DETERMINANTS OF THE ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS POST-IMPLEMENTATION BENEFITS IN INDONESIA: THE MODERATING ROLE OF SYSTEMS CUSTOMIZATION AND USER RESISTANCE

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by

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FAKTOR YANG MENENTUKAN FAEDAH PASCA IMPLEMENTASI SISTEM ENTERPRISE RESOURCE PLANNING (ERP) DI INDONESIA: PERANAN PENYEDERHANA PENYESUAIAN SISTEM DAN TENTANGAN PENGGUNA

ABSTRAK

Pelaburan dalam sistem ERP telah berkembang secara berterusan di seluruh dunia termasuk Indonesia. Penggunaan sistem ERP telah terbukti memberikan faedah yang besar untuk digunapakai organisasi. Isu-isu yang berkaitan mengenalpasti faktor-faktor yang menentukan faedah ERP pasca-implementasi, demikian pula pengenalan faedah yang diperolehi belum dikaji secara meluas di Indonesia. Selain dari pada itu, penyelidikan pengaruh penyesuaian-sistem ERP dan tentangan- pengguna terhadap faedah ERP pasca-implementasi belum banyak dilaksanakan di dalam kajian ERP.

Untuk menilai faedah ERP setelah sistem berjaya dilaksanakan, kajian ini cuba untuk mengenalpasti beberapa faktor ke dalam model kajian yang dicadangkan dan menentukan lima hipotesis yang menunjukkan hubungan antara faktor tersebut. Kajian ini mengunakan pendekatan teknologi, organisasi, dan persekitaran (TOE) sebagai asas dan latarbelakang teori. Pembolehubah tidak bersandar terdiri daripada 'Penyelenggaraan sistem ERP' sebagai aspek teknologi, ‘Kesediaan organisasi' sebagai aspek organisasi, dan 'Sokongan luaran’ sebagai aspek persekitaran; manakala pembolehubah bersandar adalah 'Faedah sistem ERP pasca-implementasi’. Di samping itu, terdapat dua penyederhana iaitu ‘Penyesuaian sistem ERP' dan ‘Tentangan pengguna’.

Lima hipotesis yang dicadangkan diuji menggunakan SmartPLS2 M3. Tiga hipotesis awal ingin melihat hubungan antara setiap pembolehubah tidak bersandar iaitu:

‘Penyelenggaraan sistem ERP', 'Kesediaan organisasi', dan 'Sokongan luaran' secara berasingan dengan 'Faedah sistem ERP pasca-implementasi’. Ketiga-tiga hipotesis tersebut disokong. Seterusnya, penyederhana ‘Penyesuaian sistem ERP' mempengaruhi hubungan antara 'Penyelenggaraan sistem ERP' dan 'Faedah sistem ERP pasca-implementasi’; interaksi ini juga disokong. Akhirnya, pengaruh penyederhana ‘Tentangan pengguna’ terhadap hubungan ‘Kesediaan organisasi' dan 'Faedah sistem ERP pasca-implementasi’ adalah tidak disokong.

DETERMINANTS OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS POST-IMPLEMENTATION BENEFITS IN INDONESIA: THE MODERATING ROLE OF SYSTEMS CUSTOMIZATION AND USER RESISTANCE

ABSTRACT

Investment in ERP systems worldwide has been growing steadily including Indonesia. ERP systems solution has shown to offer considerable benefits to adopting organizations. Issues related to the lack of understanding about factors that determine the success of ERP Post Implementation benefits, as well as the benefits gained have not been extensively studied in Indonesia. Moreover, the effect of ERP systems customization and user resistance to the ERP Post Implementation benefits has not been examined in the ERP studies.

To assess the ERP benefits after the systems has been successfully went-live, this study try to extract many factors into a proposed research model and determine five hypotheses to show relationships among the factors. This study accommodates Technological, Organizational, and Environmental (TOE) approach as theoretical foundation and background. The exogenous variables consist of 'ERP systems maintenance' as technological aspects, 'Organizational readiness' as organizational aspects, and finally 'External supports' as environmental aspects; while the endogenous variable is 'ERP system post-implementation benefits'. In addition, there are two moderating variables which are 'ERP systems customization' and 'User resistance'.

The five proposed hypotheses are tested using SmartPLS2 M3. The first three hypotheses relate individually three construct variables: 'ERP systems maintenance', 'Organizational readiness' and 'External parties' to the 'ERP post-implementation

benefits'. All the first three hypotheses are supported. Subsequently, 'ERP systems customization' moderates the relationship between 'ERP systems maintenance' and 'ERP post-implementation benefits'; their interaction is also supported. Finally, this study finds that variable 'User resistance' does not moderate the relationship between 'Organizational readiness' and 'ERP post-implementation benefits'.

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CHAPTER 1

INTRODUCTION

Research on information systems and technology (IST) as a mean to gain competitive advantage of an organization has been the dominant theme in the study of IST for many years. Theoretical and empirical evidence indicate that organizations implementing computer-based information systems are able to gain competitive advantages over their competitors.

