CRITICAL SUCCESS FACTORS FOR ERP ADOPTION PROCESS

Case: Vietnam Dairy Products Joint Stock Company

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ABSTRACT

Since Vietnam officially joined WTO in 2007, many organizations have been increasing their needs in restructuring their operations and seeking for a total business solution as a significant strategic tool of competition. Enterprise Resource Planning (ERP) system is designed to meet this need; however, there have been many failed attempts at implementing an ERP system. The aim of this research is to examine what critical success factors impact on the ERP adoption process.

The thesis chose Vietnam Dairy Products Joint Stock Company (Vinamilk), a leading company in manufacturing dairy products in Vietnam, as the case company. Data was collected from different sources such as interviews, the project's documentations, the company's reports and small-scale survey.

The results indicate the critical success factors for the ERP adoption of Vinamilk. Therefore, this study is beneficial to other Vietnamese companies' managers who plan to invest in ERP projects. Besides, this paper can be beneficial to those managers who failed to manage the ERP adoption process. Next, the findings are good reference for novice consultants who need in-depth knowledge of ERP. Finally, this thesis is helpful to those who are interested in ERP adoption in Vietnam.

Keywords: Enterprise Resource Planning (ERP), Critical Success Factors (CSFs), ERP adoption process, ERP implementation success, Vietnam.

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CONTENTS

LIST OF ABBREVIATIONS

BI	Business Intelligence
BPC	Business Process Change
BPR	Business Process Reengineering
CSFs	Critical Success Factors
ERP	Enterprise Resource Planning
IS	Information System
IT	Information Technology
M	Million
ROI	Return on Investment
Oracle EBS	Oracle E Business Suite
SMEs	Small and Medium sized Enterprises
UML	Unified Modeling Language
US	The United States
WTO	World Trade Organization

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1 INTRODUCTION

In a fiercely competitive business environment as today, business strategy plays a crucial role in both determining success and governing business survival. An effective business strategy should focus on intensive and efficient use of information technology, such as Enterprise Resource Planning (ERP) systems. An ERP system is a strategic tool that integrates all data and business processes from different departments into one single computer system. Therefore, the ERP system is the very infrastructure of how business operates and it is also the platform for future business expansion (Dave Caruso 2003, 1).

This study deals with the question of what are the critical success factors (CSFs) for adopting an ERP project or how to adopt the ERP project successfully. Instantly, you may think that this thesis is only useful for those persons that are directly involved in ERP projects such as project managers, top managers or technical staffs. However, this topic also concerns a wide range of people.

First of all, the topic is a specific example of the question of how to do a task successfully that we usually face in real life. Through this study, you may realize the importance of what are so-called 'critical success factors' in planning your tasks. Second, ERP systems are currently a trend and have been widely implemented by various organizations such as governmental agencies, companies and even Universities. It means that your future jobs may be involved with ERP systems, so why not to get familiar with their concepts from now? Furthermore, ERP projects are costly and time-consuming. Their successes or failures can have impact on not only organization's operations but also its entire staffs. Therefore, finding the answers to how to adopt ERP systems successfully is extremely important. This study is an effort to achieve that by identifying the CSFs for adopting ERP systems which corresponds with Vietnamese companies, categorizing them into the respective phases in the ERP adoption process model, and examining the importance of these factors in the real ERP project in Vietnam.

This research is divided into seven chapters: introduction, research approach, research methodology, ERP systems, review on CSFs in ERP adoption, case study and summary and recommendations. Firstly, the introduction introduces you the thesis's topic. Research approach provides the background of the problem, motivations to do this research, its scope and limitations. Next, the research methodology states how the research is processed to find the results. The fourth chapter gives some focused areas of the ERP terminology used in this study such as definitions, benefits, and its adoption process and implementation's tasks. Fifthly, CSFs in ERP adoption provides definitions of CSFs, their findings in ERP adoption projects in previous research studies and later; eight CSFs are identified for discussion and further analysis in the case study. Later, the empirical data collected is described and analyzed. Finally, summary and recommendations summarize the whole research and its findings as well as give recommendations and further research studies.

2 RESEARCH APPROACH

2.1 Research background

Nowadays, ERP systems have been widely implemented to obtain competitive advantage for companies. The major ERP vendors are SAP AG, Oracle and Microsoft. ERP systems help to improve business processes and reduce costs. Furthermore, the system can connect with suppliers, distributors, and customers, facilitating the flow of product and information. Nevertheless, there still exist numerous challenges in adopting ERP systems.

In practice, implementing an ERP system is costly, time-consuming and complex. According to the ERP 2010[1] report released by Panorama Consulting Group (2010, 3), the average of ERP implementation took 18.4 months with total owner's cost[2] of 6.2 million of US dollars. In the same period, 35.5% of ERP implementation took longer than expected, 51.4% of them went over budget and 40% of companies realized major operational disruptions after implementation go-live.

In Asian developing countries, the rate of ERP adoption was very low and several years behind advanced countries (Rajapakse & Seddon 2005, 1; Ngai et al. 2008, 12). Until February 2010, there were about 100 Vietnamese companies that already adopted ERP systems, and the number was anticipated to increase significantly. This result came from a report released on the website http://eac.vn on March 2010 which was attached in appendix 1 at the end of this thesis. The modest number above derived from the high failure rate of 70% - 80% of previous ERP projects based on statistic in 2006 (ERP implementation projects: how to avoid failure, 2006).

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[1]: The study surveyed respondents from nearly 1,600 organizations that had implemented ERP systems within the last four years.

[2] : The costs of the software, hardware, professional services (for ongoing maintenance, upgrades and optimization) and internal costs depend on the number of users, complexity of the solution, the ERP vendors and the implementation locations.

Thus, the difficulties and high failure rate in adopting ERP systems have been widely attracted many researchers to discover critical success factors for ERP adoption. Holland and Light (1999) are among the first authors to discuss the issue (Holland & Light 1999, 31). Through comprehensive literature review, Ngai et al. (2008, 14) indicate that much of the research focused on Western nations while there has been lack of research on the success or failure of ERP adoption in developing regions/countries. With the development of ERP systems, it becomes more and more powerful with high risks. All the researchers wish to find some successful factors to generalize experience. Beside, some other motivations for exploring this topic are as following:

Firstly, ERP implementation projects in Vietnam are developing intensively: The term ERP was known in Vietnam before the country joined WTO in 2007. However, only after that moment did more and more companies realize their needs of implementing ERP systems. There have been more companies pursuing ERP systems as they grow more along with the Vietnamese economy.

Secondly, there is a need to enhance ERP adoption success in Vietnam: The numbers of failed ERP projects in Vietnamese companies most dominated over successful ones. Remarkably, some companies attempted to implement the ERP system many times, but still unsuccessfully. This influenced on psychology of other managers who planned to invest in the project for their companies.

Finally, ERP success and related critical factors: ERP adoption varies from size of companies to geographical locations. Even though there have been many failed ERP projects in Vietnam, formal efforts to determine their success and underlying causes have been very limited. This paper aims to reduce the gap in literature about CSFs in ERP adoption worldwide and more importantly, it aims to be one of the first academic research studies on CSFs in ERP adoption in Vietnam.

2.2 Research question and objectives

Defining the research question is probably the most important step in a research study (Yin 2003, 7). This study aims to find the answers for the question: *What are the critical success factors for the ERP adoption process?*

The question is answered through the following methods:

- Conducting an in-depth literature review and developing theories for analysis (deductive research).
- Collecting empirical data from the case study by interviewing different participants joining the ERP project, project's documentation and small-scale survey.
- Using within-case analysis where the data collected is compared to theories.
- Finding the results

The main objective of this research is to examine the ERP adoption in light of CSFs. Additionally, some secondary objectives are to:

- Have better understanding the ERP project in real life.
- Have better understanding the state of ERP adoption in Vietnam.
- Give recommendations and suggest future research topics.

2.3 Scopes and limitations

The scope of this study is to examine CSFs for the ERP adoption of the Vietnamese company. In this thesis, the ERP adoption refers to the process from deciding to implement the ERP system to using it in normal operations in the company. Therefore, the implementation stage in the ERP adoption process is mainly focused in description and analysis because it is the main stage that influence on the success of ERP adoption. Likewise, both ERP implementation success and ERP system success refer to the success of ERP adoption. This thesis restricts its discussion and analysis on the proposed CSFs in literature reiview.

Since the case is a large organization in Vietnam, this study would be most beneficial to other large Vietnamese companies. However, the findings can also be helpful to SMEs since they have fewer obstacles in adopting ERP systems than large ones. Moreover, this study is not limited in manufacturing industry because CSFs discovered in this study are also applicable to other fields in the economy.

3 RESEARCH METHODOLOGY

> *Methodological insight gives an audience a better understanding of previously conducted research and how to proceed in future.*
>
> *(Gammelgaard 2004, 480)*

This chapter states how the research is processed to find the results. Research purpose is discussed in the first section. Then, research strategy is explained in section 3.2. Section 3.3 gives the choice of research methods. Next, the process of collecting and analysis empirical data is described. Finally, validity and reliability measures of this thesis are described.

3.1 Research purpose

In terms of research purpose, the threefold one of exploratory, descriptive and explanatory is the most often used in the research methods' literature (Saunders et al. 2009, 139). One research may have more than one purpose and the purpose may also change over time (Robson 2002, according to Saunders et al. 2009, 139).

An exploratory study is used "to find out what is happening; to seek new insights; to ask questions and to assess phenomena in a new light" (Robson 2002, 59). Exploratory study is particularly useful to develop an initial and rough understanding of a problem and it is applicable for new topic. It employs an open, flexible and inductive approach to find all relevant data on the problem (Blanche et al. 2006, 44).

A descriptive study is objected "to portray an accurate profile of persons, events or situations" (Robson 2002, 59). It may be either an extension of a piece of exploratory research or a piece of explanatory research (Saunders et al. 2009, 140). Descriptive research is often used to answer the questions *who, what, where, when* and *how.*

An explanatory study is used to establish causal relationships between variables and its analysis is on studying a situation or a problem in order to explain the

relationships between variables (Saunders et al. 2009, 140). Normally, this kind of study answers the questions *why* and *what*.

With regard to this thesis, the research purpose is mainly explanatory and partly descriptive. It is mainly explanatory because it explains how CSFs influence on the success of the ERP adoption process. It is partly descriptive because it is necessary to describe how the ERP system was implemented to have a clear picture of the problem. Besides, this thesis is somewhat exploratory because the author wishes to find out what was happening in the real ERP project in light of critical success factors.

3.2 Research strategy

Along with research approach, it is important to pay attention to research strategy that should be employed for the research. Saunders et al. (2009) consider seven types of research strategy as following: experiment, survey, case study, action research, grounded theory, ethnography and archival research (Saunders et al. 2009, 141). Each strategy can be used for exploratory, descriptive, or explanatory (Yin 2003, 3). The choice of research strategy depends on the research question and objectives, the extent of existing knowledge (Saunders et al. 2009, 141). Particularly, the case study has considerable ability to generate answers to the question *why* as well as *what* and *how* questions (Saunders et al. 2009, 146).

This thesis is designed as a case study because its purpose is to find information relating to w*hat* question. A case study uses an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence, and provided an opportunity for the intensive analysis of many specific details often overlooked by other methods (Robson 2002, 178; Kumar 2005, 113). According to Yin (2003, 15), there are at least five different applications of case studies: explanation, description, illustration, exploration and meta-evaluation (a study of an evaluation study).

3.3 Choice of method: qualitative or quantitative?

> *By our pragmatic view, qualitative research does imply a commitment to field activities. It does not imply a commitment to innumeracy.*
>
> *(Kirk & Milner 1986, 10)*

Quantitative method is often used for numerical data collection technique (questionnaires or structured interviews) or data analysis procedure (graphs or statistics) that results in numerical data (Dawson 2002, 15; Saunders et al. 2009, 152). It is used either to quantify the variation in a phenomenon, situation, and problem or to abstract from particular instances to seek general description or to test causal hypotheses (Gary King et al. 1994, 3; Kumar 2005, 12).

In contrast, qualitative research explores attitudes, behavior and experiences through such methods as interviews, observations, or focus groups to generate non-numerical results. It attempts to get in-depth opinions from participants, so it tends to take longer time than quantitative method (Dawson 2002, 15; Saunders et al. 2009, 152.) Qualitative method is typically more flexible than quantitative that it allows using open-ended questions rather than fixed ones. In that way, the participants can respond in their own words. (Qualitative Research Methods: A Data Collector's Field Guide, 4.)

Since there is lack of available data, qualitative method is most useful to the context of this bachelor thesis. Qualitative method flexibly supports explorative findings and in-depth knowledge of the current business practice (Gray 2009, 166). Additionally, quantitative data is collected as complementary tool for illustrating the results.

3.4 Data collection

According to Yin (2003, 99), multiple sources of evidence and triangulation are necessary for analyzing a case study. They can improve reliability and validity of the case evidence. He also highlights that "those case studies using multiple sources of evidence are rated more highly, in terms of their overall quality, than

those that rely on only single source of information". In addition to theoretical data from published sources, the empirical data consists of the following sources: project documentation, company report, open-ended interviews and small-scale survey. The data is collected on February 2011. Figure 1 below reveals the convergence of multiple sources used in this single case study.

