

Using Factor Analysis to Evaluate ERP Implementation Readiness at Manufacturing Company

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Abstract: Enterprise Resource Planning (ERP) system implementation that has spent a lot of cost and time does not always work as expected by the company. Implementation of ERP system involves many users ranging from top-level managers to the operational level users, and develop a large number of business software applications across many functions within the organization. Therefore, the ERP implementation factors need to be considered ERP implementation success, and one of these factors is how to measure the readiness of the organization in making changes towards the existence of a new system . using factor analysis there trying sought factors affecting ERP system implementation readiness in an organization, then look for indicators that affect the readiness factor system implementation as well as building a mathematical model of the readiness of the company's ERP system implementation including how to evaluate the readiness of the system implementation overall ERP. research as much as 660 questionnaires were distributed to respondents who are users are responsible for the implementation of ERP. From the results of the questionnaire data processing is done, the resulting presence of 2 (two) new factors that can be represented as a factor Availability Readiness and Business Process Readiness factor, where these new factors for the next can be used as a reference for mathematical modeling so that a reference in readiness evaluation.

Key words: *ERP, Factor Analysis, Implementation Readiness Evaluation.*

INTRODUCTION

The rapid development of the business led to increasingly fierce market competition. It also led to business process change are becoming increasingly complex organizations to follow the business competition. Business processes required to be able to connect the activities that occur in a company that can mengefesiensi time needed in business process and generate information that is useful and add value to the organization.

The development of rapid information technology can be used to assist the organization in carrying out business processes and process data into information that is more accurate. The combination of information technology and business process systems produces information that will support the organization to achieve that goal. Information system was originally designed to collect, process and produce useful information for the use of, but along with the increasing complexity of processes and operational needs of the organization, information systems are required to be an integrated system that can reach the highest point of effectiveness and efficiency, as well as helping the business activity of the complex by relying on the information in decision-making. Information systems developed with these goals and eventually formed the concept of ERP (Enterprise Resource Planning).

To maximize the use of ERP in an organization, the user (user) plays a fairly important. An organization using ERP systems certainly involve a lot of manual systems from various departments, various positions and various age ranges. User communities with a variety of different backgrounds have different views and knowledge about ERP system. When a user is not able to maximize the use of ERP system, the ERP system will not produce data and quality information.

XYZ Company is a subsidiary of one of the world's largest polyester manufacturers based in Thailand. Seeing the need for integrated information and real-time caused by the rapid development of business and the business market breadt, XYZ Company decides to implement ERP. ERP implementation is expected to result in an integrated process and quality information that can help decision making by management.

ERP system implementation that has spent a lot of cost and time are not always successful and produce the results expected by the company. ERP system implementation will be dealing with many users ranging from top managers to lower level users, and develop a large number of applications across many functions within the organization. Therefore, ERP implementation needs to pay attention to the factors of ERP implementation success, one such factor is the readiness of organizations to implement ERP systems (Rotchanakitumnuai, 2010:606).

Problems Formulation:

Formulation of the problem of ERP system implementation XYZ Company is as follows: first, What factors are affecting the readiness of ERP system implementation?. Second, The indicators are factors that affect the readiness of ERP system implementation?. Third, How readiness model of ERP system implementation?. And forth, How to evaluate the readiness of ERP system implementation?

The factor analysis is a multivariate method used to analyze the variables that are thought to have links with one another so that the relationship can be described and mapped or grouped on the right factors (Rummel, 1967). The purpose of factor analysis is to describe the covariance relationships among several variables underlying but unobservable, random quantities called factors (Johnson & Wichern, 2007). Many studies have reported that many ERP projects were not successful. ERP systems are large and expensive systems, which require great effort in the implementation of the large cost and time (Rotchanakitumnuai, 2010:605-606). Several studies have documented that the implementation of IT projects often fail to achieve objectives that are often associated on time, budget and function. This can be due to several important factors, one of which is how far the preparation of implementation from company. Implementation readiness assessment is useful to assess the readiness of companies and projects in running IT implementation and support of project management (Haug et al, 2011). The objective of the ERP implementation readiness assessment is to evaluate the level of preparation of the company in implementing ERP (Gartner, 2011).