As an organization's computer-based information systems, enterprise resources planning (ERP) systems have become the information system of choice for the majority of medium to large organizations around the world. ERP systems have achieved such popularity worldwide due to the capability of this information system to handle complicated business applications especially in the internetworking enterprises. The main reasons why organizations adopt ERP are the benefits realized, such as increasing operational performance by improving the business efficiency and effectiveness, and gaining a more accurate decision making process (Hitt et al., 2002; Nicolaou & Bhattacharya, 2006). Moreover, some studies confirmed that announcement of ERP systems implementation have resulted positive market response (Hayes et al., 2001; Poston & Grabski, 2001; Hunton et al., 2003; Wieder et al., 2006). Some advantages that are provided by ERP systems can also be perceived as: system quality, information quality, service quality, individual impact, workgroup impact and organizational impact (Ifinedo et al., 2010).

To benefit organizations through the implementation of ERP over a long period of time, organizations have to continuously maintain and upgrading the implemented ERP systems. Continuous maintenance and upgrading of the systems

may contribute to a competitive edge in the market. For this reason, the maintenance of ERP systems, which is the main activity in the ERP post-implementation, becomes a very important consideration.

So far, ERP studies tend to focus on issues related to ERP implementation and planning, especially in the area of critical success factors (such as Finney & Corbett, 2007; Woo, 2007; Ngai, Law & Wat, 2008; Bhatti & Jayaraman, 2008; Ramayah, et al., 2010). The ERP post-implementation benefits, however, have been inadequately researched. Hence, this study intends to investigate the issue of ERP post-implementation benefit.

1.1 Research Study Background

1.1.1 Theoretical background

Different studies define ERP from various points of view. This study defines ERP as: a collection of multi-module off-the-shelf applications software packages, which integrate activities of different functional departments, integrate the planning and management of all major business processes into a single database, optimize the resources available, including contacts with business partners and customers, and implement best practices for each business process across the entire organization (Nah et al., 2001; Arif et al., 2005; Yu, 2005; Gupta & Kohli, 2006).

Figure 1.1 extracts the ERP definition as it shows that ERP integrates data and information that put on some different functions or site of the organization by bringing all departments into a single database and finally help the organization to attain better communication among the divisions as well as external parties.

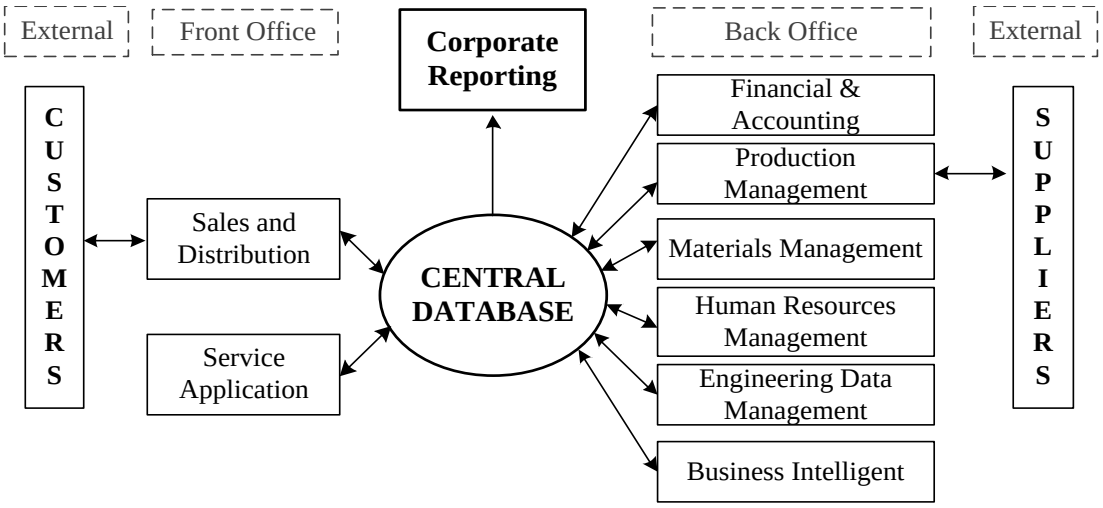

Figure 1.1
Overview of ERP systems
(adapted from Hossain, Patrick & Rashid, 2002)

Within the ERP development life cycle, there are three stages: the pre-implementation stage, the implementation stage, and the post-implementation stage (see Figure 2.4). The post-implementation stage that will be investigated in this study starts when the ERP systems run normally in the daily operation of the business activity. Main activities of this stage are system maintenance and system upgrades. Both activities make sure that the implemented ERP systems are able to continuously meet organization's long term business needs.

ERP system maintenance consists of various activities that require keeping the systems running properly and becoming the main driver to maximize the business benefits more than to only reduce the costs (Ng et al., 2002). Besides, Ng & Chang (2009); Chen et al., (2009) pointed out that as one core activity in the ERP systems maintenance, system's upgrading is important to develop a set of new capabilities to support firm-specific business processes that impacts on the firm's competitive advantage.