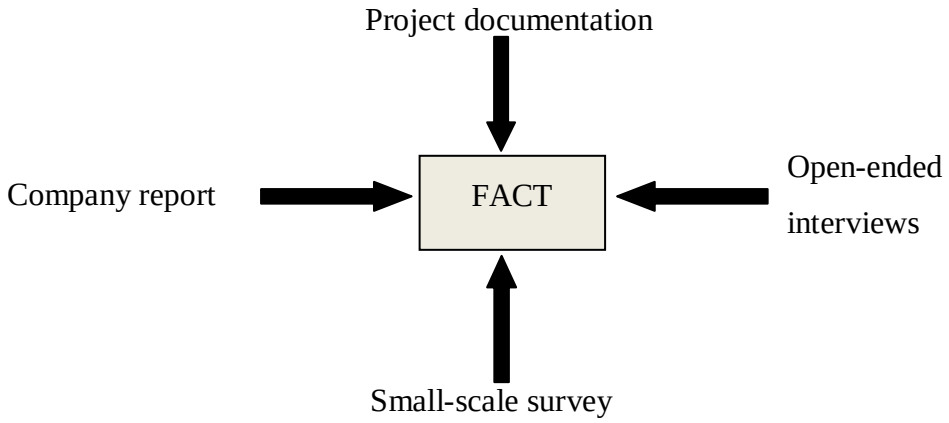


FIGURE 1. Convergence of multiple sources of evidence (adapted from Yin 2003, 100).

Sample selection

The reason to choose Vinamilk as a case study is that the company is one of the first companies in Vietnam implemented ERP successfully and the benefits of ERP have been perceived. Moreover, the company reflects the common structure of other large enterprises in Vietnam. Ultimately, the company can be easily assessed to collect the empirical data.

Interview design

In this case study of Vinamilk, the interviews were conducted with several different participants within the company as well as the ERP implementer. An email interview with top managers and representative of the ERP implementer was importantly defined as a series of emails; each contains a small number of questions. The participants, based on the questions, expressed their thoughts and opinions. However, there were some difficulties in approaching intended

interviewees. Therefore, telephone interviews were sometimes replaced for email interviews. The data then was stored as notes for further analysis.

In order to set up interviews, the targeted company – Vinamilk – was contacted and the participants responsible for the ERP project were identified. Below, list of main interviewees is presented in table 1.

TABLE 1. Provided details of main interviewees.

Interviewee	Organization	Position
Ms. Ngo	Vinamilk Ltd	Vice president of Vinamilk, ERP project supervisor
Mr. Tran	Vinamilk Ltd	IT manager, ERP project manager
Mr. Nguyen	Pythis Ltd	Manager

In addition, small groups of cross-functional staffs participating in the project were interviewed. For these groups, the interviews were done by emails and instant messenger. Table 2 shows the details of sample groups for research.

TABLE 2. Sample group for interviews.

Department	Number of interviewees
IT	3
Accounting	5
Manufacturing	3
Logistics	4
Total	15

The interview questions were designed based on the identified CSFs in literature. It is also important to know the perceived benefits, possible challenges in using the new system. Those questions were attached in appendix 2 at the end of this

study. Furthermore, a questionnaire was sent to all the interviewees to find out how they evaluated the importance of identified CSFs to the success of the project. It was presented in appendix 3 of this thesis.

3.5 Data analysis

One of the least developed and most difficult aspects of doing case studies is the analysis of data collected. The best preparation for this task is to choose a general analytic strategy (Yin 2003, 109). In this case study, the strategy used was within-case analysis where the empirical data was compared with the theories or identified CSFs. In addition, the quantitative data was analyzed for illustrating the result.

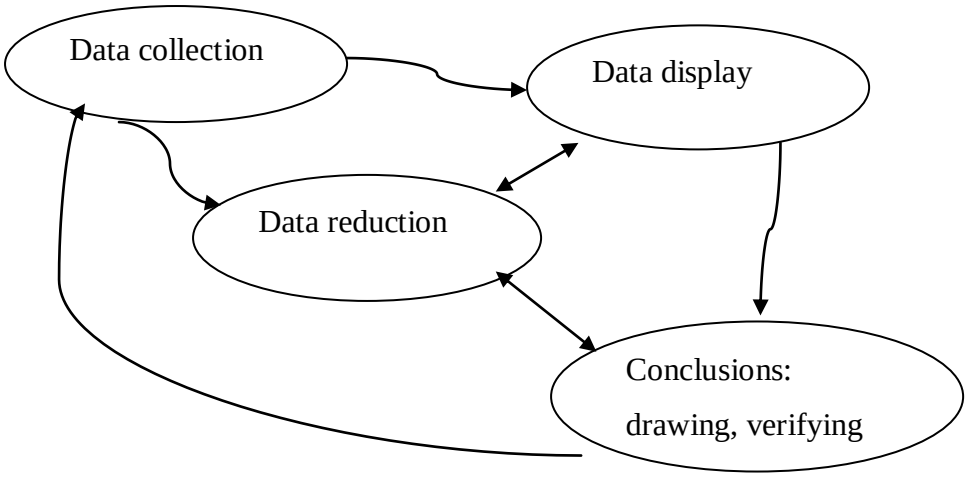


FIGURE 2. Components of qualitative data analysis – Interactive model (Miles & Huberman 1994, 10).

Firstly, the qualitative evidences were used to examine CSFs in the successful project. The analysis includes data reduction, data display, and conclusion. Data reduction was the process of selecting, focusing, simplifying, abstracting and transforming the data. Its purpose was to organize the data, so that conclusions could be drawn and verified. Data display was to take the reduced data and displayed it in flowchart or other graphics that permitted conclusion drawing easily. Finally, the tasks in conclusion drawing process were to decide what things mean, note regularities, patterns, explanations, possible configurations, causal

flows and propositions. Figure 2 above illustrates the components of qualitative data analysis. (Miles & Huberman 1994, 11.)

Secondly, quantitative data collected was then synthesized to find the frequency of CSFs cited from small-scale survey. The purpose was to verify the importance of the identified CSFs to the ERP adoption process of Vinamilk. Also, the result indicated the most and least critical factors according to interviewees' perspectives. For this task, the statistical tool of Microsoft Excel was used.

3.6 Validity and reliability

> *Validity and reliability have to be considered to reduce the risk of obtaining incorrect answers to research questions.*
>
> *(Chisnall 1997, 12)*

Validity and reliability are two valuable factors to measure the quality of a research. Validity both concerns with whether the research conclusions are really about what they appear to be about and refers to how well a specific research method measures what it claims to measure (Chisnall 1997, 12; Saunders et al. 2009, 157). Reliability refers to the consistency of research findings. In other words, if another researcher follows the same procedures, he should get the same results. The goal of reliability is to minimize the errors and biases in a study (Yin 2003, 37.) It is important that all respondents understand the questions in the same way and their answers can be coded without the possibility of uncertainty (David Silverman 2001, 229.)

In order to deal with validity and reliability, this thesis used four sources of evidence from the case study. All the chosen interviewees were well-involved in the project, so their answers derived from their own experience. The time to conduct interviews was also flexible and dependent on interviewees' schedule, so they were comfortable to express their opinions. In addition, the list of references was made to store all the sources from which the data was collected.

4 ERP SYSTEMS

This chapter provides some main background information about ERP systems such as definition, benefits, and ERP adoption process and implementation approach. It is also necessary to mention the success measurement for ERP implementation and explain why implementation success is critical.

4.1 ERP definition

Wallace and Kremzar (2001, 5) define an ERP system as:

> *An enterprise-wide set of management tools that balances demand and supply, containing the ability to link customers and suppliers into a complete supply chain, employing proven business processes for decision making and providing high degrees of cross-functional integration among sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development and human resources, thereby enabling people to run their business with high levels of customer service and productivity and simultaneously lower costs and inventories; and providing the foundation for effective e-commerce.*

In figure 3 below, the ERP system is the central database.

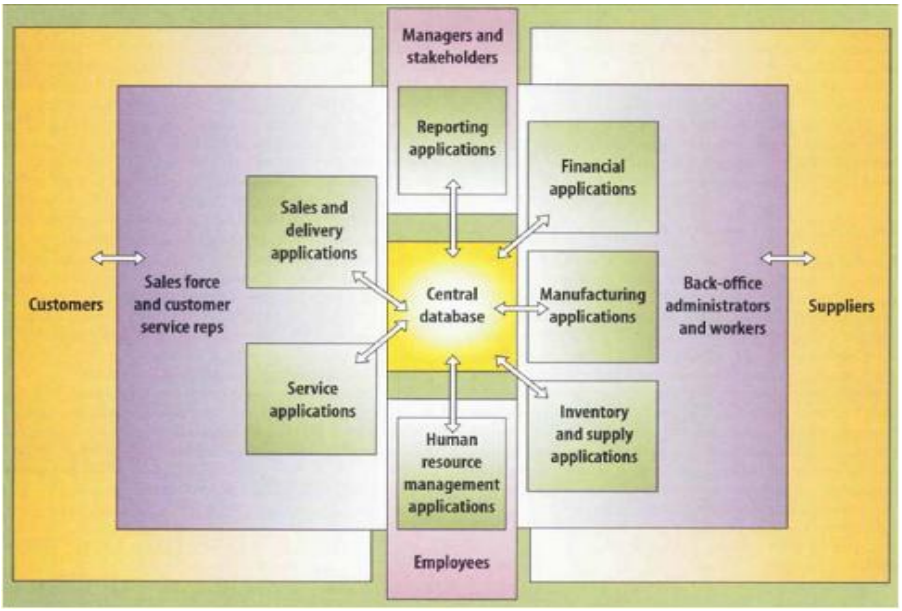


FIGURE 3. Anatomy of an ERP system (Davenport 1998, 124).

4.2 Benefits of implementing an ERP system

According to Röthlin (2010, 104), Shang and Seddon (2003) classify the benefits of ERP systems into five dimensions with 21 sub-dimensions as following:

- *Operational:* ERP systems are built to integrate and automate business processes. Therefore, they are expected to provide the benefits in terms of cost reduction, cycle time reduction, productivity improvement, quality improvement, customer service improvement.
- *Managerial:* ERP systems may help the company to achieve better resource management, improved decision making and planning and performance improvement.
- *Strategic:* ERP systems may support for strategic actions such as business growth, business alliance, building business innovations, building cost leadership, generating product differentiation (including customization) and building external linkages (customers and suppliers).
- *IT infrastructure:* ERP systems provide building business flexibility for current and future changes, IT cost reduction and IT infrastructure capability improvement.
- *Organizational*: ERP systems may support company's changes, facilitate business learning, empowerment and building common visions.

4.3 ERP adoption process

From literature review, it was noticed that there was no common viewpoints regarding the stages of adoption process. According to Placide et al. (2008, 533) the ERP adoption process has been identified between three and thirteen stages in literature. According to them, the ERP adoption process contains seven stages: decision, planning, search for information, selection, evaluation, choice and negotiation. However, this model cannot reflect the true meaning of the ERP adoption process.

Next, Pastor and Esteves (1999, 3) propose six phases for the lifecycle of adopting an ERP system: decision planning, acquisition, implementation, use & maintenance, evolution and retirement. In this thesis, the author proposes that ERP adoption in a company is a process from realizing the needs for a new ERP system, replacing old system(s) by that new system and obtaining intended benefits through using it in normal operations. Accordingly, the new model consists of four phases adapted from Pastor and Esteves (1999): decision planning, acquisition, implementation and use & maintenance. Figure 4 illustrates the ERP adoption process used in this study.

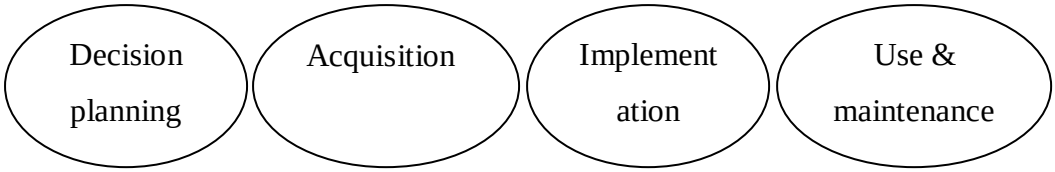


FIGURE 4. An ERP adoption process (adapted from Pastor & Esteves 1999, 3).

Decision planning phase

This stage presents the business vision and planning of organization. Top managers have to fulfill the following activities. Firstly, they must analyze the needs and requirements for adopting an ERP system. Secondly, they should analyze the costs and expected benefits from ERP adoption. Lastly, feasibility study is needed to determine tentative impacts on the organization. (Pastor & Esteves 1999, 4.)

Acquisition phase

The acquisition team is formed to choose the ERP package that best fits the requirements of the organization so that customization would be minimized. An ERP implementer is also selected. Terms and conditions in implementing contract are defined. It is also important to make an analysis of the return on investment (ROI) of the selected ERP package. Another important task is to investigate and evaluate the current IT infrastructure of company to consider whether it satisfies the requirements of the new ERP system or not. (Pastor & Esteves 1999, 4; Pastor & Bibiano 2006, 3.)

Implementation phase

This stage is the most important phase in the ERP adoption process where the ERP system and business processes of the organization match each other. The role of consultants is so crucial in this stage because they provide implementation methodologies, know-how knowledge and training. (Pastor & Esteves 1999, 5.)

According to Theodor (2009, 14), some main tasks in this stage contain:

- *Formation of project team*: consist of project manager, IT personnel, and end-users from all related departments/ levels, ERP consultant and steering committee that supervise the progress.
- *Preparation of implementation plan*: a plan outlines the whole implementation process: goals, objectives of the system, timeline, cost and personnel resource, etc.
- *Gap Analysis*: this step is designed to compare *as is* and *to be* analyses to determine what gaps exist between current company's processes and new processes that they want to have.
- *Business Process Reengineering (BPR) and customization:* reengineered business processes are mapped on to the software; if possible make use of the standard functionalities the software offers, otherwise apply gap analysis
- *Create master data*: all key information is standardized and unified.
- *Set up application, configuration and integration*: the ERP system is installed and configured; then all modules are integrated.
- *System integration testing*: important step that eliminates software bugs and other problems.
- *Data conversion or data migration*: data is transferred from old systems to the ERP system in appropriate format and sequence.
- *Go live*: the ERP system functions properly and replaces old systems.
- *User training*: end-users are trained to know how to use the new system.

