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Analysis of Enterprise Resource Planning (ERP) system implementation for manufacturing in Indonesia

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Abstract. The purpose of this study is to analyze the success of ERP systems in Indonesia for companies that have implemented ERP systems. There are various kinds of companies with different business fields, such as manufacturing, mining, oil and gas, information technology and construction companies. The method used to achieve this research goal is through the study of literature, by selecting ERP references that support, starting from the theory, framework and information resources. The population involved is the end-user ERP, which consists of various types of industries that have implemented an ERP system. The results of this study indicate the measurement of system quality, service quality, information quality, benefits obtained, user satisfaction and ERP system benefits.

1. Introduction

Enterprise Resource Planning (ERP) is a system that is widely applied in the information system era, and companies will benefit from the implementation of this ERP [1]. Integrated ERP system is very helpful in the process of sharing data or information on each unit in a company [2]. According to ERP system suppliers, such as SAP, Baan, Oracle, PeopleSoft, and so on, there are 12 modules that can be integrated into ERP systems [3]. The most important modules in ERP are sales and distribution modules, marketing modules, production planning, material management, cost control, project management and finance [4]. ERP system is a system that has a high complexity and requires large resources, so it takes energy and high costs to manage it [5]. Despite the complexity and high resource consumption, companies need to continue implementing ERP systems, which are divided into three stages, namely pre-implementation, implementation and post-implementation [6]. ERP systems can be used as integrators of information flow from each different unit in a company.

When implementing ERP, the company hopes to increase productivity, access through information and company management performance in decision making [7]. Not only the benefit can be seen from the implementation of the ERP system, but there is also evidence of project failure in the implementation of the ERP system [8], [9]. Competitively and technically, on the one hand the implementation of an ERP system must still be done, but on the other hand there are high enough costs that must be incurred for the ERP system implementation process. If the implementation of an ERP system is successful, of course this is very significant for the development of company resources [10]–[12].



Although there are differences between the designations, the concept is substantial, and also describes the corresponding ERP phase which is defined into the end-to-end phase. [8], [13], [14]. Therefore, there needs to be support from stakeholders, such as business analysts and developers, in assessing the impact of post-implementation of ERP systems, as well as assisting companies during ERP system implementation [8]. There is a lot of literature that discusses research related to ERP systems, with a focus on the problem of adoption and implementation of ERP systems in companies, but only a few are conducting research on the post implementation stages [15].

1.1 Research Objective

This study aims to determine the critical point of successful ERP system implementation. In addition, this study makes it possible to show empirical evidence in some countries to meet the gap between technology and culture in the previous research [16]–[18]. In addition, this study was also conducted to understand the important dimensions of ERP systems, based on a combination of successful ERP system implementation models in the company, as well as a combination of theoretical frameworks and practices of implementing ERP systems to optimize the effectiveness of ERP systems in a [18]–[20].

There are many models for ERP system implementation that proposed by other researchers to analyze the successful of ERP systems [17]–[19], [21]–[23]. From the studies, the D&M model provides many applications for measuring the successful implementation of information systems in general, and ERP systems in particular [15]. The D&M model presented in Figure 1, which has several variables of measurement [23].

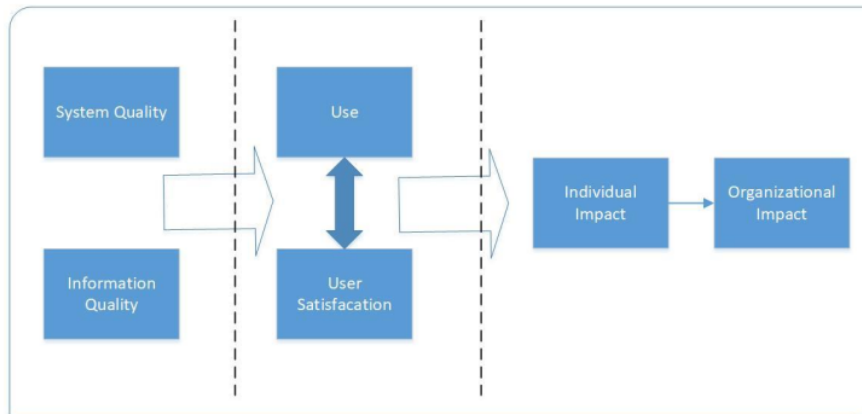


Figure 1. D&M IS Success Model [23]

Researcher revised the model that has been used in response to criticism and empirical testing from other researchers [24], then merged Service Quality into a newest variable to detached the quality elements of the system support. The revised D&M model is presented in Figure 2.