Investment decisions in ERP systems are considered as a strategic investment decision. Similar to any other investment decisions, the adopting organizations expect

to benefit from those investments over a long period of time. Shang & Seddon (2000) classified any kind of ERP benefits into 5 categories: operational, managerial, strategic, IT infra-structures, and organizational benefits.

Many ERP studies have been performed in a number of fields of studies. Some early studies in ERP systems have been performed, for example, by Davenport (1998) who looked at reasons for implementing ERP system and the challenges during the implementation project itself; Faleti (2001) concluded that ERP system implementation differs from other IT projects as they are not single events; Hitt, Wu, and Zhou (2002); Poston and Grabski (2000) focused on financial impacts of ERP system implementation.

A number of later surveys were conducted for instance by Nicolaou and Bhattacharya (2006) who studied the impact on the performance of the organization; Finney and Corbett (2007) performed a compilation and analysis of the critical success factors in the ERP implementation, McGinnis and Huang (2007) investigated a new perspective from the angle of knowledge management and continuous improvements of ERP success; and Ifinedo (2008) considered the impacts of business visions, top management support, and external expertise on ERP success.

Country-specific studies such as the one performed by Nah, Islam and Tan (2007) investigated factors influencing the success of ERP implementation in multinational organizations in Malaysia; Ramayah and Lo (2007) studied the impact of shared beliefs on ‘‘perceived usefulness’’ and the ‘‘ease of use’’ in the implementation of an enterprise resource planning system in Penang, Malaysia; Ramayah et al., (2007) focused on the successful ERP implementation in manufacturing companies; Chien and Tsaur (2007) investigated the success of ERP systems in Taiwanese high-industries, Bhatti and Jayaraman (2008) validated the

critical success factors of ERP implementation in Australia, and Yaseen (2009) conducted the same study using Jordanian context, while Ramayah et al., (2010) conducted a study on the ERP critical success factors in Malaysia.

In the attempt to find previous studies of ERP implementations in Indonesia, the researcher browsed the internet and found few studies, which mostly were master thesis and a PhD dissertation. Table 1.1 names some previous ERP studies in Indonesia.

Table 1.1
Previous ERP studies in Indonesia

Research	Title	Findings
Tjakrawala & Lukita, 2012	Model Kausalitas *Critical Success Factor* dalam Imple mentasi Sistem *Enterprise Resource Planning* Guna Memberikan *Net Benefit* bagi Perusahaan dengan Menggunakan *Partial Least Square.* - National Symposium of Accountancy (SNA) - Indonesia - Type of research: Quantitative	(1) Project management (2) User training (3) Implementation success Those three factors are found to support the achievement of net benefits from ERP implementation. While the unsupported factors are: Top management support, Business process reengineering, and Vendor support.
Tarigan, 2008	Peranan Para Manajer Departemen (*Key User ERP*) Terhadap Kinerja Perusahaan Melalui Imple- mentasi ERP, Studi Kasus Perusahaan Manufaktur di Jawa Timur. - PhD dissertation - Type of research: Quantitative	(1) The role of top management is not strong enough to support the effectiveness of key users for successful ERP implementation in a company, (2) Organizational culture positive ly influences the ERP project team in terms of knowledge sharing, (3) Best practices in the ERP business process reengineering have a positive influence on ERP implementation at the time when a company makes process adjustments, (4) The effectiveness of key users provide process acceleration on data management and contribute to a good ERP implementation process, (5) Business process reengineering does not significantly affect the firm's performance, (6) Technical compatibility of ERP technology has no effect on organizational performance.

Table 1.1 Continued

Research	Title	Findings
Tjahjadi, 2008	Identifikasi Faktor Kesukses-an Implementasi Sistem ERP di Indonesia: Studi Kasus Multi-Site. - Master theses - Type of research: Qualitative	Factors contributing to ERP system implementation success are: (1) top management support which includes how high the commitment, initiative, and enthusiasm of the board of directors of a company, (2) The organization structure which takes into account of central ization, specialization and formal ization inside an organization.
Arianto, 2008	Perancangan Aplikasi Ber-basis Web Untuk Mengukur Kualitas ERP (Enterprise Resource Planning) System – (Studi Kasus di PT Indomobil Suzuki International). - Master theses - Type of research: Qualitative	The selection of ERP products is very important in order to enhance the successful implementation of ERP systems. Therefore, measure ing the quality of ERP products is required. The criteria used for measurement in this research are: portability, reusability, interopera bility, correctness, reliability, efficiency, integrity, usability, test ability, flexibility. The result of this research is a measurement of the quality of ERP product that will be considered by an organization in selecting an ERP.
Indriani, 2006	Model penerimaan user dalam implementasi system ERP dengan memodifikasi model TAM serta memasuk kan karakteristik individu user dan organisasi. - Master theses - Type of research: Qualitative	The compatibility of ERP and attitude toward ERP system has direct effects on ERP symbolic adoption, while ERP businesses are fit and ERP has useful influences on ERP symbolic adoption by being fully mediated through attitude

All of the studies mentioned above focused on the area of the ERP implementation stage. Although there are not that many studies, some research concentrating on ERP post-implementation can be identified, such as: Ifinedo et al., (2010); Yu (2005); and Light (2001). Yu (2005) argues that the system assessment after an ERP installation is not an end point by itself but a continuous implementation. Light (2001) insists that ERP systems customization is possible given its potential impact upon future maintenance during the post-implementation phase. Further, Ifinedo et al., (2010) clarify the relationship between ERP post-implememtation

success constructed from an organizational level. They suggest that evaluating ERP success cannot only use single proxy construct rather than utilizing multidimensional indicators of success.