Use and maintenance phase

This stage contains continuous user training, implementation evaluation, user satisfaction and usage intention. In this stage, benefits of the system are perceived. It also covers the report to analyze the expected ROI. Once a system is implemented, it must be maintained because of malfunctions, special optimization requests, and general systems improvements. (Pastor & Esteves 1999, 5; Pastor & Bibiano 2006, 5.)

4.4 ERP implementation approach

Big bang and phased are the two primary approaches for implementing an ERP system. A big bang approach is a deployment where at once old systems at all locations are upgraded to the new ERP system. In contrast, a phased approach is a deployment where modules of the ERP system are implemented in a sequence to replace the old systems gradually. (O'Leary 2000, 151.)

The choice of implementation approach depends on organizational characteristics such as size, structure, complexity and controls of the organization. Often the big bang is suitable to smaller and less complex organizations whereas the phased approach is most used by larger and more complex ones. Besides, the more hierarchical (tall) with tighter controls an organization becomes, the more likely the phased approach is used. Figure 5, 6 below show the linkages between organizational characteristics and implementation approach used. (O'Leary 2000, 157, 158.)

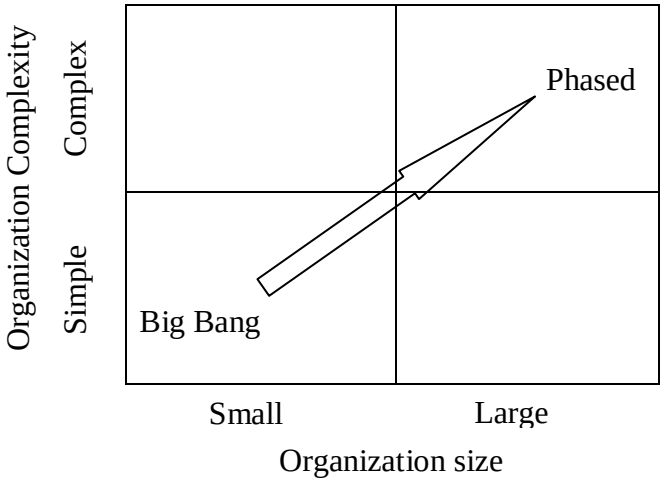


FIGURE 5. Linkages between organization size and complexity and implementation approach used (O'Leary 2000, 157).

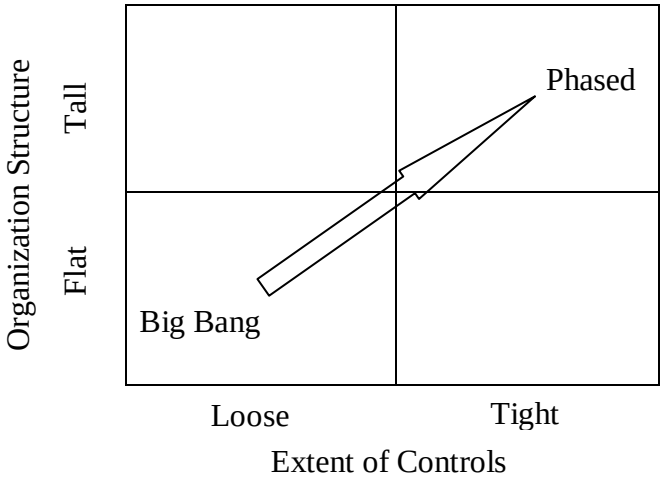


FIGURE 6. Linkages between organization hierarchy and control and implementation approach used (O'Leary 2000, 158).

As compared with the big bang, the phased approach takes longer implementation time, higher total cost but lower risks, less personnel resource required during implementation. In addition, by using the phased approach, old systems can go back in case of the new ERP system would not work as expected and personnel can accumulate knowledge in one phase to improve the tasks in later phases. (O'Leary 2000, 153.)

4.5 ERP implementation success and why it is critical

Companies can obtain a number of benefits through successful ERP implementation. On the contrary, the project can be a catastrophe for those companies that fail to manage the implementation process (Holland & Light 1999, 30.) Hence, the arising problem is to discover what characteristics define a successful ERP implementation.

Previous research studies show that the definition and measurement of the ERP adoption success is a thorny issue. According to Samiaah et al. (2010, 3), Atkinson (1999) proposes 'the triangle model' for project success. His model consists of three factors in each angle, namely *time*, *cost* and *quality*. However, these basic criteria have been criticized because of being inadequate.

According to Esteves (2004, 37), some authors indicate that success depends on the viewpoints from which one measures it. For example, on time and within budget are often the success measurement of project managers and implementation consultants. However, business managers and end-users tend to focus on having a smooth transition to stable operations with the new system, achieving intended business improvements like inventory reductions, and gaining improved decision support capabilities.

More generally, according to Ifinedo (2008, 554), Ifinedo (2006a, b) and Ifinedo & Nahar (2006) proposed an ERP system success measurement model based on an extensive literature review and case studies. Their model includes system quality, information quality, individual impact, workgroup impact and organizational impact as presented in figure 7 below. In this thesis, the author adopts the viewpoint of Ifinedo and Nahar.

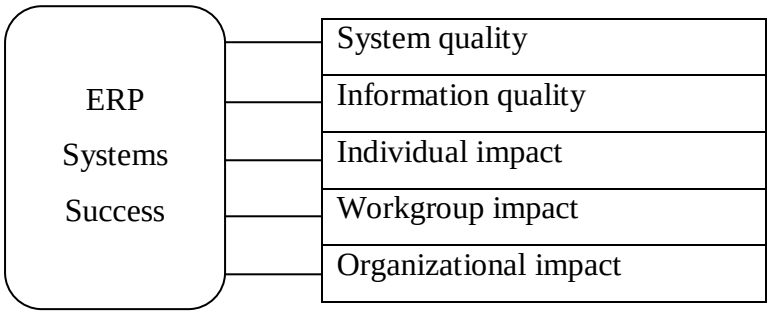


FIGURE 7. ERP implementation success model (Ifinedo 2008, 554).

All in all, ERP systems are commercial software packages that may cover all activities of an organization. Since the system touch many aspects of a company's internal and external operations, its successful deployment and use are critical to its performance and survival. In some unsuccessful cases, the ERP project led them to bankruptcy proceedings and litigations (Bicknell 1998, 3).

Moreover, implementing an ERP system is expensive, complex and too risky. In fact, 65% of executives believe that ERP systems have at least a moderate chance of hurting their business because of the potential for implementation problems (Umble & Umble 2002, 26). Despite of experiencing in information system (IS) implementation, those companies planning for the ERP project should take care of all aspects that may occur during the implementation stage.

5 REVIEW ON CRITICAL SUCCESS FACTORS IN ERP ADOPTION

This chapter provides some background information in the areas of CSFs in ERP adoption. Firstly, some definitions of CSFs are given. Then, theirs findings in literature are reviewed. Next, conceptual framework is illustrated. Finally, CSFs are discussed for further analysis.

5.1 Critical success factors approach

Daniel (1961) was the first author developed the concept of critical success factors as a basis for determining the information needs of managers (Amberg et al. 2005, 2). The idea was then popularized by Rockart (1979) and has since been used widely to help businesses implement their strategies and projects. He defined that:

> *CSFs are the limited number of areas in which results, if they are satisfactory, would ensure successful competitive performance for the organization. They are the few key areas where things must go right for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period would be less than desired.*
>
> *(Rockart 1979, 85)*

He also summed up that CSFs are "areas of activity that should receive constant and careful attention from management*"*. According to Pinto and Slevin (1987), CSFs are "those factors which, if addressed, would significantly improve project implementation chances" (Pinto & Slevin 1987, 22). Peffers et al. (2003, 55) indicate that:

> *Senior managers have found CSFs to be appealing for IS planning because they help justify the development of strategically important new systems, the benefits of which may be hard to quantify*

In the context of ERP, CSFs for ERP adoption are defined as "factors or conditions that must be satisfied to ensure a successful ERP adoption" (Holland & Light 1999, 31; Finney & Corbet. 2007, 330).

In other words, identification of CSFs is essential for organization to achieve the mission and strategic goals of its business or project. Whereas the mission and

goals focus on the aims and what is to be achieved, CSFs focus on the most important areas and get to the very heart of both what to be achieved and how to achieve it.

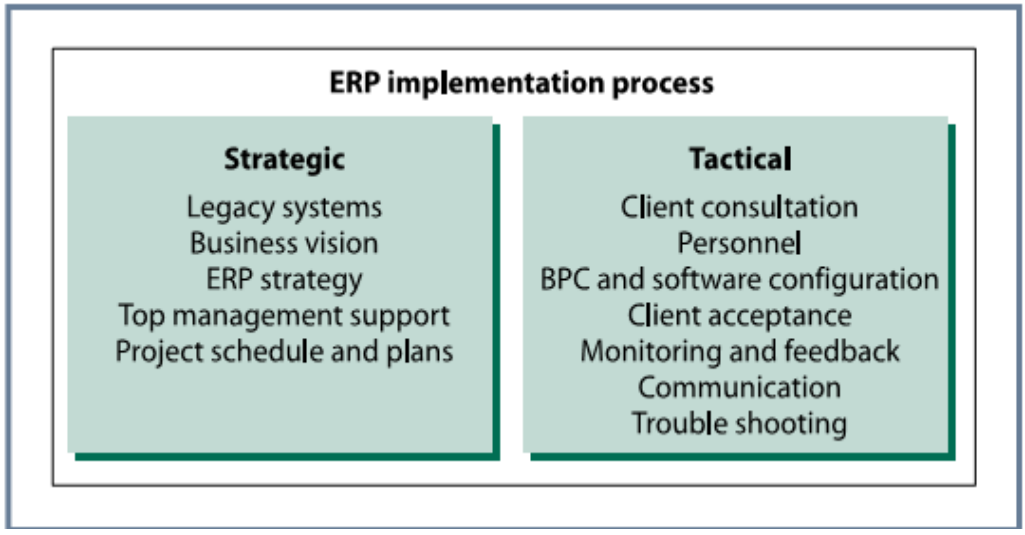
The term CSF was initially used in data analysis and business analysis. Since then, it had been used extensively by various areas. In information system (IS) discipline, this CSF method helps CEOs specify their own needs for information about issues that are critical to the organization so that systems can be developed to meet those needs. According to Williams & Ramaprasad (1998), "there is a great deal of attention devoted to the concept in the IS literature as many argue that the use of CSF can have a major impact on the design, development, and implementation of IS" (Williams & Ramaprasad 1998, according to Esteves 2004, 47).

5.2 CSFs for ERP adoption

ERP adoption is a process of great complexity, with many conditions and factors potentially affecting on the process. If these conditions are absent, they can generate some problems during adopting the new system. Therefore, it has been an increasing demand for research into the ERP success area, motivated by the high failure rate noticed on ERP adoption. (Somers, Nelson & Ragowsky 2000, according to Nah & Lau 2003, 6.)

Several authors have been studying the adoption process and its CSFs with the aim to enhance ERP adoption worldwide: Holland and Light (1999, 31), Shanks and Parr (2000, 299), Somers and Nelson (2001, 7), Nah et al. (2001, 295), etc. As a result, there have been many CSFs found in research studies. They represent different aspects of ERP adoption: people, technical issue, culture, management, communication, hardware and software. The common point is that many CSFs are interrelated; thus, missing out one factor can affect on others and the whole project. (Nah & Lau 2003, 9; Finney & Corbet 2007, 329.)

One of the most extensive studies is the model of Holland and Light (1999, 31). They conducted some case studies implementing ERP systems across a range of industries. Holland and Light proposed a CSF research framework where CSFs were grouped into strategic and tactical factors. Figure 8 presents their findings.



Note: BPC = Business Process Change

FIGURE 8. A critical success factors model with strategic and tactical factors (Holland & Light 1999, 31).

Using the responses from 86 organizations implementing ERP, Somers and Nelson (2001) described the importance of critical success factors across ERP life cycle. They summed up a list of 22 CSFs for ERP adoption. Five most important CSFs were: top management support, project team competence, interdepartmental cooperation, clear goals and objectives and project management. (Somers & Nelson 2001, 7.)

Finney and Corbett (2007) reviewed 70 articles and 45 articles were considered to contain success factors. Totally, 26 CSFs categories were found. Table 3 below summarizes their results. (Finney & Corbet 2007, 340.)

TABLE 3. Frequency analysis of CSFs in literature (Finney & Corbet 2007, 340).