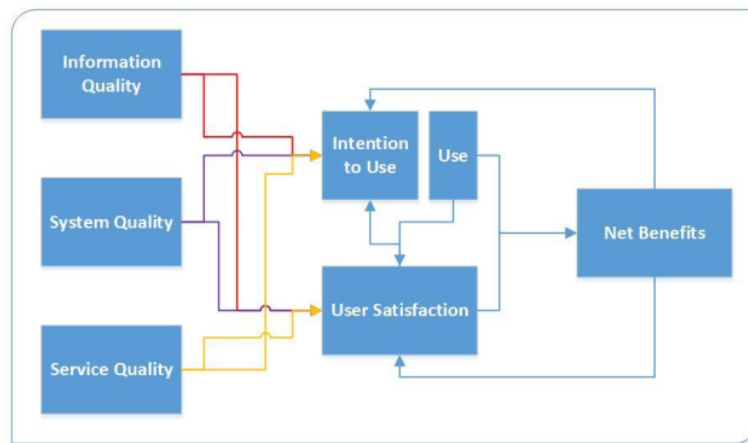


Figure 2. Updated D&M IS Success Model [24]

To simplify the model, new net benefit variables can be used [11], [15]. The development of successful models of information system implementation, such as the Delone and McLean models, has become important for researchers to increase understanding of information systems management. However, some problems in the model, the success of the information system will still exist. Some research that discusses the various measurable dimension is presented in Table 1.

Table 1. ERP research with Measurable Dimensions

	Measurable Dimensions	Remarks	Authors
1	ERP system quality, information quality, service quality and net benefits	Adds financial benefits	[25]
2	System Quality, Information Quality, Service Quality, Individual Impact, Workgroup Impact, Organizational Impact	Removes intention to use and user satisfaction	[26]
3	ERP system quality, information quality, perceived usefulness, user satisfaction, and ERP system usage	Adds top management support	[27]
4	System Quality, Information Quality, Vendor Quality, Individual Impact, Workgroup Impact, Organizational Impact	Adds vendor quality	[28]
5	System Quality, Information Quality, Service Quality, extended use, user satisfaction, individual benefits.	Adds extended use	[29]

19 Table 1 summarizes the studies on ERP system implementation that have been carried out previously, which adopted the D&M IS success model. From the five studies above, each has dimensions that can be measured in terms of quality and influence. Therefore, researchers largely agreed to adopt a number of identic variables from the D&M model [30] – [32].

3. Methods

The method used to achieve this research goal is to search and study literature, especially on references related to ERP system implementation, both successful and failed implementations. In addition, an assessment was also conducted related to ERP system theories and framework concepts that have been developed for ERP system implementation. This research is focused on the ERP system implementation for the post-implementation. The target occupant in this study is the end user of the ERP system that has been implemented, especially users who have implemented the ERP system for a certain period. Companies in Indonesia are selected as samples representing samples from developing countries. Implementation of ERP system in Indonesia, which has been developing for more than twenty years, provides a qualify sample to illustrate the practice of ERP systems.

Furthermore, some industries in Indonesia that implement ERP system and the various applications of ERP that have been used by respondents in this study can reflect the generalization of implementation of ERP system in real life.

4. Results and Discussion

The research results are explained descriptively through the following statistical data. The sample was composed by various industry types, such as utility, manufacturing, oil and gas, information technology, mining, construction and retail, that have implemented ERP systems. Table 2 shows the count of the respondents (N=60).

Table 2. List of the Respondents

No	Industry type	Respondents
1	Utility	17
2	Manufacturing	16
3	Oil and Gas	10
4	Information Technology	7
5	Mining	5
6	Construction	3
7	Retail	2
	Total respondents	60

4 Table 3 below shows the results of statistical data of the conducted survey for the information of system quality (SYQUAL), information quality (INQUAL) and service quality (SEQUAL).

Table 3. Descriptive statistics of system quality

	N	Minimum	Maximum	Mean	Std. Deviation
SYQUAL1	60	2	5	4.20	.605
SYQUAL2	60	2	5	3.97	.758
SYQUAL3	60	1	5	3.72	.976
INQUAL1	60	3	5	4.03	.610
INQUAL2	60	2	5	4.02	.676
INQUAL3	60	1	5	4.08	.766
SEQUAL1	60	2	5	3.83	.693
SEQUAL2	60	1	5	3.77	.767
SEQUAL3	60	2	5	3.87	.676
Valid N (listwise)	60				

Table 4 below shows the results of descriptive statistics of the conducted survey for the information of perceived usefulness (PERUSE1, PERUSE2, PERUSE3, PERUSE4) and user satisfaction (USERSAT).

Table 4. Descriptive statistics of perceived usefulness and user satisfaction

	N	Minimum	Maximum	Mean	Std. Deviation
PERUSE1	60	3	5	4.33	.601
PERUSE2	60	1	5	3.63	1.025
PERUSE3	60	2	5	4.10	.681
PERUSE4	60	3	5	4.25	.628
USERSAT	60	1	5	3.85	.899
Valid N (listwise)	60				

24

Table 5 below shows the results of descriptive statistics of the conducted survey for the information of ERP system's benefit (BENEFIT1 – BENEFIT10).