1.1.2 International background

ERP systems were initially adopted in the beginning of the nineties and SAP Germany became a globally leading vendor of ERP systems. Within a short period of time, the growth rate of investment in ERP system solutions made by organization worldwide has continuously increased tremendously. Business Week reported that at the end of 1997 the value of the ERP market was $10 UK billion, later the AMR Research announced as much as $180 billion in global investments in ERP systems in 2002 (Kalling, 2003). According to US Industry Reports at least 30,000 organizations worldwide have been implementing ERP systems in 2004 (Mabert et al., 2006). Later studies mentioned that the new license revenue for ERP is expected to grow at a multiple annual growth rate of 6.3% by 2009 (Eschinger et al., 2005; Ragowsky & Gefen, 2008). A recent survey has estimated that the global market for ERP is US$ 47.7 billion in 2011 (Jacobson et al., 2007), grows at an annual rate of 6.9% and will reach $50 billion by 2012 (Hamerman et al., 2008).

After succeding in the implementation stage, organizations enter the next stage which is post-implementation with maintenance and upgrades as the main activities. Table 1.2 lists the result of a survey conducted by AMR in 2007 about ERP application revenue share by revenue type in 2006-2011. The result shows that revenue sharing of Application Software Maintenance is 36%, the highest share compared to the other application's revenues.

ERP implementation is only conducted once during the ERP life-time, while ERP systems maintenance costs will be a recurring expenditure every 2 or 3 years with 25% to 70% of the implementation cost annually. Due to this reason, good planning and management of post-implementation activities is important.

Table 1.2
ERP application revenue share by revenue type in 2006-2011

Revenue Type	Revenue Share, 2006	Revenue Share, 2007	Revenue Share, 2008	Revenue Share, 2009	Revenue Share, 2010	Revenue Share, 2011
Application Software License	32%	31%	31%	32%	32%	31%
Alternate Pricing and Delivery	1%	1%	2%	2%	2%	2%
Application Software Maintenance	36%	36%	36%	36%	36%	36%
Implementation, etc	30%	31%	30%	30%	30%	30%
Other	1%	2%	2%	2%	2%	2%
Total	100%	100%	100%	100%	100%	100%

1.1.3 National background – the growth of ERP systems in Indonesia

Organizations in Indonesia started to adopt ERP systems in the late nineties. The first adopting organizations are Astra International, Inc, an automotive company, followed by Garuda Indonesian Airways (GIA). They have succeeded in the implementation of SAP packages solution. Around the year 2002, the scenario of ERP systems implementation in Indonesia was witnessing a rapid growth. Diski Naim, a solutions architect of PT. SAP Indonesia mentioned that organizations have realized the competitive edge of ERP, as the early adopters deployed ERP only for system automation, such as for sales order processing, purchasing, and human resources, or to face the Y2K momentum (Nurwandini, 2002b).

Felix Sugianto, manager of eBusiness Solutions of PT. Oracle Indonesia testified that the demand of ERP solutions in Indonesia would increase following the economic growth (Nurwandini, 2002b). According to Krishnendu Datta, the

managing director of PT SAP Indonesia, SAP Indonesia was optimistic that IT spending was still part of the organization's investments in Indonesia in 2009, although the country was affected by the global financial crisis. Organizations require IT solutions to help them overcome the increased pressure during the crisis (Warta Ekonomi on Line, 2008).

In summary, the growth of ERP system solutions in Indonesia are parallel to the better development of national economy including human resources and capital investment, which covers IT investments such as hardware platforms, software, internet and telecommunication facilities. The national environments that support the growth of ERP in Indonesia are:

1. Economic growth: 2004 – 2008: 5.0 – 6.3% per year; 2010: 6.2%; 2014: expected to reach 6.8%

   According to the former vice president of Indonesia, Jusuf Kalla, this economic growth above 6% is the best among all ASEAN countries and even Asian countries (Suhartono, 2009; Badan Pusat Statistik, 2010)

2. The average growth of internet facilities is 20% per year with a growing amount of Internet users:

   Year 2007: 20 million users

   Year 2008: 33 million users

   Year 2009: 36 million users

   Year 2010: 40 million users (it is approximately only 1.9% of the total amount of Indonesian citizens) (Syaifudin, 2008).