Critical success factor	Number of instances cited in literature
Top management commitment and support	25
Change management	25
BPR and software configuration	23
Training and job redesign	23
Project team: the best and brightest	21
Implementation strategy and timeframe	17
Consultant selection and relationship	16
Visioning and planning	15
Balanced team	12
Project champion	10
Communication plan	10
IT infrastructure	8
Managing cultural change	7
Post-implementation evaluation	7
Selection of ERP	7
Team morale and motivation	6
Vanilla ERP	6
Project management	6
Troubleshooting/crises management	6
Legacy system consideration	5
Data conversion and integrity	5
System testing	5
Client consultation	4
Project cost planning and management	4
Build a business case	3
Empowered decision makers	3

Note: BPR = Business Process Reengineering

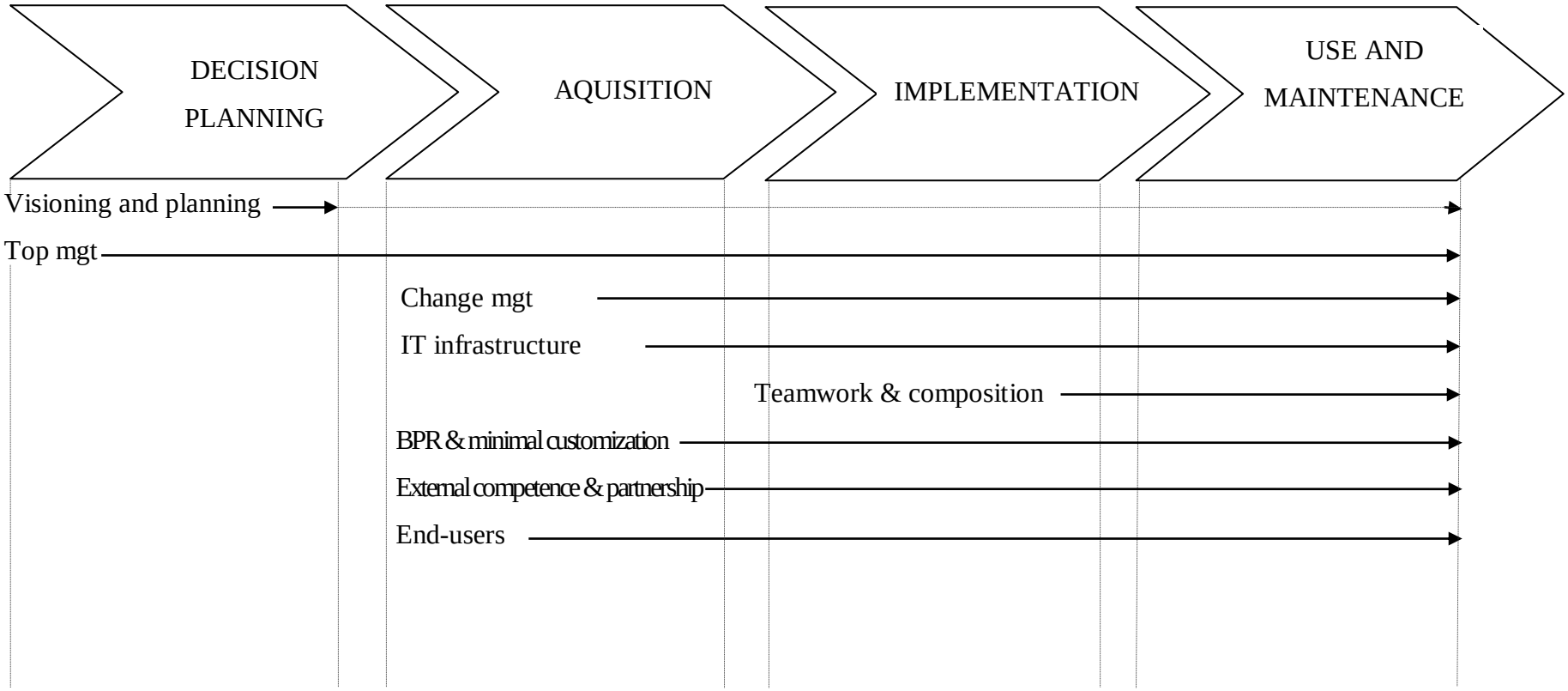
Through an extensive literature review, the author identified eight CSFs for further discussion and analysis in the case study: visioning and planning, top management support and commitment, change management, IT infrastructure, ERP teamwork and composition, BPR and minimal customization, external competence and partnership, and end-users: involvement, education and training. As can be seen, some CSFs were the combination of two or more CSFs above. Table 4 presented eight CSFs and their key authors in literature that the author adapted from Nah et al. 2001 and developed it based on his proposal.

TABLE 4. Review on CSFs for ERP adoption (adapted from Nah et al. 2001, 288).

CSFs / AUTHORS	Visioning and planning	Top management support and commitment	Change management	IT infrastructure	ERP teamwork and composition	BPR and minimal customization	External competence and partnership	End-users: involvement, education and training
Bingi et al. (1999)	X	X	X		X			X
Somers and Nelson (1999, 7)	X	X	X		X	X	X	X
Falkowski et al. (1998)	X		X		X			
Holland and Light (1999, 31)	X	X	X	X	X	X	X	
Nah et al. (2001, 289-293)	X	X	X	X	X	X		
Shanks and Parr (2000, 299)	X	X	X		X	X	X	X
Rosario 2000	X		X		X	X		
Remus (2007, 541-549)	X	X	X		X	X	X	X
Woo (2007, 439)		X	X		X		X	X
Francoise (2009, 381-387)	X	X	X		X		X	X

Note: BPR = Business Process Reengineering, IT = Information Technology

As different factors are important in different phases, it is necessary to classify the eight CSFs identified into the ERP adoption process. Figure 9 shows the classification of these factors into an integrated framework.



Note: Top mgt = Top management support and commitment; Change mgt = Change management; End-users = End-users: involvement, education and training.

FIGURE 9. Classification of CSFs in the ERP adoption process (adapted from Markus & Tanis's model 2000, according to Nah et al. 2001, 290).

5.3 Conceptual framework

The conceptual framework reveals the main objective of this study which examines the importance of 8 identified CSFs above to the success of the case's ERP adoption. This framework is shown in figure 10.

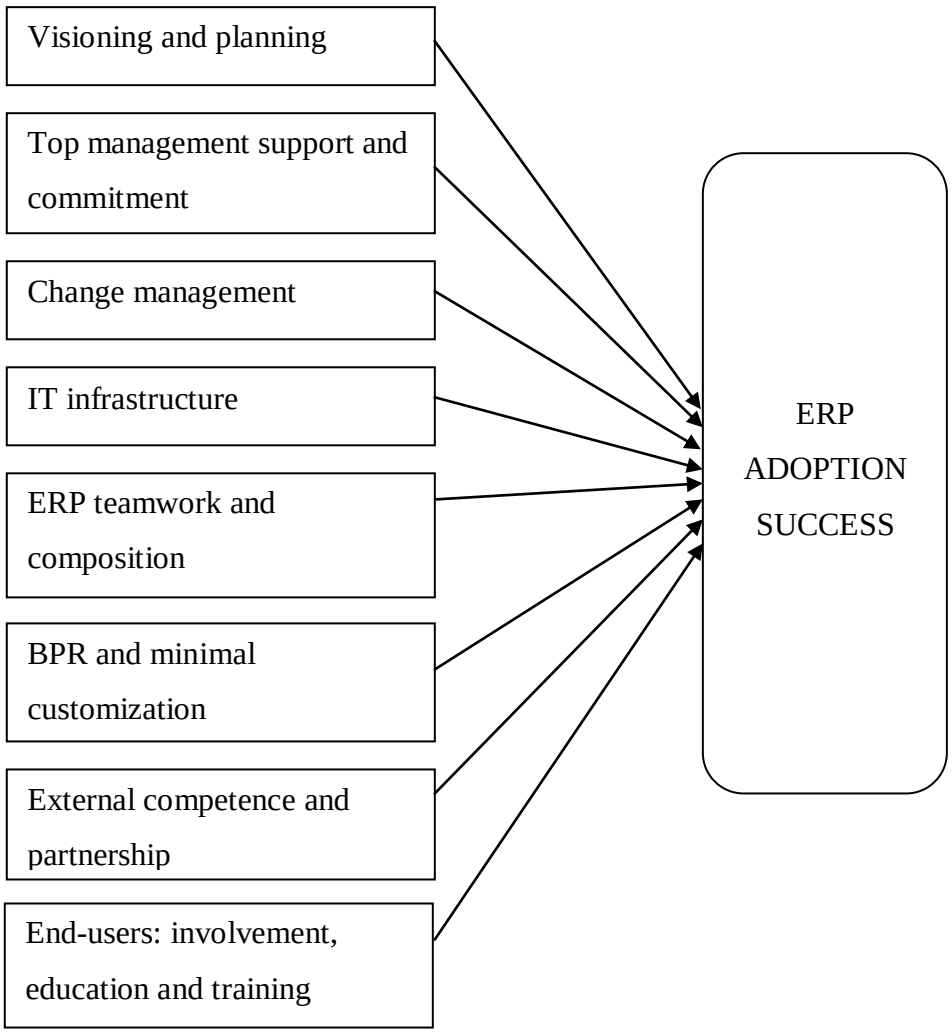


FIGURE 10. The conceptual framework (adapted from Thong et al. 1996, according to Ifinedo 2008, 554).

5.4 Discussions on identified CSFs

5.4.1 Visioning and planning

Visioning and planning is needed throughout the ERP adoption process. It is important to have a clear business plan and vision to steer the direction of the project. This plan should state strategic and tangible benefits, resources, costs, risks, and timeline. Besides, it is needed to have a clear business model describing how the company will operate after the implementation stage (Buckout et al. 1999, Holland et al. 1999, Wee 2000, according to Nah et al. 2001, 291.)

Additionally, business plan and long-term vision should determine goals and company's feasibility of the project. Furthermore, it must be defined as the company's most important project and all decisions made regarding it must be achieved consensus in advance from the whole management team (Collins 2001, according to Remus 2007, 542). Next, objectives must be specific to the scope of the project, the end-users need to be affected and the time line should be practical and formulated (Francoise 2009, 383).

Overall, the following characteristics for this factor can be summarized:

- A clear business plan and vision steer the direction of the project.
- Business plan should state strategic and tangible benefits, resources, costs, risks and timeline.
- A clear business model describes how the company will operate after implementation.
- Business plan and vision should determine goals and company's feasibility of the project.
- The ERP project is defined as the most important project.
- Objectives must be specific to the scope of the project, the end-users need to be affected
- Timeline should be practical and formulated

5.4.2 Top management support and commitment

Top management support and commitment is one of the two most widely accepted CSFs. This factor emphasizes the importance of support and commitment from top managers and senior managers who involve in the strategic planning and are also technically oriented. (Yusuf et al. 2004, according to Finney & Corbett 2007, 335.)

Top management support and commitment is needed throughout the ERP adoption process because the project must receive approval and align with strategic business goals. Top managers must commit themselves to involve in the project for allocating the required personnel resource for implementation and giving appropriate time to finish the job. A share vision of the company and the role of the new system and structures should be communicated between managers and employees. Moreover, top managers should be the persons to harmonize any conflicts between internal and external parties. (Bingi 1999, Buckhout 1999, Sumner 1999, Roberts & Barrar 1992, according to Nah et al. 2001, 291.)

Top management should not entrust their duties of ERP implementation to their technological departments because it is more than a technological challenge. Project planning, forming the project team, choosing the ERP package and the ERP implementer, the project sponsor and supervisor are among the duties that can only be done by top managers. (Woo 2007, 435.)

The following characteristics for this factor can be summarized:

- Highly support and approval from top management is required during the adoption process.
- Top management should not entrust the tasks in the ERP implementation.
- Top managers must commit to involve in the project and allocate the required personnel resources.
- Top managers should be the persons to harmonize any conflicts between internal and external team members.

- The new company's structure and roles should be communicated to employees.

5.4.3 Change management

Change management is the other most widely accepted CSF. Implementing an ERP system also means there will some changes in company. Change management is a method or procedure to manage the transition from using old systems to adopting new ones effectively. In ERP adoption, this factor refers the need for a company and its employees ready for changes. Specifically, a company should formally prepare as soon as possible a change management program to deal with the complex organizational problems of employees' resistance, confusion and redundancies, and errors regarding to the new system. Top managers can inform employees about the new project in early stages or build user acceptance through education about the benefits and need for an ERP system in order to get positive attitudes towards it. Change program should cover end-users involvement and training in the implementation stage and they must be regularly supported from top management or implementation team. The project planning must be looked upon as a change management initiative not an IT initiative. (Aladwani 2001, 269; Remus 2007, 541; Nah et al. 2001, Abdinnour-Helm et al. 2003, Ross & Vitale 2000, Kumar et al. 2002, Wood & Caldas 2001, according to Finney & Corbet 2007, 336; Francoise 2009, 382.)

Moreover, managing cultural change is considered a subcategory of change management. It is critical to pay attention to the cultural differences and preferences in each company and its country such as language & culture, government regulations, management style, time zone and labor skills. Management commitment and support is the crucial factor to ensure the necessary conditions for effective change brought by the ERP project into the company. (Aladwani 2001, 272; Sheu et al. 2003, according to Sheu et al. 2005, 2; Finney & Corbet 2007, 336)

The following characteristics for this factor can be summarized:

- A company and its employees should be ready for changes.
- A company should inform its employees about the project in advanced.
- Change program should cover end-users involvement and training in the implementation stage and they must be regularly supported.
- The project planning must be looked upon as a change management initiative not an IT initiative
- Change program must manage cultural changes.

5.4.4 IT infrastructure

The issue of IT infrastructure is one of the reasons for high failure rate of ERP adoption. Therefore, it is critical to evaluate company's current IT readiness, including architecture and skills, before implementation. Since ERP implementation involves a complex transition from legacy systems and business processes to an integrated infrastructure and common business process throughout a company, it is necessary to upgrade or revamp the poorly current IT infrastructure. (Huang et al. 2004, according to Woo 2007, 432; Siriginidi 2000a, b, Somers & Nelson 2001, Tarafdar & Roy 2003, Somers & Nelson 2004, Bajwa et al. 2004, according to Finney & Corbet 2007, 338.)

The following characteristics for this factor can be summarized:

- IT infrastructure must be evaluated beforehand so that it satisfies the requirements of the ERP system.