Table 5. Descriptive statistics of benefit of ERP system

	N	Minimum	Maximum	Mean	Std. Deviation
BENEFIT1	60	1	5	3.63	.920
BENEFIT2	60	1	5	3.98	.854
BENEFIT3	60	1	5	3.98	.854
BENEFIT4	60	2	5	3.95	.649
BENEFIT5	60	2	5	3.95	.675
BENEFIT6	60	1	5	3.62	.885
BENEFIT7	60	1	5	3.77	.927
BENEFIT8	60	1	5	3.90	.838
BENEFIT9	60	1	5	3.83	.785
Valid N (listwise)	60				

4

Table 6 below shows the results of correlation statistics of the conducted survey for the information of system quality (SYQUAL), information quality (INQUAL) and service quality (SEQUAL).

Table 6. Correlation statistics of system quality

		SYQUAL1	SYQUAL2	SYQUAL3	INQUAL1	INQUAL2	INQUAL3	SEQUAL1	SEQUAL2	SEQUAL3
SYQUAL1	Pearson Correlation	1	.680**	.270*	.441**	.489**	.439**	.283*	.321*	.315*
	Sig. (2-tailed)		.000	.037	.000	.000	.000	.028	.012	.014
	N	60	60	60	60	60	60	60	60	60
SYQUAL2	Pearson Correlation	.680**	1	.308*	.186	.431**	.384**	.247	.394**	.355**
	Sig. (2-tailed)	.000		.017	.155	.001	.002	.057	.002	.005
	N	60	60	60	60	60	60	60	60	60
SYQUAL3	Pearson Correlation	.270*	.308*	1	.187	.161	.304*	.355**	.544**	.404**
	Sig. (2-tailed)	.037	.017		.152	.218	.018	.005	.000	.001
	N	60	60	60	60	60	60	60	60	60
INQUAL1	Pearson Correlation	.441**	.186	.187	1	.656**	.502**	.334**	.271*	.299*
	Sig. (2-tailed)	.000	.155	.152		.000	.000	.009	.037	.020
	N	60	60	60	60	60	60	60	60	60
INQUAL2	Pearson Correlation	.489**	.431**	.161	.656**	1	.390**	.295*	.400**	.190
	Sig. (2-tailed)	.000	.001	.218	.000		.002	.022	.002	.145
	N	60	60	60	60	60	60	60	60	60
INQUAL3	Pearson Correlation	.439**	.384**	.304*	.502**	.390**	1	.442**	.293*	.546**
	Sig. (2-tailed)	.000	.002	.018	.000	.002		.000	.023	.000
	N	60	60	60	60	60	60	60	60	60
SEQUAL1	Pearson Correlation	.283*	.247	.355**	.334**	.295*	.442**	1	.627**	.603**
	Sig. (2-tailed)	.028	.057	.005	.009	.022	.000		.000	.000
	N	60	60	60	60	60	60	60	60	60
SEQUAL2	Pearson Correlation	.321*	.394**	.544**	.271*	.400**	.293*	.627**	1	.724**
	Sig. (2-tailed)	.012	.002	.000	.037	.002	.023	.000		.000
	N	60	60	60	60	60	60	60	60	60
SEQUAL3	Pearson Correlation	.315*	.355**	.404**	.299*	.190	.546**	.603**	.724**	1
	Sig. (2-tailed)	.014	.005	.001	.020	.145	.000	.000	.000	
	N	60	60	60	60	60	60	60	60	60

Table 7 below shows the results of correlation statistics of the conducted survey for the information of perceived usefulness (PERUSE) and user satisfaction (USERSAT).

Table 7. Correlation statistics of perceived usefulness dan user satisfaction

		PERUSE1	PERUSE2	PERUSE3	PERUSE4	USERSAT
PERUSE1	Pearson Correlation	1	.367**	.579**	.494**	.408**
	Sig. (2-tailed)		.004	.000	.000	.001
	N	60	60	60	60	60
PERUSE2	Pearson Correlation	.367**	1	.272*	.303*	.547**
	Sig. (2-tailed)	.004		.036	.019	.000
	N	60	60	60	60	60
PERUSE3	Pearson Correlation	.579**	.272*	1	.456**	.246
	Sig. (2-tailed)	.000	.036		.000	.058
	N	60	60	60	60	60
PERUSE4	Pearson Correlation	.494**	.303*	.456**	1	.488**
	Sig. (2-tailed)	.000	.019	.000		.000
	N	60	60	60	60	60
USERSAT	Pearson Correlation	.408**	.547**	.246	.488**	1
	Sig. (2-tailed)	.001	.000	.058	.000	
	N	60	60	60	60	60

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

5. Conclusion

ERP system implementation in a company that has been running smoothly, it does not mean the company's success has been obtained. Companies need to think about and consider the amount of investment costs from implementing an ERP system, which is seen from the economic aspects and business benefits, such as improving employee and company performance, which requires a long time to build it. In contrast to information technology projects in general, ERP system implementation is very complex and requires significant resources, involving various stakeholders, but can also end in failure. Therefore, thorough research to find out and understand the success factors of ERP system implementation and to minimize failure rates, needs to get a higher priority. By analyzing various important factors and significantly influencing ERP systems, company management can place the focus on related aspects to achieve maximum business benefits.

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