3. There is a government mega-project called Palapa Ring network with an estimated total cost of US$1,500 million. Palapa Ring will become the backbone of the internet connection and telecommunication in the entire Indonesia

archipelago. It consists of an integrated ring of rings made of submarine fiber optic cable network, laid along the coasts of the major islands from the northern tip of Sumatra until the eastern border of West Papua. It has a total length of 35,280 km. The project implementation would be on a phased basis within 3 to 5 years starting in October 2009 (Barhuni, 2009)

4. ERP grows as part of the e-business solutions. Gartner Dataquest projected that the demand for e-business in Indonesia will reach US$ 369.2 million in the year 2002 and continues to US$ 637.5 million in 2005 (Nurwandini, 2002b). E-business in Indonesia will be 10 to 20 times fold in the following years (Candraningrum, 2002).
5. Capital investment was US$160 billion in 2010 and is projected to increase to US$300 billion in 2014; it includes IT spending/investment (Supriadi, 2009; BAPPENAS, 2010).
6. Investment in IT product was US$2.2 – 2.4 billion in 2008; there was an increase of 12% in year 2009 (Department of Industry, Republic of Indonesia in BAPPENAS, 2010; Rusli, 2008).

All of the above facts show that the ERP market in Indonesia has potential and is continuously growing. SAP, Microsoft, Oracle Data Base are the major international vendors operating in Indonesia, besides many local ERP vendors that mostly are adopted by small and medium organizations.

1.1.4 ERP implementation in Indonesia - the success and failure stories

Besides successful ERP implementations, many failed stories behind the implementation of ERP come from all over the world. One famous unsuccessful story of ERP implementation was encountered by FoxMeyer Drugs, located in Carrollton,

Texas, USA (In 1992, FoxMeyer Drugs started to implement ERP – SAP: R3). FoxMeyer Drugs went bankrupt and prosecuted the vendor together with the consultant for not selling product and services as it was promised. Here are few success features of Indonesian ERP adopting organizations:

1. Garuda Indonesia Airways (GIA)

GIA is a government-owned flags carrier and the largest airline in Indonesia. This organization adopted SAP R/3 that went live in 1999. At the beginning, the priority objective of this project was to ensure Y2K compliance of the financial administration and to improve its administrative procedures. The system's business functions include financials, controlling, sales & distribution, procurement, inventory, manufacturing, maintenance, and human resource management. In 2004, phase 2 in the Garuda Maintenance Facilities area was finalized, which included latest industry specific functionalities, SAP IS A&D (IS- Industrial Solutions and Services, A&D- Automation and Drives/A&D*)*, and a technical upgrade (Magnus, 2004).

2. Mandiri Bank

Starting in the year 2004, Mandiri Bank developed an IT colossal project called Enterprise Mandiri Advanced System (EMAS) by adopting the SAP Domestic & International Payment System (DIPS) package. A huge investment of about US$170 million was invested into the project. This IT investment was allocated to accomplish the company's motto: "Customers always expect ease/comfortable transaction, for both within Indonesia and abroad". Before developing the systems, Mandiri Bank made changes in the company's business processes that made the systems work efficiently. The results of this colossal project are more efficient and effective communication networks to support the branches' operation, including

ATMs, electronic banking, call centers, centralized back office, and so on. Andreas E. Susetyo, CITO & SEVP Information & Technology at PT Bank Mandiri Tbk said that the average annual budget to maintain these IT systems is between US$ 40 million to US$ 50 million (Mandiri, 2004; Mohammad & Angraeni, 2007).

3. Blue Bird Group Indonesia

PT. Blue Bird Group Indonesia, the country's leading transportation organization with a fleet of approximately 13,000 vehicles in 2004 (the year when ERP-SAP first went live) and grew to 30,000 vehicles in 2010, comprising of taxis, limousines, buses and container trucks. This organization announced their successful implementation of MySAP Business Suite during their go-live ceremony at their headquarters in Jakarta in 2004. Goals of the ERP implementation are to build new foundation for organization's future and a strategic move to deliver the highest level of customer satisfaction as well as to build and maintain market leader position in every category in which it compete. With MySAP, Blue Bird expects to fulfill their vision of becoming not just a transportation company but a total transportation solution and able to maintain their leadership position, even if foreign investors enter and compete into the same market.

As a result, with the wide functionality of mySAP Business Suite, Blue Bird can easily monitor in a real-time basis much of the important information such as details of drivers, numbers of customer orders in each depot, vehicles that are operating or under maintenance, fuel consumption and so on. Such data/information will be useful for the board to make quick decisions, solve problem areas and improve efficiency (SAP, 2004).

4. PT. Semen Gresik (Persero) Tbk

Semen Gresik Group is the biggest group of state-owned cement producing companies. On January 1st, 2010 the companies launched SAP ECC 6.0 program as its latest ERP version which would be adopted by three cement companies in Indonesia, including; PT Semen Gresik (Persero) Tbk (Java island), PT Semen Padang (Sumatera island), and PT Semen Tonasa (Sulawesi island).

This system is expected to be able to improve the integrity of the three national cement making companies and able to replace and accommodate the function of the previous ERP. This new ERP SAP ECC 6.0 system replaced the old one, which had been adopted in 2003. They were Oracle Program adopted by PT Semen Padang, J.D. Edward program by PT Semen Gresik (Persero) Tbk and PT Semen Tonasa (Semen Gresik, 2011).

