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Analysis of Enterprise Resource Planning (ERP) Systems Implementation

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Abstract

This research discussed about ERP system success in its post-implementation, therefore, it can only be applied to organisations that have implemented an ERP system. To achieve the research objective, a rigorous strategy for searching the literature was developed. The current study selected supporting ERP references, including theories, research, frameworks, and other verified information resources. The target of population is the ERP end user, specifically, a user who works in a company that has implemented an ERP system. The sample was composed of various industry types that have implemented ERP systems, and the count of respondents is 60. The result of this research shows the measurement of system quality, service quality, information quality, perceived usefulness, user satisfaction and benefit of ERP system.

Keywords*: enterprise, resource planning, implementation, success factor, information system*

1. Introduction

Enterprise Resource Planning (ERP) is a dream come true in the information system era. Despite its widespread usage [1] have persuasively argued that the ERP abbreviation is misleading in its reference to unspecific resources, the poor functionality of its main feature and too narrow definition of 'enterprise', however, in many IS publications and indexing services, the phrase has become publicly accepted. ERP can be characterised according to different points of view. Firstly, from a technical perspective, ERP is an enterprise-wide software package built into one single integrated system and has technical features capability that fundamentally differentiate it from other software [1].

Despite the complexity and high consumption of resources involved, organisations need to proceed with ERP implementation in several stages. Researchers suggest that the implementation phase refers to the whole ERP lifecycle, including adopting, selecting, implementing and using an ERP system [2]. However, [3] proposes an additional stage for improving the system and uses the term 'implementation project' to define specific activities during the software deployment and customisation according to specific requirements. Viewing the issue from a different angle, [4] describes that an ERP system implementation is a well-planning project commencing from the appropriate system selection through the deployment and training until the system is up and running operatively. While there are differences among those designations, such as adoption and implementation, the concept is substantially similar [5]. [5] also describe suitable ERP phases defined into end-to-end stages, involving the chartering phase, project phase, shakedown phase and onward and upward phase. It is argued that the opportunities for the success of ERP systems can be found at every stage. During ERP implementation, [6] studied three important key roles: strong leadership commitment, effective communication and highly motivated and proportional project team member. Hence, the ERP implementation strategy is no doubt one of the key factors of successfully pursuing the ERP project [7].

2. Research Objective

The present research defines its objective as to understand the determinants of an ERP system success and to examine the relationship significances between those factors. Moreover,

the present study enabled empirical evidence in the developing country to fill the technology and culture gaps to the past literature, which mostly focusing on developed one. In addition, this research comprehended ERP essential dimensions based on the proven success models and theoretical frameworks combined with the insight from ERP practices which can be used to optimise ERP system effectiveness in a company [20].

Various ERP success models have been proposed by researchers to analyse the success of ERP systems [5][8-12][19]. Among these models to date, the D&M model has provided the most applications in IS success measurement generally, and in ERP particularly. The D&M model in Figure 1 identifies six interdependent measurement variables (system quality, information quality, use, user satisfaction, individual impact, and organisational impact) based on the extensive IS literature between 1981 and 1988. D&M primarily aims to show a causal, in contrast to a process, relationship among the defined variables.

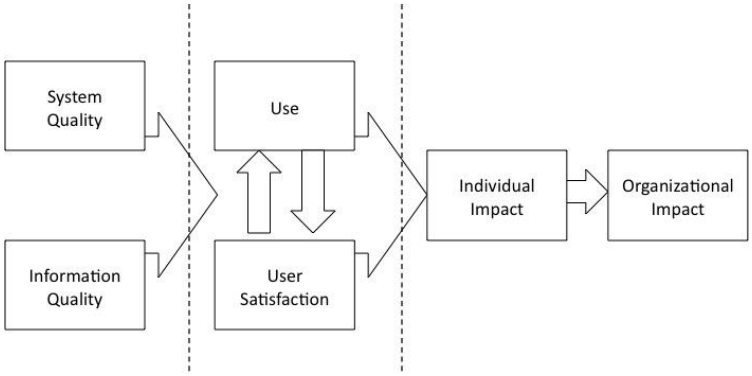

Figure 1. D&M IS Success Model [9]

The D&M model in Figure 1 identifies six interdependent measurement variables (system quality, information quality, use, user satisfaction, individual impact, and organisational impact).

Responding to the criticism and empirical testing by other researchers, [10] revised the widely used model, incorporating service quality to the new variables to separate the element of system support quality either internally or externally. The updated D&M model, in Figure 2, replaced the terminology *use* with *intention to use* and *use* to include attitude and behaviour interpretation.

