, evaluation and audit the system periodically.

(5) **Support and Monitoring Phase**, ensuring system performance through ERP monitoring and support.

Aim of this study is proposing a new ERP implementation methodology that can minimize a failure of implementation this system. With this methodology, ERP implementation will give an optimal return value for organization itself. This methodology has already involved some factors that influenced an ERP implementation success. It give us a guidance to exercise some components that most important for implementation ERP system. That's component, such as: how we know a top

management support, commitment and capability; how we can build a project team that have a good composition, leadership and skill; how we can identify the organization business vision, so it can suitable with the ERP product that organization chosen; how we can exercise the project scope, schedule, investment and role; how we can identify the organization maturity level, thus we can select the right ERP product and what modules we suppose to implement to support an operational organization; how we can build a functional requirement; how we can build a good communication in internal/external project team, etc.

## CONCLUSSION

In the light of the findings on this study, it can be concluded that ERP implementation methodology as preliminary study divided into 5 phase, namely: (1) ERP Selection Phase, (2) Project Preparation Phase, (3) Implementation & Development Phase, (4) Operational & Maintenance Phase, and (5) Support & Monitoring Phase. This methodology will give the organization an optimal return value. Because, each phase contained some factors that influenced ERP implementation success.

## FURTHER RESEARCH

This study shown that some aspects influence ERP implementation success, which we can classify into organization factor, technology factor and country / external organization factor. Each aspect contains some activity that should be involved in ERP implementation methodology as preliminary design that we proposed. For further research, we need to explore more deeply according to ERP implementation methodology that suitable for organization culture especially in Indonesia and also fit to industrial sector.

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