Examples of failed ERP implementation come from two big companies owned by the government of Indonesia. Both companies finally succeeded as well as gained the expected benefits because they got the second change to implement ERP.

1. PT. PERTAMINA (Persero)

PERTAMINA is a big oil company owned by the government of Indonesia. Since 2003, PERTAMINA has been implementing the mySAP system, but unfortunately during the year 2003 - 2006, the system did not run as expected. This system aims to improve the ease of centralized control in the product supply and distribution, budget formulation, evaluation of cash flow, including fuel-related transactions from gas stations, depots, banks, and PERTAMINA headquarters. Because of the system failure, it had caused insufficiency of fuel supply to a number of gas stations throughout the country.

Various constraints alleged as the cause. Some IT observers said that the failure of the mySAP ERP application system was due to human factors. The replacement of the old system by mySAP ERP 2005 was not supported by reliable and competent human resources, reforming the standard operating procedure (SOP), and insufficient communication with employees (Yun et al., 2009). Another comment came from Kurtubi, director of the Center for Petroleum and Energy Economics Studies. He pointed out that Pertamina directors together with McKinsey, the ERP consultants imposed the implementation of these technologies without a preliminary trial (Yun et al., 2009).

Meanwhile PERTAMINA spokesman Anang Rizkani Noor said, PERTAMINA was evaluating and improving the mySAP system that previously did not work, and now the mySAP 2005 has been able to function normally for all kinds of transactions and online services at petrol stations all over the country (Yun et al., 2009).

2. PT. Perusahaan Listrik Negara (Persero) – PT. PLN (Persero)

This is a government-owned company that is responsible for supplying electricity throughout the country. PT. PLN (Persero) began to implement ERP in the year 2000 and failed. The company acknowledges that the lack of top management supports and poor project management were the main factors of the failure. Director of Planning and Technology of PT. PLN, Bambang Praptono explained that PLN will continuously implement ERP by strengthening the human resources. He elaborated further that PT. PLN will intensively communicate the information systems and technology programs to all units, and to all employees at headquarters, regions, and units. Until 2010 the enterprise systems have been applied in PLN Java, Madura, Bali,

Sumatra and Sulawesi. Bambang confessed that ERP improves PLN's efficiency in terms of time, costs and services. With ERP, PLN is able to apply good corporate governance (GCG), and support the changes of company business process (Amenan, 2009).

1.1.5 A preliminary study

The researcher conducted a preliminary study to collect primary data of factors that lead to the ERP post-implementation benefits in Indonesia. Sixteen (16) questionnaires were e-mailed to ERP consultants/implementers, managers, and users who were experts in ERP. A total of twelve (12) answers were returned and completed (75%). Table 1.3 shows the profile of respondents in the preliminary survey. Results of the preliminary survey are listed in Tables 1.4, 1.5, and 1.6; meanwhile, Appendix B shows the preliminary survey questions.

Table 1.3
Profile of the respondents: the preliminary study

Respondent categories	Frequency
ERP consultants/ERP implementers	6
Managers	2
User managers	3
Researcher	1
Total	12

Table 1.4 lists the first seventh ranks of factors that lead to the ERP post-implementation benefits. It shows that "Ongoing user trainings" together with "A good documentation of customization during implementation" are chosen as the primary success factors that lead to the ERP post-implementation benefits; and the last is "Having a clear plan of system maintenance, innovation and up-grade is important".

The result of the survey illustrates that "Support and commitment from top managers" is not the foremost key factor. This finding is supported by Tjahjadi's (2008) research finding, but not with Tarigan's (2008). The finding also shows that 44% of the respondents who select "Having a clear plan of system maintenance, innovation and up-grade is important" put this selection in the lowest rank**.**

Table 1.4
Factors that lead to the ERP post-implementation benefits:
A preliminary study in Indonesia

No	Factors that lead to the ERP post-implementation benefits	%
1	Ongoing training to users	100
2	A good documentation of customization during implementation	100
3	Availability of a help desk and/or support from the EDP department	89
4	Support and commitment from top managers	78
5	Knowledge transfer from consultant	67
6	Support from direct managers	56
7	Having a clear plan of system maintenance, innovation and up-grade is important	44

Table 1.5 lists the first five (78%, 56%, 44%, 33%, and 22%) in the rank of ERP post-implementation benefits selected by respondents. There are 15 selected benefits out of 20 options of benefits provided in the questionnaire. The 20 options of benefits are considered as operational, managerial, and strategic ERP post-implementation benefits. Operational benefits (benefits no. 1 – 4) dominate the selections (78%, 56%, 44%, and 33%). Followed by managerial benefits (benefits no 5 – 13) that were selected by 33% respondents, and 22% respondents chose strategic benefits (benefits no 14, 15).