5.4.5 ERP teamwork and composition

This is another widely cited CSF in literature review since ERP project is a big project in a company and it may involve all functional departments in that company. The project team must contain a mix of internal and external staffs so that internal staffs can develop technical skills for design, implementation and later usage. The internal staffs should be a mix of technical, business experts and end-users from different business units in company. Moreover, they should be balanced and key staffs in the company. Further, the project team should be

empowered in decision making for continuous implementation progress. External staffs should contain well-known ERP implementers, vendors and consultants. (Falkowski et al. 1998, Bingi et al. 1999, Buckhout et al. 1999, Rosario 2000, Shanks et al. 2000, Wee 2000, according to Nah & Lau 2003, 12; Finney & Corbet 2007, 337; Woo 2007, 436.)

Besides, the project team must be dedicated to work full time on the project. Therefore, they need to be supported, encouraged, and rewarded to maintain high enthusiasm during implementation. Communication among various parties is also vital and need to be managed by regular meetings or seminars. (Nah & Lau 2003, 12; Alexis Leon 2008, 542.)

Additionally, project manager appointed should be experienced, mix of business and IT knowledge, strong leadership skills and have adequate authority to manage all aspects of the project. Besides, the project manager must be mix of technical, business and change management requirements. It is also important that he must understand the company's business process. A competent project manager has crucial role in ERP implementations (Nah & Lau 2003, 18; Remus 2007, 544; Woo 2007, 436; Francoise 2009, 381.)

The following characteristics for this factor can be summarized:

- The project team should be mix of internal and external staffs.
- Internal staffs should be mix of cross-functional key staffs and should have both business and IT skills.
- The project team should be empowered to do the tasks.
- The project team should be dedicated to the project.
- The ERP team should be given compensations and incentives.
- Good communication among team members.
- The project manager should be experienced, mix of business and IT knowledge, strong leadership skills and have adequate authority.

5.4.6 BPR and minimal customization

A process is “a lateral or horizontal organizational form that encapsulates the interdependence of tasks, roles, people, departments and functions required to provide a customer with a product or service”. A business process is “comprised of the people who conduct it, the tools they use to assist them, the procedures they follow and the flows of material and information between the various people, groups and sub-activities”. Business process includes operational and infrastructure process. Operational process refers to business functions such as product development, order management, and customer support whereas infrastructure process is more administrative including establishing and implementing strategy and managing human resources or physical assets. (Earl 1994, 13; Tjaden et al. 1996, according to Pastor et al. 2002, 2; Olson 2004, according to Yingjie 2005, 27.)

According to Hammer & Champy (1993), BPR is “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed” (Hammer & Champy 1993, 32). The importance of BPR is to create the best way of doing business, so it changes the way of working of a company. Kale (2000) emphasizes “the most important outcome of BPR has been viewing business activities as more than a collection of individual or even functional tasks; it has engendered the process-oriented view of business” (Kale 2000, 132). To be clear, the company’s business strategy indicates *what* it wants to do, BPR indicates *how* to do it and the ERP system answers the question *with what*. There are several modeling techniques used in BPR process: data flow oriented methods (dataflow diagrams, flowcharts), object oriented methods (use case diagram, state chart diagram, and activity diagram) and control flow oriented methods (swimlane diagrams) (Weske 2007, 347).

ERP systems provide best practices in doing business for industry domains, not for a specific company. Therefore, many companies consider customizing the ERP software to fit its business characteristics or even to its business processes.

In literature, BPR and minimal customization is the third most commonly cited CSF. In order to obtain full benefits of ERP implementation, it is advised to reengineer the existing business processes to best practices integrated on the system. Firstly, the ERP system itself can not improve the company's performance without reengineering the current business process. Another reason is that modification of the software will cause some problems including software license cost, code errors, maintenance and difficulty in upgrading to newer versions and releases. Once the ERP system is in use, BPR should be continued with new ideas and updates to get full benefits of the system. All in all, company should be willing to change its business processes to fit the software in order to minimize the degree of customization needed. (Bingi et al. 1999, Holland et al. 1999, Murray & Coffin 2001, Roberts & Barrar 1992, Shanks et al. 2000, according to Nah & Lau 2003, 11; Finney & Corbet 2007, 338; Francoise 2009, 384.)

The following characteristics for this factor can be summarized:

- Doing BPR and aligning the business processes with the ERP software.
- Doing minimal customization to the software.

5.4.7 External competence and partnership

Due to the complexity of implementing an ERP system, it is necessary for company cooperate with the ERP consultant except the ERP implementer and the ERP vendor. The ERP consultant or advisory firm should be involved as soon as company realizes its needs for ERP project. The role of ERP consultants is to consult company in defining new business process and choosing the suitable ERP package. Therefore, the consultant should have multiple skills covering functional, technical issues and in-depth knowledge of the software. Three external parties above should be professional, experienced to provide know-how knowledge and training for internal staffs. The most important thing is to ensure external parties to involve in different stages of the ERP project. Further, it is essential for company to manage its partnership well. Many researchers emphasize the importance of external competence and partnership. (Guang-hui et al. 2006, 558; Trimmer et al. 2002, Bajwa et al. 2004, Kraemmergaard & Rose

2002, Al-Mudimigh et al. 2001, Bingi et al. 1999, Skok & Legge 2002, Kalling 2003, Willcocks & Stykes 2000, Motwani et al. 2002, according to Finney & Corbet 2007, 338; Francoise 2009, 387.)

The following characteristics for this factor can be summarized:

- The ERP consultant should have multiple skills covering functional, technical issues and in-depth knowledge of the software
- External partners should be experienced and professional.
- External partners should involve in different stages of the ERP project.
- Company need to manage external partnership well.

5.4.8 End-users: involvement, education and training

It is definitely essential for the success of ERP adoption. End-users should be involved in early stage of design and implementation to improve user requirements and understand the new system as well as give feedback from their own point of views to enhance system quality. Since the end-users understand the ideas of new system sooner, they will have positive attitude; their resistance to the new system will be reduced; and training is more easily accepted. Moreover, end-users involvement is helpful in the ERP configuration analysis and in data conversion as well as in system testing. (Pastor et al. 2004, 131; Yingjie 2005, 37; Finney & Corbet 2007, 342; Francoise 2009, 387.)

The aim of education and training for end-users is to help them they gradually get used to new working habits behind the new system. In other words, they should be educated new business processes and know how to use the system properly. Hence, there should have an appropriate plan for training facilities and budget to ensure effective and continuous training for existing end-users and newcomers. Internal IT department and external staffs should play the main role in education and training. Education and training should be a carried out seriously and end-users are supported during training program. Further, management needs to consider how to allocate end-users after the ERP implementation stage. (Yingjie 2005, 34, Finney & Corbet 2007, 339.)

According to Yingjie (2005, 35), some difficulties in users training are the diversity of the users (IT skills, age), the complexity of the new systems (interfaces, functions) and different available training methods (web-based virtual training, computer-based training, and video courses).

The following characteristics for this factor can be summarized:

- End-users should be involved in early stage of design and implementation.
- End-users should be educated new business processes and know how to use the system properly.
- There should have an appropriate plan for training facilities and budget to ensure effective and continuous training for existing end-users and newcomers
- Education and training should be a carried out seriously and end-users are supported during training program.
- Management needs to consider how to allocate end-users after the ERP implementation stage.

6 CASE STUDY

6.1 Company background

According to Euromonitor, a global market research company specializing in industries, countries and consumers, Vinamilk is the leading manufacturer of dairy products in Vietnam. In 2010, its products had 39% of market share, ranging from core dairy products such as liquid and powdered milk, to value-added dairy products such as condensed milk, drinking and spoon yoghurt, ice cream, and cheese. Since commencing operation in 1976, Vinamilk have grown strongly with compound annual growth rate of 7% and now it was producing 570,406 tons annually with more than 4000 employees.

In 2010, Vinamilk had gross sales of 575 million US dollars, and net income of 129 million US dollar and, its market value accounts for 1.56 billion US dollar. The company has also been designated as both a Famous Brand and one of the Top 100 Strongest Brands in Vietnam.

6.2 ERP project description

The ERP project of Vinamilk was started from 15th of March 2005 to 1st of January 2007 and total investment was 3.6 million US dollar including hardware upgrade, software and other costs. The success criteria used was good system quality, information quality and impact on individual employee, single department that Oracle is implemented and the whole company. Figure 11 illustrates the implementation success measurement applied to Vinamilk.

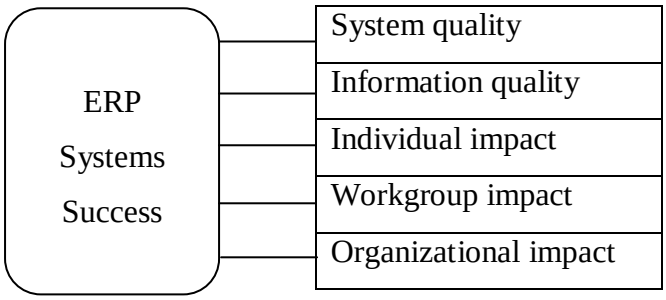


FIGURE 11. ERP implementation success applied (Vinamilk 2011).

For implementing the Oracle EBS system, there were three companies cooperated with Vinamilk: the ERP implementer – Pythis, the ERP vendor – Oracle, and the sole advisory firm – KPMG. After considering a number of different ERP packages, Vinamilk chose to implement the following main applications of Oracle E-Business Suite:

Financial and accounting management

- General Ledger
- Fixed Assets
- Accounts Payable
- Accounts Receivable
- Cash Management

Manufacturing management

- Material Requirements Planning/ Master Production Scheduling
- Work In Process
- Bill of Material
- Quality Management
- Cost Management

Supply chain management

- Purchasing
- Order Management
- Inventory

Business intelligence (BI): analytic and reporting capabilities.

6.2.1 Decision planning phase

In the late 1990s and early 2000s, Vinamilk experienced a high growth period (25% growth rate during 1998 - 2004.) However, Vinamilk's top management recognized that the old systems were not able to deal with the rapidly increasing production. Mr. Tran, IT manager of Vinamilk, shared in the interview:

> *IT modernization was an indispensable issue in long-term business strategy of Vinamilk. Two previous systems, manufacturing and distributing, could not ensure to provide timely and exactly information for processes of manufacturing, managing redundant goods in inventory and marketing. Therefore, top management came to realize the need to implement ERP system to solve these problems.*
>
> *(Mr. Tran 2011).*

Besides, the ERP adoption was desired to help to improve competitive advantage and management once Vietnam joined WTO. Ms. Ngo, vice president of Vinamilk, added:

> *In 2003, Vietnam was negotiating to join WTO. The company's strategy was to standardize IT systems, business processes and restructure the company in order to improve the company's competitiveness. Implementing ERP would support our employees and centralize information from business activities, so that making decision and planning business strategy would be carried out faster and more efficient.*
>
> *(Ms. Ngo 2011).*

Accordingly, on January 2004 Vinamilk required assistance of KPMG, a global network specializing in providing Audit, Tax and Advisory services, to consult the company in implementing the new ERP system. A feasibility analysis and initial BPR was made. The feasibility analysis investigated the requirements of the new system including technology, costs, personnel resource and anticipated some impacts in work processes throughout the company. The aim of BPR was to define new business processes that Vinamilk would comply with. An initial expectation of benefits was also made clear. Vinamilk's top management hoped to obtain benefits such as standardizing IT infrastructure, information integration, reducing manufacturing costs, real time management, increasing efficiency and effectiveness in operations, improving competiveness.

6.2.2 Acquisition phase

Through investigating current IT infrastructure, Vinamilk found that it could not meet the requirements of the new ERP system. On March 2004, a huge investment of 2.5 million US dollar was put on upgrading IT infrastructure. Vinamilk selected IBM to provide solutions for data centers, host computer system, storing system, recovering system and software of application management.

In the middle of 2004, Vietnam was in the last negotiations to join WTO. Vinamilk's managers realized that it was appropriate time to initiate the project and in addition, the preparations were ready.

In first step, the company formed an acquisition team and named it "VIERP2004". Ms. Ngo was put in charge of the project effort. Other members consisted of managers of different departments in the company: IT, finance, accounting, logistics, manufacturing, sales and research & development and the representatives of KPMG. The task was to investigate, evaluate and choose the ERP package that most suitable with company's IT infrastructure and needs. An ERP implementer was selected based on experience in implementing ERP systems, its partners, and its quantitative, qualitative resources.

A short list of ERP implementers were chosen, contacted, and asked to prepare a demo for the "VIERP2004" team. In final results, the acquisition team chose to implement 4 application modules of Oracle E Business Suite 11i with the support of Pythis – the ERP implementer (implementing tasks, consulting, training, etc), Oracle – the ERP vendor (technical issues.) On 15th of March 2005, an official contract for implementing the Oracle EBS system was signed by Vinamilk and Pythis.

6.2.3 Implementation phase

Staffing project team

During implementation period, Vinamilk formed two primary teams. First, the steering committee was headed by Ms Ngo Thi Thu Trang and included managers of all departments in the company as well as the representatives of KPMG. Second, a 100-person project team consisted of members from IT department and several of each business unit's key employees. In that team, there were twenty operators focusing on inputting information. The project members were removed from their daily duties and worked on the project full time. They were divided into 4 sub-teams for different tasks in condition that each sub-team had cross-functional members. External resource included 20 persons from Pythis, 5 persons from KPMG, 8 persons from Oracle. Ms Ngo Thi Thu Trang was continuously the project supervisor. Mr. Tran Nguyen Son was appointed for the project manager position. He had more than ten years working for Vinamilk and experienced in implementing several IS and ERP projects (co-operating contracts with other companies.) Overall, the project team consisted of 150 persons.

Implementation plan

The project was officially initiated on 15th of March 2005. A clear project plan was developed based on clear project goals, scope, timeline, budget and personnel. It was planned to take 22 months to implement the system completely. Initial investment excluding IT infrastructure upgrade was nearly one million US dollar. All risk factors and contingency plan were also defined. The plan also stated incentive policies for the project team. There were four modules to be implemented: financial and accounting management, manufacturing management, supply chain management and BI. The scope was to implement the system in thirteen different locations: the headquarters of Vinamilk, inventories and its factories throughout the country. Table 5 below summarizes the implementation plan for the Oracle EBS system.