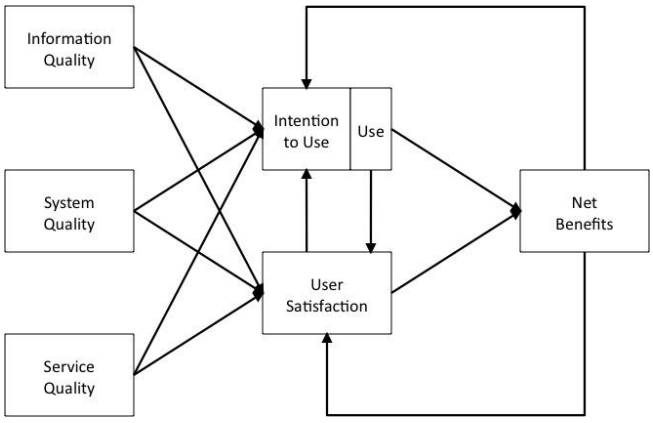

Figure 2. Updated D&M IS Success Model [10]

The model also enhanced the measurement by introducing a *net benefits* variable to include *individual benefit* and *organisational benefit* into one contextual dimension. Using the new *net benefit* variable is also useful for simplifying the model, yet it encompasses all of the

advantages. The updated model has consistently maintained causal correlation and the parsimonious framework as the success measurement metrics.

Many ERP researchers have adopted the D&M IS success model and proposed enhancements with additional measurement dimensions or modified it with a different contextual model.

Table 1. Various measurable dimensions of ERP research

Authors	Measurable Dimensions	Remarks
Bernroider, 2008 [13]	ERP system quality, information quality, service quality and net benefits	Adds financial benefits
Ifinedo, 2010 [14]	System Quality, Information Quality, Service Quality, Individual Impact, Workgroup Impact, Organisational Impact	Removes intention to use and user satisfaction
Lin, 2010 [15]	ERP system quality, information quality, perceived usefulness, user satisfaction, and ERP system usage	Adds top management support
Rouhani and Ravasan, 2013 [16]	System Quality, Information Quality, Vendor Quality, Individual Impact, Workgroup Impact, Organisational Impact	Adds vendor quality
Hsu, 2015 [17]	System Quality, Information Quality, Service Quality, extended use, user satisfaction, individual benefits.	Adds extended use

Table 1 displays a summary of the past ERP research which adopted the D&M IS success model. Accordingly, the current research reviews and comprehend the most critical factors while keeping the simplicity and reasonable aspects. Accordingly, the researchers were mostly agreed to adopt some similar variables from D&M model, namely system quality and information quality, while other measurement variables were used interchangeably. [18] found out that it is impracticable to measure a system success employing only one single model due to different approaches and specific case.

3. Research Method

To achieve the research objective, a rigorous strategy for searching the literature was developed. The current study selected supporting ERP references, including theories, research, frameworks, and other verified information resources. This study focus on the ERP system success in its post-implementation onward-and-upward phase. Therefore, it can only be applied to organisations that have implemented an ERP system in a steady state. The target population for this study is the ERP application end user, specifically, a user who works in a company that has implemented an ERP system for specific period. Indonesian industry was selected as the non-experimental sample to represent the population in a developing nation. ERP system implementation in Indonesia, which has been growing for more than two decades, provides adequate sampling to portray ERP system practices. Furthermore, the various types of industries that implement ERP systems in Indonesia and diverse ERP applications that have been used by the respondents in this research could reflect the generalisation of ERP implementation in the real world. To support the suggested theoretical model, empirical and quantifiable data is inevitably required. Consequently, the need to sample is almost found in every piece quantitative research. The sampling to support this survey research is paramount; however, the appropriate sample size varies.

4. Result and Discussion

This chapter sets out what the descriptive statistics of the conducted survey results are as well as providing a detailed analysis of the quantitative analysis. The sample was composed

of various industry types that have implemented ERP systems. Table 2 shows the count of the respondents (N=60).

Table 2. Count 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

Table 3 below shows the results of descriptive statistics 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				

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				

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

Just because the ERP system has been technically run into a steady state in post-implementation does not mean that a triumph has been achieved. Organisations must also consider the enormous amount of costs that are economically difficult to justify and the intangible business benefits, such as individual and organisational work performance improvement, that takes an unpredictable time to establish. In contrast to a typical IT project, ERP implementation is complex and resource consuming, involving various stakeholders, and yet it can end in failure. Hence, a thorough study to understand the critical success factors and to minimise the failure rate demands a higher priority. By analysing the most important factors that significantly affect the ERP system, the management of a company can focus on the associated aspects to achieve the optimal business benefit.

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