Table 1.5
ERP post-implementation benefits: a preliminary study in Indonesia

No	ERP post-implementation benefits	%
1	More timely reports (such as financial statements, salary and wages reports)	78
2	Improve quality of the reports (more accurate and reliable)	56
3	Improve the operational decisions	44
4	Reduce cost of inventories	33
5	Improve inventory management	33
6	Improve assets management	33
7	Improve human resources management	33
8	Support business innovation (new marketing strategies, new process-chain, e-comers, etc)	33
9	Improve harmonization and coordination among department in the company	33
10	Improve services to customers	33
11	A more flexible IT-infrastructures in responding the business needs	33
12	Improve the middle managers decisions	22
13	Improve production management	22
14	Improve the strategic decisions	22
15	Support the business growth (market expansion, increased transactions' volume)	22

This result proves that the adopting organization will gain ERP benefits starting from the operational level (78% already gained the benefits), and will be tagged along by managerial benefits (33%) and lastly strategic benefits (22%). Results of this preliminary study are supported by previous research, such as Shang & Seddon (2002).

Table 1.6 shows factors that support the failure of ERP implementation selected by respondents. There are 20 options in the questionnaire, and 9 are picked up as the first four ranks. Most of the selected answers show that human factors such as "lack of top management support", "unqualified human resources", "and incompetence consultants/implementers" become the major factors for the failure of ERP implementation in Indonesia, followed by "undefined business process".

Table 1.6
Factors that support the failure of ERP implementation: A preliminary study

No	Factors that support the failure of ERP implementation.	%
1	Lack of top management support	78
2	Undefined business process	78
3	Unqualified human resources	67
4	Not-intensive user trainings	56
5	Incompetence consultants/implementers	56
6	None or not-intensive socialization to employees for the new implemented ERP systems	56
7	Incompetence ERP implementation project team	44
8	Not communicative ERP implementation project team	44
9	Inadequate IT infrastructures	44

The researcher browsed related information from the internet as well as discussed electronically (via email) with some ERP practitioners and experts in further uncovering problems encountered regarding ERP implementations in Indonesia. Results of the electronic-based discussions with some ERP consultants/implementers and Internet browsing indicate that 70% of ERP implementation in Indonesia has failed (Agorsiloku blog, 2009). The failures are mainly caused by lack of competent human resources, including consultants, ERP project-team members, and employees/users (Adji Kasrinandi, ERP consultant and manager), undefined business process in the beginning of ERP project, and lack of top management support (Faezal Rustanto, ERP consultant). These factors lead to too much system customization. Other factors that contribute to the implementation failure are a lack of intensive communication about the new system and trainings for users and employees (Indri Sibarani, SAP consultant partner).

Anjar Priandoyo (2007) an ERP consultant writes in his blog about the developments of ERP systems implementation in Indonesia since 1990 up to 2010, they are:

1. Period 1990 - 1999: Early implementation: basic ERP systems applications
2. Period 2000 - 2004: Stable operation
3. Period 2005 - 2009: System enhancements: review**,** upgrading, consultation: additional features
4. Period 2010 - present: New Technology Investment (Priandoyo, 2007).

It is concluded that ERP systems implementation in Indonesia has been reaching system enhancements, which include system innovation and upgrade, and investment in new technology.

1.2 Research Problem Development

Studies of ERP systems mostly are conducted in developed countries, although a number of studies can be found in certain developing countries such as China, India, and Taiwan, but only very few in Indonesia. Based on the previous explanations and discussions, problems of ERP implementation in Indonesia will be discussed in the following paragraphs.

1.2.1 Research problem identification

The market of ERP systems solutions is potentially growing in Indonesia, but so far not many ERP research have been conducted in Indonesia. Some previous research have been limited to the area of ERP implementation, and have not studied the post-implementation, a stage when the systems have been normally operating, focusing on continuous maintenance of the implemented systems to meet the organization's future business advantages. Arguing the importance in the study of ERP post-implementation stage, Al-Mashari (2002) observed that the second wave direction of research within ERP context is the post-implementation stage, while the

first wave is in the context of the implementation stage.

Some ERP adopting organizations in Indonesia reported success stories, unfortunately many experienced the opposite condition. These issues result from the lack of understanding factors that influence the success of ERP implementation, which are not identical in each phases. ERP implementation in Indonesia is currently entering the post-implementation phase (Priandoyo, 2007). Results of the preliminary study in Table 1.4 shows that "Having a clear plan of system maintenance, innovation and up-grade is important" is selected by only 44% of respondents who have specified it as the last rank. This fact indicates that:

1. The adopting organization may not realize the importance of having a long term planning of the ERP systems' maintenance, up-grade, and or innovation, or/and
2. The adopting organization may not have a clear picture of what will be doing with the expensive ERP systems in the future since the first decision to implement the system.

A lack of ERP system maintenance, innovation and up-grade planning may reduce the ERP systems capabilities in delivering a future competitive advantage to organizations, and not only benefiting in the operating level. Law et al. (2010) found that ERP success requires a full lifecycle perspective to be taken into consideration by the adopting organizations. High quality maintenance can result in systems having a profound and lasting impact on the adopter's competitive advantage and extend the ERP systems life span (Law et al., 2010). That is why setting up a plan of ERP systems maintenance and upgrades that follow the organization's long-term strategic plan is important.