TABLE 5. Plan for implementing the Oracle EBS system of Vinamilk (Vinamilk 2011).

FACTOR	PLAN
Modules to be implemented	4
Total investment ($)	$ 1 M
Implementation duration	21 months
Project members	150
Scope of implementation	13 locations

Implementation approach

In order to implement the Oracle EBS, the phased approach was used. As Mr. Tran explained:

> *It was too difficult to implement the Oracle system in thirteen different locations at once. Some factories were located in Ha Noi and other provinces while the headquarters of the company was in Ho Chi Minh City. In addition, we could go back to use the old systems in case the new system would not function well.*
>
> *(Mr. Tran 2011)*

In the beginning, the sub-module of supply chain management was implemented for logistic department. Manufacturing management, financial and accounting management and BI were then implemented.

BPR and customization

Since Vinamilk planned to reengineer of its business processes extensively, 'as-is' analysis was not necessary to be done. Instead, there was little change in software code to ensure the system satisfy the Vietnamese financial and reporting regulations. Project team tried to align business processes most suitably to the system. By using business process modeling techniques, new business processes were illustrated by Unified Modeling Laguage (UML) diagrams. Figure 12 below illustrates an example of collecting money process (through banks, cash) in sub module accounts receivable in the module finance and accounting management.

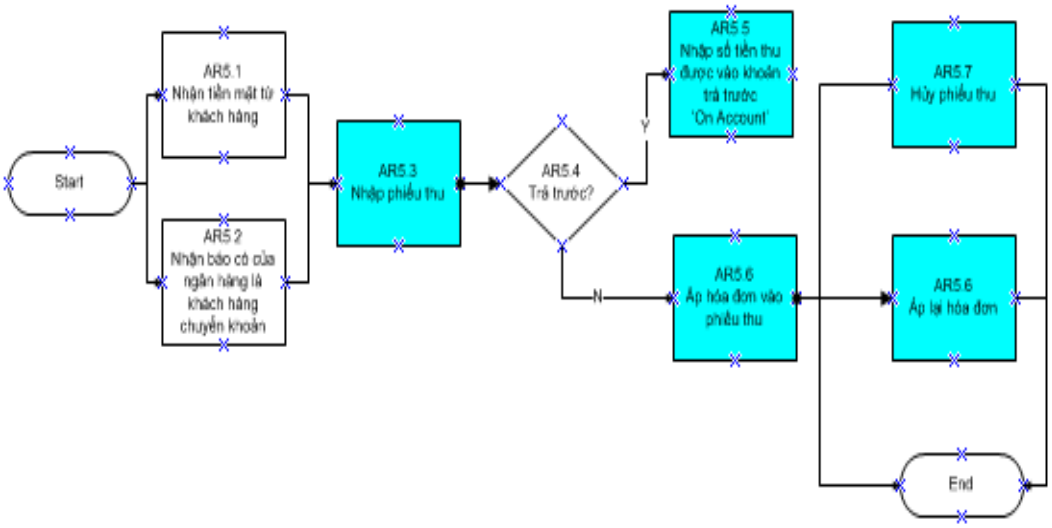


FIGURE 12. Collecting money process in the accounts receivable module of the Oracle EBS system (Vinamilk 2011).

Creating master data and report format

Master data was the key business information. In the case of Vinamilk, it included customers, suppliers, distributors, products, employees, username, responsibility and approve hierarchy (contractual approval). Besides, Pythis had to create over 300 new reporting formats for accounting, financial, inventory, ordering, purchasing, etc. All reporting formats must be complied with all regulations of the Ministry of Finance, the Socialist Republic of Vietnam

Set up application, configuration and integration

Each sub module was set up and configured for suitable working environments of end-users. The interfaces of input were kept in English but outputting interfaces were changed into Vietnamese. Then, all modules were integrated. The job firstly faced a lot of troubles in linking some modules.

Testing

After fixing problems in integrating modules, trial runs were carried out based on several test scripts or test cases. Later, new systems were run in parallel with old ones to compare their outputs. Integration test was also performed to ensure all

modules function well. The test phase had strongly support from Oracle technical staffs.

Go live

On 1st of January 2007, Vinamilk claimed that the Oracle EBS system went 'live' and functioned smoothly. Table 6 below summarizes the actual results after implementing the Oracle EBS system successfully.

TABLE 6. Actual results after successful implementation (Vinamilk 2011).

FACTOR	RESULTS
Modules to be implemented	4
Total investment ($)	$ 1.1 M
Implementation duration	21.5 months
Project members	150
Scope of implementation	13 locations
Status	Completion

Education & training

Before the implementation date, all employees had been informed about the event so that they would not be astonished. Top management also prepared the budget for substantial training. 22-month implementation schedule contained 7 weeks of main training. All employees (even IT staff) based on their departments were alternatively trained to use new system and educated new processes. IT department had responsibility of supporting users. Mr. Tran emphasized the importance of training:

> *Education and training were important issues in implementing new system. Local managers were not allowed to pull employees from training despite of what business problem arose. The users must master all manipulations relating to their job.*
>
> *(Mr. Tran 2011)*

Data conversion

This was important task required for the migration from old systems to the Oracle EBS system. Twenty operators were appointed to input the data based on master data created already. Their jobs were rechecked to ensure high quality data.

Implementation challenges

Ms. Ngo, project supervisor, indicated some obstacles in implementing the system: "During implementing process, the company faced many obstacles. One of the main ones related to acquire new knowledge and to adapt with new processes."

Mr. Nguyen, manager of Pythis, also shared some experience obtaining from this project:

> *The main challenges came from implementing the system at thirteen different locations which were far from each others, and the software interface was in English. It required a lot of training so that employees could manipulate their tasks easily.*
>
> *(Mr. Nguyen 2011).*

6.2.4 Use and maintenance phase

From Vinamilk's documentation, the Oracle EBS system was fully functioned on 1st of January 2007. The system has been maintained regularly in three months. User training continued to be done.

After five months in using new systems, benefits were realized. Some main benefits below were summarized from interviews and Vinamilk's documentation:

- Improving productivity of manufacturing, sales, finance, purchasing, accounting and ordering by 20%.
- Reducing work in process by 40%.
- Operational reports were processed much faster. After implementing the Oracle EBS system, monthly statement preparation was reduced from 30 days to 3 days.

- Real-time management and data accuracy were realized
- Improving gross margin by 10% of total sales
- IT staffs obtained a lot of knowledge and experience.
- In accounting, the system helped to minimize risks. With obvious decentralization, operations in accounting and finance were more smoothly than previous.
- IT infrastructure was synchronized, standardized and strengthened.

6.3 CSFs analysis

Based on interviews, project's documentations and literature review, the proposed CSFs are going to be analyzed to check how they were managed and how they influenced on the adoption of the Oracle EBS system. For each factor analysis, there is a table to present summarized characteristics according to the required data in theories.

6.3.1 Visioning and planning

Overall, top managers and Pythis president emphasized the importance of visioning and planning while most of employees were unsure about its influence on the success of the project. They knew that there was a plan to implement the system but, they could not had chance to see how clear and detailed it was.

TABLE 7. Factor 1– Visioning and planning.

Visioning and planning	Evaluated
A clear business plan and vision steer the direction of the project	+/+
Business plan should state strategic and tangible benefits, resources, costs, risks and timeline	+/+
A clear business model describing how the company will operate after implementation	+/+
Business plan and vision should determine goals and company's feasibility of the project	-/+

ERP is defined as the most important project	-/+
Objectives must be specific to the scope of the project, the end-users need to be affected	-/+
Time line should be practical and formulated	+/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

According to Mr. Tran (2011), visioning and planning were really important for any project, not only for IT project specifically. This factor contains a set of prerequisite activities that would influence to other activities in later stages. Specifically, Vinamilk's top managers had clear determination of the scope for the implementation, its corresponding budget and personnel resources and, time of readiness for implementation. With clear scope for the implementation, the ERP package was selected suitably. As ERP project was initiated, we had clear plan with all specified goals and objectives of project, costs and budget, timeline and specified resources, and contingency plan for managing risks factors. The planned budget also covered training for both current employees and new employees. Since a project was envisioned and planned carefully, risks were lessened and thus, increasing the ability of success.

After decision for adopting the ERP system had been made, a business plan was created to outline some strategic benefits, resources, costs, risks, timeline and new processes that Vinamilk should operate behind the ERP implementation. This plan steered the direction of the project and thus, it was important to the success of our project. (Ms. Ngo 2011.)

Additionally, visioning and planning were practical and detailed to ensure that all the tasks were under controls. In most of failed ERP projects previously, there were some cases where timeline for project completion was set so optimistic, or even unrealistic and leading to extend implementing period. This meant more jobs, more costs and less enthusiasm. Visioning and planning also referred to expectations of top managers on the system. The higher they expected on the system, the more risky the project had. Vinamilk was not in those cases and it contributed to the success of the project. (Mr. Nguyen 2011.)

6.3.2 Top management support and commitment

TABLE 8. Factor 2 – Top management support and commitment.

Top management support and commitment	Evaluated
Top management should not entrust the tasks in the ERP implementation.	+/+
Highly support and approval from top management is required during the adoption process.	+/+
Top managers must commit to involve in the project and allocate the required personnel resource	+/+
Top managers should be the persons to harmonize any conflicts between internal and external team members	+/+
New company's structure and roles should be communicated to employees	-/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

All respondents did agree that top management support and commitment was so critical to the success of Vinamilk's project. Firstly, it was noticed that in early steps of the implementation, a steering committee group was formed to direct the implementation process. Ms Trang noted: "to ensure successful implementation, in addition to spend money, you had to take care of the details". Besides the support of outside partners, top managers of Vinamilk created best conditions for project team to do their jobs. The company had clear plan for personnel, costs and incentive policies. In Vinamilk, there was a high support and approval from top management. All changes during and after the project were informed to all Vinamilk's employees.

Top management support and commitment was considered the most important factor for the entire ERP project life cycle because only top managers could make decisions for main issues such as planning for project, budget, time plan, the ERP vendor and consultant selection and personnel resources. Vinamilk's top managers usually paid special attention to the project and gave instant support to

any problems occurred and infused enthusiasm into all team members. Once there was a conflict between internal and external parties, top managers played an intermediary role to harmonize the atmosphere. Moreover, allocating personnel resource was also a thorny issue for top managers. Normally, implementing an ERP system required a great numbers of personnel resources and when the system was implemented already, how they would be allocated? (Mr. Nguyen 2011.)

6.3.3 Change management

TABLE 9. Factor 3 – Change management.

Change management	Evaluated
Company and its employees should be ready to changes.	+/+
Company should inform its employees about the project in advanced.	+/+
Change program should cover end-users involvement and training in the implementation stage and they must be regularly supported.	+/+
The project planning must be looked upon as a change management initiative not an IT initiative.	-/+
Change program must manage cultural changes.	+/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

ERP implementation also meant that there would be surely a significant impact on the whole company, from processes, procedures to all employees and departments. Hence, Vinamilk tried to execute different strategies for all employees to get familiar to oncoming changes. Firstly, Vinamilk informed all the employees that the company was going to implement the system. Later, seminars were held for them to get to know about the new system, its benefits to the company and to themselves and how their normal habits in doing their jobs would be changed. This preparation not only prevented employees' resistance to the system, but also developed strong feelings toward accepting and adopting it. Secondly, the employees were put into hands-on training where they had a chance to get real experience about the quality attributes of the system and its potential

benefits. Lastly, there were two advantages for end- users to participate in the implementation process. On one side, they understood the system sooner; the training was therefore more easily accepted. On the other side, they feel that they had important role in the project and this ensure their valuable commitment. As a result, most of the employees and the departments had been doing their good jobs in new system. (Ms. Ngo, 2011.)

Change management also referred to manage cultural issues. ERP systems were designed by western countries and it worked based on their culture – a professional style. The challenges for most of Vietnamese companies were weak management, so detailed processes and traditional working habits. ERP systems required close and accurate process, and this usually troubles the employees. Through seminars and training, Vinamilk gradually helped the employees adapt and master the new system. (Mr. Nguyen, 2011.)

6.3.4 IT infrastructure

TABLE 10. Factor 4 – IT infrastructure.

IT infrastructure	Evaluated
IT infrastructure must be evaluated beforehand so that it satisfies the requirements of the ERP system.	+/+

+/+ = Mentioned as a factor

IT infrastructure modernization was considered important factor for the project's success by all respondents. Once the system was implemented, all information would be integrated. Therefore, hardware system must ensure for storing such huge data and its processes. Besides, internet networks should be stable, fast and high secure. Due to those requirements were satisfied, it would be much advantageous to the implementation stage and use and maintenance stage. Specifically, there had been no breakdowns occurred and implementation time was reduced. The remaining issue was to train people to learn how to operate it smoothly. Vinamilk equipped main data center and another one for backup. Each possessed the current latest IBM server – IBM System p, p meant high

performance – and storage system IBM DS8100 having capacity 10 terabytes, weight of 1 ton. (Mr. Tran, 2011.)

A synchronized and standardized IT infrastructure was so important before initiating the project. This could be compared with building a new house where IT infrastructure was the base and the remaining tasks were to install and to configure the software to best fit that base. (Mr. Nguyen, 2011.)

6.3.5 ERP teamwork and composition

TABLE 11. Factor 5 – ERP teamwork and composition.