MATERIALS AND METHODS

The methodology used in this thesis is to use factor analysis. Design research conducted in this research are: at the *First stage*, Determination of the factors used in this evaluation is based on five main factors, among others: Project Readiness, Functional Readiness, Technical Readiness. Cultural Readiness. and Resource and Effort Awareness. Having obtained the factors that influence the readiness of ERP implementation at XYZ Company, then will be found that the most influential factor in ERP implementation readiness. At the *Second stage*, Having obtained the factors that influence the readiness of ERP implementation at XYZ Company, then The next will be analyzed based on the fact that these factors to obtain the indicators that will be a point in the search for information. Analysis of the facts is done by conducting interviews with the IT department Assistant General Manager XYZ Company with the aim of analyzing the results of that fact in accordance with the facts that occurred at XYZ Company. At the *Third stage*, Questionnaire data will be collected and analyzed data will be aiming to get the indicators and factors affecting ERP implementation readiness at XYZ Company. And at the *Fourth stage*, From the analysis of the data and information obtained, and then compiled into reports results in accordance with the conclusion that there are systematic so useful in giving advice to the XYZ Company to prepare to receive the ERP. To determine which variables need to be considered to improve the readiness of ERP system implementation, it is necessary to test regression using factors are then linked to the readiness of ERP system implementation using existing value of each factor and the value of ERP system implementation readiness according to respondents contained in the questionnaire. By using the ERP system implementation readiness assessment at this time as the dependent variable and the factor scores as the independent variable, then followed by analysis using regression techniques.

Based on the literature related to the evaluation of the readiness of ERP implementation, it can be concluded in accordance with the results of previous studies Table. 1. Readiness Assessment, which is as follows: for examples, Journal of The Role and Impact of Project Management in ERP Project Implementation Life Cycle and published by Al-Mudimigh Ara in 2011 to discuss the impact of project management in ERP project life cycle by studying a variety of project management methodologies, as well as the important role and activities of managers project, the project team and project management therefore explored the ERP project implementation in organizations of different sizes and cultures and another else literatures.

RESULTS AND DISCUSSION

In the process of analyzing data reduction factor occurs, where it occurs in the process of "filtering" a viable component to be used as indicators that affect the readiness of ERP system implementation as illustrated in Figure 1.

If based on the relationship between the variables that factor group obtained more acceptable is a fixed number of factors = 2.

Table 1: Matrix of Readiness Assessment.

Factor	Indicator	Journal	Vari-able	Statement
Project Readiness	Project Management Discipline	Ara, A., & Al-Mudimigh, A.S. (2011).	P1	ERP implementation was preceded by the determination of the scope, time, quality and budget
	Risk Mitigation & Management	Ara, A., & Al-Mudimigh, A.S. (2011).	P2	Risk mitigation strategies have been prepared by forming a council to guide the course of the project focuses
	Communication	Nah, F. F. H., Islam, Z., Tan, M. (2007).	P3	Planning and development of the project has been communicated to the user
Functional Readiness	Business Process Documentation	Deep, A., Guttridge, P., Dani, S., & Burns, N. (2008).	F1	Business processes within the scope of the ERP has been well documented
	Requirement for Unique Business Process	Dixit, A.K., Prakash, O. (2011).	F2	Companies require some unique business processes to support control of company operations
Technical Readiness	Infrastructure	Upadhyay, P., Dan, P.K. (2009).	T1	Computers, networks, servers, applications and other support is available and running well
	Application Customization	Upadhyay, P., Dan, P.K. (2009).	T2	Customization of the application has been made to support the company's unique business processes
Cultural Readiness	Program and Project Governance	Nfuka, E.N., Rusu, L. (2011).	K1	Consolidation, communication and enforcement of policies and guidelines for the use of IT across the organization do to improve project performance
	Executive Support and Commitment	Upadhyay, P., Dan, P.K. (2009).	K2	Management supports ERP implementation and commitment in resource allocation
	Training	Pabedinskaite, A. (2010).	K3	Training of implemented ERP systems are delivered to the user
Resource and Effort Awareness	Schedule	Elragal, A.A., Al-Serafi, A.M. (2011).	S1	ERP implementation schedule has been scheduled, known and agreed
	IT Resource Availability	Ifinedo, P. Nahar, N. (2009).	S2	IT resources are available to support the ERP implementation