Incompetent human resources become one of the dominant factors of unsuccessful ERP implementation projects in Indonesia (Adji Kasrinandi, Faezal

Rustanto - ERP consultants). PT. PERTAMINA and PT. PLN who both failed in their first attempt to implement ERP experienced this factor. A result of the preliminary study strengthens this fact by showing that human factors such as “lack of top management support”; “unqualified human resources”; “incompetence consultants/ implementers” are selected as the major failure factors of ERP implementation.

Lack to create the awareness to employees in headquarters, regions, and units is also identified as a primary source of implementation failure in PT. PERTAMINA and PT. PLN. It is confirmed by Indri Sibarani, an SAP consultant partner; and result in Table 1.6 that proves 56% respondents agree ”None or not-intensive socialization to employees for the new implemented ERP systems” is a factor that supports the failure of ERP implementation.

Table 1.4 shows another fact that “On-going training to users” is important factor that lead ERP post-implementation benefit. It corresponds to the finding that 56% believe that one key ERP implementation failure factor is “not-intensive user trainings”. Research of Bueno & Salmeron (2008) suggests that key-user education positively affects the effectiveness of the use of ERP technology. Human factors including trainings are considered as organizational readiness to implement ERP solution.

All respondents in the preliminary study consider that “good documentation of customization during implementation” is important. Customization of the ERP package in some reason is needed. It is estimated that 20% of the processes in an organization cannot be modeled in an ERP system without customization (Scott & Kaindl, 2000). Davis (2005) argues that for reasons of misalignment and strategic alignment, customizations of the enterprise systems are necessary. However, customization of an ERP will have maintenance and upgrade impacts. Each time a

change is required to the system, the effect of the change on the customization will have to be assessed by the organization, as the software vendor will not support these customizations (Davis, 2005).

Investment in ERP systems worldwide has been growing steadily including Indonesia. Some Indonesian companies such as Blue Bird and Mandiri Bank gained considerable benefits after adopting ERP systems, however the adopted ERP systems did not run as it was expected in other companies like in PT. Pertamina and PT. PLN. Many formerly failed or out-of-control ERP projects were encountered by companies such as FoxMeyer Drug, Dow Chemical, Dell Computer, Hersey Foods in USA, and Mobile in Europe (Whang et al., 2003). The development of ERP implementation in Indonesia has been reaching post-implementation stage; but so far the success stories experienced by some ERP adopting organizations in Indonesia have not yet been explored in an intense investigation. Table 1.5 of the preliminary study proves that the adopting organization will gain ERP benefits starting at an operational level (78%), managerial benefits (33%) and strategic benefits (22%). Assessing the benefits of ERP post-implementation adoption becomes an emerging research agenda in Indonesia of whether the adopting organizations gain advantages from ERP investment in the operating, managerial, strategic, or all 3 levels.

1.2.2 Research problem statement

Based on the theoretical background and results of the preliminary study, this research is intended to explore and examine the implementation of ERP systems in Indonesia. The researcher concludes that it is important to investigate: what are the factors that influence post-implementation benefits through investment decision in

ERP systems solution by improving operating, managerial, and strategic performances?

1.3 Research Objectives

Considering the earlier discussions as well as the research problem identified, the purposes of this study are:

1. To identify the antecedents of ERP systems maintenance, the organization's readiness, and external support that influence the post-implementation benefits of ERP systems implementation.
2. To examine if ERP systems customization affects the relationship between ERP systems maintenance and ERP post-implementation benefits.
3. To investigate the moderating effects of user resistance on the relationship between organizational readiness and the ERP post-implementation benefits.

1.4 Research Questions

Considering the research problem and objectives, this research attempts to answer the following questions:

1. Does system maintenance (technological aspects) together with organizational readiness (organizational aspects) and external supports (environmental aspects) influences the ERP system post-implementation benefits?
2. Does system customization moderate the relationship between system maintenance, and ERP post-implementation benefits? The more the ERP package is customized, the more complex it will be in the post-implementation activities that may reduce the ERP post-implementation benefits.

3. Does user resistance moderate the relationship between organizational readiness and ERP post-implementation benefits? The more the resistance of users, the less the organizational readiness to adopt ERP systems, that may decrease the ERP post-implementation benefits.

1.5 Scope of the Study

This study tries to identify factors that lead to the benefits of ERP systems post-implementation, and the benefits gained by ERP adopting organizations. The study perceives technological, organizational, and environmental aspects (TOE) as the underlying theoretical approach. Indonesia will become the research setting.

Recent researches in information system and technology (IST) have tended to avoid using financial (tangible) indicators to measure an organization's performance. The reason is because of the difficulty in isolating the effect of the IST effort from other effects, which influence the organization's performance. This study will accommodate non financial indicators to measure the ERP benefits. Some non-financial indicators of benefits are faster processing, more timely and accurate transactions and information, increased information quality, and better decision-making. The technological aspects of this study will not cover the technical problems of the ERP systems, which may be covered in the field of computer science.

1.6 Significance of the Study

This research is intended to provide a number of theoretical and practical contributions. The researcher hopes that the results of this study will initiate future studies in the area of information systems and technologies, particularly the study of ERP systems, as well as provide benefits to the businesses in Indonesia.