ERP teamwork and composition	Evaluated
The project team should be mix of internal and external staffs.	+/+
Internal staffs should be mix of cross-functional key employees and should have both business and IT skills.	+/+
The project team should be empowered to do their tasks.	-/+
The project team should be dedicated to the project.	+/+
The ERP team should be given compensations and incentives.	+/+
Good communication among team members.	+/+
The project manager should be experienced, mix of business and IT knowledge, strong leadership skills and have adequate authority.	-/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

Another widely agreed factor that impacted on the success of the implementation is ERP teamwork and composition. In addition to IT infrastructure, the issue of personnel resource preparation had been initiated soon. Those employees potentially chosen for the project would be handed over their tasks to juniors or coworkers to ensure normal operations during the implementation period and team members could work full time on the project. Incentive policies were also

given to project team to encourage them working more positively on the project. (Ms. Ngo 2011.)

Internal team members were staffed from key employees of cross-functional departments, so they could share information to other departments and prevent any conflicts during implementation. This communication was important because all four modules implemented were integrated closely. If there was a little change in one module, it would affect the others. Besides, these key players would be crucial factors in user training, and controlling new system in future. Overall, all respondents mentioned that team members were a mix of experienced business and technical staffs, could flexible for changes.

Project team also contained external staffs – Pythis, Oracle and KPMG. Their roles were no doubt important to provide training, knowledge to internal staffs, so that they could master the new system after finishing the project.

Project manager was the most important member in project team. Mr. Tran had experienced in participating in different IS projects in Vinamilk and cooperating projects. In addition, he had worked for Vinamik for many years, so he was so familiar with the company's processes.

According to Mr. Nguyen (2011), Vinamilk assigned a balanced and specialized project team member. IT staffs were hard-working, professional and positive working attitude. In many case companies, their managers thought that the duties of implementation by default belonged to ERP implementers. They simply bought the software and hired implementers and later, they would have new system in a next few months. As a result, those projects could not be carried out.

6.3.6 BPR and minimal customization

TABLE 12. Factor 6 – BPR and minimal customization.

BPR and minimal customization	Evaluated
Doing BPR and aligning the business processes with the ERP software.	+/+
Doing minimal customization to the software.	+/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

Another factor got common opinions from interviews was BPR and minimal customization. Firstly, the importance of BPR was to define new business processes for Vinamilk in the early decision planning phase and from that point, the Oracle EBS system was selected as the best fit with the requirements. Then, by using business process modeling tools BPR helped to diagrammatize the new process and most of respondents said that BPR was the most difficult task in the implementation stage.

As mentioned earlier, there was minimal change in the software. This minimal change had some advantages. Foremost, new business processes were satisfied. Second, it was easier for the implementing tasks and maintenance because all modules were integrated closely, so a change in one could require changes in the others. This was not to mention that Vinamilk must pay huge costs for license and maintenance in case of changing the codes. Therefore, the implementation duration and budget would be ensured. Third, this minimal change would facilitate updating subsequent versions of the Oracle EBS system. Next, minimal change would enhance the ERP interface quality; specifically English was translated into Vietnamese. This led to better users' satisfaction and data quality. Ultimately, integrated processes in the Oracle EBS could give Vinamilk a chance to standardize the company's processes.

6.3.7 External competence and partnership

TABLE 13. Factor 7 – External competence and partnership.

External competence and partnership	Evaluated
The ERP consultant should have multiple skills covering functional, technical issues and in-depth knowledge of the software.	-/+
External partners should be experienced and professional.	+/+
External partners should involve in different stages of the project.	+/+
Company need to manage external partnership well.	-/+

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

According to Ms. Ngo (2011), the project was supported dedicatedly by sole advisory firm – KPMG, the ERP implementer – Pythis and the ERP vendor – Oracle. Firstly, KPMG (www.kpmg.com) is a multinational network specializing in providing Audit, Tax and Advisory services. The role of KPMG was to give advice in initial preparations before implementing ERP system such as defining new business processes; choosing suitable ERP package and ERP implementer; documenting contractual agreements. Those supports helped Vinamilk to save time and initial costs. Besides, KPMG supported to create report format for new processes and played an intermediary role in interdepartmental decisions. Overall, the role of KPMG was to simplify and clarify the ERP implementation procedures for those companies where the system would be implemented in the first time.

Next, Pythis (http://pythis.com/webpythis/) was the current leader in implementing software solutions in Vietnam. Moreover, Pythis was the best partner of Oracle in Vietnam. Why these two factors were important? Pythis's experience in implementing various software solutions including the ERP would help Vinamilk avoid some mistakes of Pythis's previous customers and get higher quality service. In addition, its personnel resource was abundant to undertake all the tasks. As the best partner of Oracle in Vietnam at that time, Pythis were handed over substantial technology, knowledge and authority from Oracle's products. In Vinamilk's project, the important contributions of Pythis were to

match the system and new business processes; creating 300 report formats; provide knowledge for internal IT staff and user training. Especially, the tasks for analyzing business processes and procedures of Vinamilk required an experienced and professional consultant. Additionally, the project had supported considerably by Oracle Vietnam. Product support and troubleshooting were the main contributions.

6.3.8 End-users: involvement, education and training

TABLE 14. Factor 8 – End-users: involvement, education and training.

End-users: involvement, education and training	Evaluated
End-users should be involved in early stage of design and implementation.	+/+
End-users should be educated new business processes and know how to use the system properly.	+/+
There should have an appropriate plan for training facilities and budget to ensure effective and continuous training for existing end-users and newcomers.	-/+
Education and training should be a carried out seriously and end-users are supported during training program.	+/+
Management needs to consider how to allocate end-users after the ERP implementation stage.	-/-

+/+ = Mentioned as a factor

-/+ = Not mentioned as a factor, but considered important

-/- = Not mentioned as a factor

All respondents strongly agreed that this factor had substantial impact on the success of project. It is simply that if the company wants to obtain benefits from the system, there must be someone to use and control it in a right way.

First of all, all respondents said that end-users were involved in the early stages of implementation to define user requirements and new processes. By participating in the project, they understood the system better, contributed to enhance system

and therefore, they would be more satisfied and accepted with the system. Besides, their participations helped to shorten the implementation time. However, junior respondents also complained that they had more jobs to do and worked extra time.

Next, end-users must be educated new business processes so that they would get rid of their traditional habits when doing their tasks in new system. For example, even though a transaction was processed at the end of working day, it should be input and updated in the system instantly. However, they traditionally thought that it was possible to input this information in the next working day. The aim of education was to ensure data quality because once input data was incorrect, this led to a series of incorrect reports and transactions.

Another important issue was to train end-users. Most of respondents said that training was indispensable not only in the implementation stage but also in later stages. Training in the implementation stage aimed to ensure all employees know how to use the new system, especially for some employees even had no IT skills such as over forty-year-old employees. Training would be important to later stages to solve the problems of losing employees or hiring new ones. Therefore, planned budget also covered this issue. To conclude, training was always needed to maintain skill labors and continuous running of the system.

6.4 Statistical results

The small-scale survey attached in appendix 3 resulted in the most critical factors for the successful ERP implementation of Vinamilk. If one factor was marked extremely important, its instance was counted as 1. Table 15 provides the result of the survey. As can be seen, top management support and commitment, change management, external competence and partnership, and ERP teamwork and composition were the most important factors for the success of Vinamilk's ERP project. Whereas, visioning and planning, BPR and minimal customization, end-users: involvement, education and training, and IT infrastructure were less important. Remarkably, there was no factor marked as neutral. It consolidated the importance of identified CSFs to the success of the project.

TABLE 15. Frequency of CSFs in the Vinamilk's ERP project.

Rank	CSFs category	Number of instances cited
1	Top management support and commitment	16
2	Change management	14
3	External competence and partnership	10
4	ERP teamwork and composition	9
5	Visioning and planning	7
6	BPR and minimal customization	6
7	End-users: involvement, education and training	4
8	IT infrastructure	1

7 SUMMARY AND RECOMMENDATIONS

7.1 Summary

As introduced in early chapters, companies can obtain numerous benefits from successful ERP adoption. Conversely, the project can be a disaster for those companies that fail to manage the adoption process. Wishing to improve the rate of the ERP adoption in Vietnam, this thesis aims to answer the question of what are the critical success factors for the ERP adoption of Vinamilk.

In seeking for the answers, an extensive literature review was conducted to identify the CSFs model. Indispensably, the empirical data is collected from various interviewees' perspectives, project's documentations and small-scale survey in the company. The findings were derived from the analysis between CSFs model and the empirical data.

As a result, all identified CSFs were found to be critical to the success of the ERP adoption of Vinamilk. Specifically, top management support and commitment, change management, external competence and partnership, and ERP teamwork and composition were the most critical factors for its success whereas visioning and planning, BPR and minimal customization, end-users: involvement, education and training, and IT infrastructure were less critical.

In addition, the study found that maintaining initial scope of the project was important to the success of the project. In particular, there was no change in the initial choice of thirteen locations to be implemented and the phased approach which was used to implement the Oracle EBS system.

7.2 Discussion and recommendations

In this section, the author revises the research methodology that he used and give his recommendations based on research findings.

7.2.1 Discussion of the method

It is helpful to reflect on the research methodology used. The interviews were conducted with different participants in the project: project manager, project supervisor, representative of the ERP implementer and some representatives of the accounting, manufacturing and logistics departments. Those people were well-involved in the project, so they could answer all questions thoroughly. In addition, a small-scale survey was used as a supplementary tool for research findings. Therefore, the author believes that he made a good choice to find reliable results.

In the deductive way of this thesis, one case study seems to be the most effective choice because the empirical data could be obtained more sufficiently, then the analysis would be done more deeply. The author also had a chance to get a deeper understanding of the problem that he wanted to investigate. Moreover, the interviews included the representative of the ERP implementer who had been experienced in ERP adoption in Vietnam, so other case studies were also reflected. Hence, it was not necessary to use multiple cases.

7.2.2 Recommendations

Careful preparations for ERP project is never redundant

Once the need for the ERP system is realized, a firm needs to be ready before implementing it. The preparation must ensure suitable IT infrastructure, affordable personnel resource and budget for the project. Moreover, it is necessary to investigate experience in ERP adoption from other companies to minimize risks during the adoption process. Some Vietnamese companies failed their ERP projects due to lack of good preparations and practical investigations.

The need of sole advisory firms

In Vietnam, the participation of sole advisory firms like KPMG in ERP projects has been very limited. Most companies are afraid that such participations will increase budget for the project. Moreover, the role of such firms is rather vague and unreliable. However, as analyzed previously, the benefits which came from a sole professional consultant are substantial in early stages of ERP projects. Therefore, the presence of a sole professional advisory firm would be necessary for those companies where the ERP system is firstly implemented.

Choosing an ERP implementer carefully

This is really important in ERP adoption. The ERP implementer must be experienced and professional in implementing ERP systems. They must also be a trusted partner of the ERP vendors. Personnel resources of the ERP implementer must ensure all the tasks in the ERP implementation stage. Lack of experience and personnel resources are two reasons leading to implementation failure in Vietnam.

Ensuring internal support and commitment

ERP projects must be supervised and steered directly by top managers to departmental managers. If there is a conflict or divergence between internal and external staffs, this is a time for harmonization and decisiveness of those managers. Top managers must also commit to take part in the project to encourage and support all the project members. In lots of failed ERP implementations previously, some top managers even misunderstood the meaning of the ERP terminology, they simply thought that ERP was just pure software and entrusted the tasks of ERP implementation to IT managers or even IT staffs. If there were any problems relating to business processes or such, those positions could not make decisions and everything must be submitted and waited for approval. Therefore, this not only extended the duration of the process but also made the project team more tired and unenthusiastic.

Ensuring effective change management

It is sure that the presence of the new ERP system will affect many aspects in a company from business processes, procedures to staffs' roles. Therefore, companies need to have a flexible strategy to create the best conditions for all the members to adapt to the new system gradually. For example, companies may firstly identify and evaluate the attitudes of end-users to define the sources of their resistance to the new system. The company may help end-users get familiar to the new system through different strategies of communication such as informing of the presence of the new system and its benefits or giving a general description of how the system will work. Besides, careful timing of the introduction of the new system is also helpful. Education, hands-on training and top management commitment are part of effective change management. Without effective change management, ERP adoption may easily lead to failure.

Staffing an effective project team

In addition to the presence of the external staffs, the project team must be a mix of internal key staffs of different departments in the company to ensure both business and IT skills and enhance communication issues during the implementation process. Those key staffs are the persons who influence directly on the adaptation of end-users to the new system through education, hands-on training and support. The project team also needs to be empowered to not slow down the progress. Moreover, the team needs to be focused on implementing tasks and handing over their daily ones to others. In many cases, underestimating the demands and roles of internal staffs is one of the reasons leading to ERP project failure because they themselves will be the receivers and operators of the new system.

Doing BPR and ensure minimal customization

Improving business process is the basic reason for adopting the ERP system. Consequently, old business processes will be surely changed, the only difference is whether the change is extensive or minimal. Therefore, BPR must be done to define new business processes and align them to the ERP system. BPR is important in the early phase from decision planning to implementation. In case that company is not satisfied with the new system or new business processes, BPR will be carried out again.

Another issue associated with BPR is software customization. Since no ERP software is likely to meet all needs of a company, there exists a thorny issue: should business processes or the ERP software be changed? It can be stated that there is no generally optimal solution because it depends on the suitability of the company's characteristics and the ERP software. In case of large Vietnamese companies, they are in accordance with modern ERP systems. Vinamilk is a sample where extensive business processes and minimal software customization are carried out. On the contrary, the simple and easy-to-customize ERP software is more suitable for small and medium-sized Vietnamese companies. Whatever model a company belongs to, minimal customization must be ensured because if software is modified there will be costs of software license, system upgrade, maintenance and support. It is not to mention whether the modified software functions well or not. It is advised to choose the ERP package that is most suitable for the company's needs and conditions so that minimal customization is ensured.

In reality, many Vietnamese companies usually care about reputation of the ERP vendors rather than specifications of the software. As a result, over-customization is requested and the ERP project cannot be progressed because of increasing costs and complex issues in customization.

Ensuring involvement, education and training of end-users

Before implementing the ERP project, end-users should be involved in defining user requirements. Early acknowledgment of the new system will increase positive attitudes towards accepting it and create a chance to enhance the system quality. Education and training for end-users must be carried out seriously for them to learn new business processes and software interfaces which impact on the operations of the company. After implementing the system, training is also needed to ensure continuous operations of the company. Simulation and scenario are two useful methods in training staffs. In case of numerous end-users, the company can train key staffs first; then they will train the others in the company.

Defining clear initial scope and maintaining it

Scope is the initial blueprint of an implementation plan. According to this, budget and personnel resources are established. If extending the scope, budget and personnel resource could not ensure completing the project. As a result, the project may be delayed or fail.

7.3 Further research studies

This study is limited to investigating the importance of the proposed CSFs to the ERP adoption success of the Vietnamese case. Therefore, the research findings do not reflect truly the state of ERP adoption in Vietnam. Hence, there are still a lot of areas for further research studies.

- First of all, large-scale quantitative surveys can be conducted to get more general results. Or, multiple case studies representing successful and unsuccessful ERP projects can be done to find out about CSFs for ERP adoption in Vietnam in general.
- Next, it would be helpful to find out the common challenges of Vietnamese companies before implementing ERP systems.
- Another interesting issue would be how identified CSFs impact on each other in the ERP adoption process.
- Besides, it is necessary to find out how cultural issues impact on ERP adoption in Vietnam.
- Finally, further research can discover or examine CSFs in ERP adoption in Vietnamese SMEs. Likewise, it is possible to compare ERP adoption in large companies with that of in SMEs.

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List of Interviews

Ms. Ngo. 2011. Vice president of Vinamilk – ERP project supervisor. Interview 15 February 2011.

Mr. Tran. 2011. IT manager of Vinamilk – ERP project manager. Interview 20 February 2011.

Mr. Nguyen. 2011. Director of Pythis – representative of ERP implementer. Interview 18 February 2011.

APENDICES

APPENDIX 1: List of Vietnamese companies implemented ERP until February 2010, brought by http://eac.vn (original source).

Tên công ty	Giải pháp	Đơn vị
Tổng công ty Xăng dầu Việt Nam - Petrolimex	SAP	FPT
Ngân hang TMCP Quân đội Mbank	Oracle	FPT
Công ty Viễn thông Toàn cầu GTEL	Oracle	FPT
Nova Group	Oracle	FPT
Công ty Phát Triển nhà Thủ Đức – Thủ Đức House	SAP	FPT
Phạm Nguyên	Oracle	FPT
Ajinomoto Việt Nam		FPT
Công ty CP Cơ điện lạnh REE	SAP	FPT
Công ty Sonadezi Châu Đức	Oracle	FPT
Công ty CP Hạt giống Đông Tây	Oracle	FPT
Công ty CP Cấp nước Đà Nẵng – Dawaco	Oracle	FPT
SATO Vietnam	SAP	FPT
Toàn Mỹ	Oracle	FPT
SACOM	Oracle	FPT
Tập đoàn Thép Việt	SAP	FPT
Unilever Việt Nam	Oracle	FPT
Xí nghiệp liên doanh dầu khí Vietsopetro	Oracle	FPT
P&G Việt Nam	SAP	FPT
Pepsi Việt Nam	Oracle	FPT
Công Ty CP Dịch Vụ Tin Học HPT	Oracle	FPT
Công ty CP Hợp tác Kinh tế và XNK Savimex	Oracle	FPT
Ngân hàng Hàng hải Hải Phòng (MSB)	FPT.Success	FPT
Ngân hàng Đầu tư và Phát triển Việt Nam	FPT.Success	FPT
Công ty CP Bánh kẹo Biên Hoà - Bibica	Oracle EBS	FPT

Công ty CP Cửa sổ nhựa Châu Âu – EuroWindow	Oracle EBS	FPT
Công ty CP Tài Chính và Phát Triển Doanh Nghiệp FBS (Gami Group)	Oracle	FPT
DKSH Vietnam (Diethelm Keller Siber Hegner)	SAP	FPT
Công ty CP mía đường Lam Sơn	Oracle	FPT
Công ty CP Prime Group	Oracle EBS	FPT
Công ty CP Thương mại Tổng hợp Vincom	Oracle	FPT
Cty CP Xây dựng và Đầu tư Việt Nam – CAVICO VN	Oracle	FPT
Công ty CP Bao bì nhựa Tân tiến – Tapack	Oracle	FPT
Công ty CP Thương nghiệp tổng hợp chế biến lương thực Thốt Nốt – Gentraco	Oracle	FPT
Panasonic Việt Nam	SAP	FPT
Vinamilk	SAP	FPT
Công ty TNHH Mía đường Bourbon Tây Ninh	Oracle	FPT
Công ty CP Gạch Đồng Tâm	Oracle	FPT
Công ty CP Giấy Sài Gòn	Oracle EBS	FPT
Bộ tài chính (Dự án TABMIS)	Oracle	FPT
Kho bạc Nhà Nước Việt Nam	Oracle	FPT
Sơn Hà	Oracle	FPT
Vàng bạc Đá quý Phú Nhuận - PNJ	Oracle	FPT
Công ty CP Everpia Vietnam	Oracle EBS	FPT
Công ty CP Xây dựng và Đầu tư Việt Nam- Cavico	Oracle EBS	FPT
Công ty Nhựa Đông Á	Oracle EBS	FPT
Công ty bóng đèn Điện Quang	Oracle	FPT
Công ty CP Sản xuất hàng thể thao (Maxport JSC)	Oracle	FPT
Công ty TNHH Minh Hiếu, Hưng Yên	Oracle	FPT
Cảng Hải Phòng	FPT.Success	FPT
Công ty Supe Phốt phát và Hoá chất Lâm Thao	Oracle	FPT
Công Ty TNHH Du Llch & Thương Mại Á Đông (Vidotour Indochina Travel)	Oracle	FPT
Lộc Hóa dầu Bình Sơn	Oracle	PVTech
Công ty CP chứng khoán Gia Phát – GPSC	Oracle	SSG

Công ty CP chứng khoán Sài Gòn – Hà Nội – SHS	Oracle	SSG
Công ty CP chứng khoán Âu Việt – AVSC	Oracle	SSG
Công ty sổ số Bình Dương	Oracle EBS	SSG
Công ty may 10	Oracle EBS	SSG
Tổng công ty Hàng không Việt Nam	Oracle EBS	SSG
Công ty Toyota Viêt nam	Oracle EBS	SSG
Công ty bảo hiểm Bảo Minh	SAP	SSG
Trung tâm giao dịch chứng khoán Hà Nội – HASTC	Oracle	SSG
Công ty Vinagame	Oracle	SSG
Công ty ADC	Oracle	SSG
Công ty CP điện – điện tử – tin học Sao bắc Đẩu	Oracle EBS	Pythis
Công ty CP Cho thuê Tài chính II - Ngân hàng Nông nghiệp và Phát triển Nông thôn Việt Nam (ALC II)	Oracle	Pythis
Xi măng Hải Vân	Oracle	Pythis
Xi măng Nghi Sơn	Oracle	Pythis
Công ty CP chứng khoán Sài Gòn SSI	Oracle	Pythis
Dệt may Thành Công	PERP	Pythis
Công ty CP Xây dựng & Kinh doanh Địa Ốc Hòa Bình	PERP	Pythis
Công ty CP Đầu tư Công nghệ Giải trí Én Việt	PERP	Pythis
Tập đoàn Gemadept	Oracle	Pythis
Dược Sài Gòn Sapharco	Oracle	Pythis
Tập đoàn Tân Tạo	SAP	Pythis
Công ty CP bao bì Biên Hòa	Oracle EBS	Pythis
Vinamilk	Oracle EBS	Pythis
Công ty CP Đồ hộp Hạ Long CANFOCO	Oracle	Pythis
Masan Group	Oracle	Pythis
Café Trung Nguyên	Oracle	Pythis
Saigon Co-op	Oracle	Pythis
Công ty CP XNK Y Tế tp Hồ Chí Minh	Oracle	Pythis
Công ty TNHH giải pháp CNTT Lộ trình Avenue	Oracle	Pythis
HT Mobile	Oracle	Pythis
Hutchison Telecoms	Oracle EBS	Pythis

Sfone	Oracle	Pythis
Zamil Steel Vietnam	Oracle	Pythis
Tổng Công ty Khoan và dịch vụ Khoan Dầu khí PVD	Oracle	Pythis
Canon Viêt Nam	Oracle EBS	Pythis
Công ty Chứng khoán Ngân hàng SACOMBANK	Oracle	Pythis
Công ty TNHH Paxar Viet Nam	Oracle	Pythis
Công ty Xổ Số Kiến Thiết Bình Dương	Oracle	Pythis
Tập đoàn Đầu tư Công nghiệp Việt Á	Oracle	Pythis & CMCSoft
Công ty Đầu tư phát triJn sản xuất Hạ Long (BIM)	Oracle EBS	TVE
Công ty bia Đại Việt	Oracle EBS	TVE
Công ty CP Xây dựng Kiến trúc AA	SAP	CSC (Global CyberSoft)
Tân Hiệp Phát	SAP	CSC
Công ty CP Vận tải biển Vitranschart	SAP	CSC
Tập đoàn Điện Lực Việt Nam - EVN	Oracle	CMC
Nguyên Bình Group	Oracle	HPT
Lucky Group	Oracle	HPT
Công ty TNHH Ôtô Thế Giới (World Auto)	Incadea	Tectura

APPENDIX 2: List of interview questions

ERP project manager – Mr. Tran

1. What were the reasons for implementing the ERP system?
2. How was the ERP project planned?
3. How was the scope defined? Did it change during the implementation process?
4. What approach used to implement the system? Why?
5. How do you assess management commitment and support to the outcome of the project?
   - Was a highly support from top management in the project?
   - How did management involve in implementation? Did they allocate the required personnel resource?
   - Was management in middle in time of conflict between internal and external members?
6. Was the project planning looked upon as a change management initiative or IT initiative?
7. What IT infrastructure the company had before implementation? Was it evaluated?
8. What needed to be changed: business processes or ERP system?
9. Did you do BPR?
10. Did you change software code?
11. Did the ERP vendor and the consultant involve in different stages of implementation? How do assess their collaboration and support?
12. Were end-users involved in design and implementation of business processes?
13. Was IT staffs trained? Were they beneficial from external support?
14. Were end-users educated new processes and trained how to use the new system?
15. Did the company have an appropriate plan for training facilities and budget to ensure effective and continuous training for existing end-users and newcomers?
16. Were end-users supported during education and trainings?

17. How was the communication during implementation?
18. What were the criteria for the implementation success?
19. What experiences did you obtain from the project?

ERP supervisor – Ms. Ngo

1. What were the reasons for implementing the ERP system?
2. What was the company's expectation from the ERP project?
3. Did the company have business plan for the ERP project? Did it include strategic and tangible benefits, resources, costs, risks and timeline?
4. Did the company communicate new structure and roles to all employees?
5. How did Vinamilk prepare for changes behind the ERP implementation?
   - Did the company inform its employees about the project?
   - Were end-users involved and trained in the implementation process?
   - How were the trainings for IT staffs?
6. How was advisory firm selected? Did they have multiple skills covering functional, technical issues?
7. How was ERP package and ERP implementer selected?
8. What were the roles of external partners in project?
   - Did they have in-depth knowledge of software?
   - Was the company able to manage external staffs well?
9. How was the project team selected?
   - Did the team include cross-functional key employees? Was the team a mix of external and internal staffs?
   - How was the knowledge of team members: technical, business?
   - Were team members dedicated to the project?
   - How was the project team encouraged to do their jobs well?
   - Was the project team empowered to do the tasks?
   - How was communication among team members?
   - How was the project manager selected?
10. How were responsibilities and authorizes assigned to the project team?

11. Did top management consider allocating end-users after the ERP project?
12. How do you assess the current system?
13. What experience did you obtain from this project?

Pythis manager – Mr. Nguyen

1. According to you, what was the impact of visioning and planning in the ERP project? How was about Vinamilk?
2. How do you assess management commitment and support to the outcome of the project?
   - Was a highly support from top management in the project?
   - How did management involve in the implementation?
   - Was management in middle in time of conflict between internal and external members?
3. What do you think about change management in ERP implementation?
4. How was project team of Vinamilk?
5. Was the ERP software customized? How was the importance of minimal customization in ERP project?
6. What were the main challenges during implementation?
7. What experiences did you obtain from the project?

Departments: IT, Finance & Accounting, Manufacturing and Logistics

1. What is your title in your department?
2. How were your business/ IT skills?
3. At what stage did you involve in the ERP project?
4. Were you encouraged to do your task? Did you work full-time on the project?
5. Did you help end-users in training?
6. Were you educated new business processes?
7. What knowledge you learned from the external staffs?
8. What challenges did you face during implementation? Did you get support from top management?
9. Did you get incentives/compensations to do your tasks?

10. How was the communication among team members during implementation?
11. How do you feel about new system?

APPENDIX 3: Questionnaire

How do you evaluate the importance of the following factors to the ERP adoption success of Vinamilk?

Factors	Neutral	Somewhat important	Important	Extremely important
Visioning and planning				
Top management commitment and support				
Change management				
IT infrastructure				
ERP teamwork and composition				
BPR and minimal customization				
External competence and partnership				
End-users: involvement, education and training				