Source: analysis result, 2013

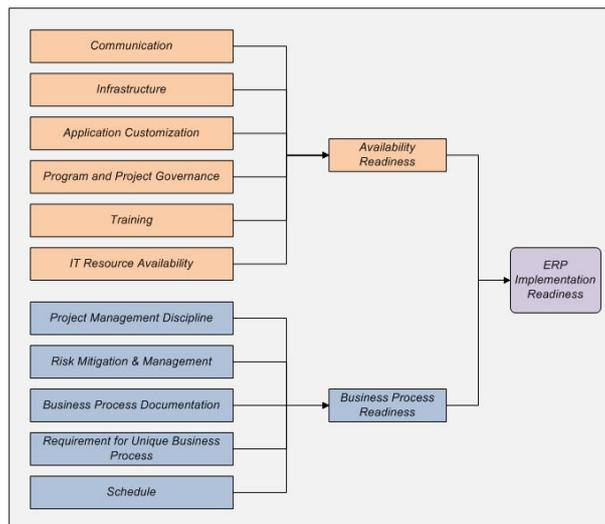


Fig. 1: Analysis of Results Indicators Facts

Source: analysis result, 2013

Table 2: Mean of Questionnaire Statement.

Variable	Statement	Mean
K2	Management give support and commitment in ERP implementation	4.84848
P1	The scope of ERP implementation to be implemented is determined at the beginning of implementation	4.50000
F1	Users know the company's business processes that are running at the moment	4.45455
P2	Team members of ERP implementation project have been determined and play well	4.37879
T1	Computers, networks, servers, applications and other support is available and running well	4.36364
F2	The company's business processes are documented and included in the scope of the ERP implementation	4.28788
K1	Person in charge and the decision-makers has been established in every part of the project (both for project and every department) and they're working well	4.28788
S2	IT resources are available to support the ERP implementation	4.12121
T2	Customization of the application has been made to support the company's unique business processes	3.87879
P3	Users get information on the progress of ERP implementation	3.80303
S1	ERP implementation schedule has been scheduled, known and agreed	3.59091
K3	Users receive training on ERP	3.53030

Source: analysis result, 2013

The first factor consists of P3, T1, T2, K1, K3, and S2 which can be interpreted as due Availability Readiness indicators that fall into this factor a great deal about the availability of information, infrastructure, applications and resources. The second factor consists of the P1, P2, F1, F2, and S1 which can be interpreted as a Business Process Readiness for the indicators included in this factor a lot of talk about the business process and scope of implementation. Indicators Of The Most Influential ERP Implementation Readiness. Table 2 explains the average weight of each answer questionnaires using Likert scale. From the table it can be seen indicators that are ready and not ready for the implementation of the ERP system at XYZ Company.

According to the table it can be stated that the three (3) statements that scored the highest average is K2, P1 and F1. The third indicator is an indicator of the most prepared in the implementation of ERP systems on XYZ Company. The third statement is:

1. K2: The management and committed support in ERP implementation
2. P1: The scope of implementation / modules to be implemented ERP to be implemented is determined at the beginning of implementation
3. F1: Users know the company's business processes are running at the moment.

While the three (3) statements that got the lowest average value is P3, S1 and K3. The third indicator is an indicator of ill-equipped for the implementation of the ERP system at XYZ Company.

The third statement is:

1. P3: Users get information on the progress of implementation of ERP
2. S1: Schedule of ERP implementation has been scheduled, known and agreed
3. K3: Users receive training on ERP

Model Affecting ERP System Implementation Readiness:

In the study, 2 (two) new factors affecting ERP implementation readiness, ie Business Process Availability and Readiness Readiness. For more details can be seen in Figure 2.

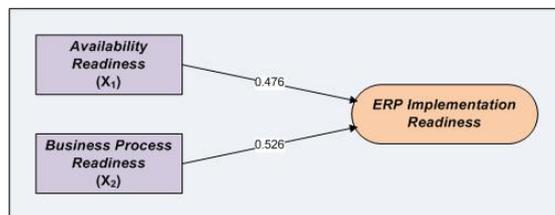


Fig. 2: Factors Affecting ERP implementation Readiness.

Source: analysis result, 2013

By using the ERP system implementation readiness assessment at this time as the dependent variable and the factor scores as the independent variable, then followed by analysis using regression techniques. From the results of the regression analysis conducted, it found that the equation can be used as a formula which describes the preparation of ERP system implementation at XYZ Company.

$$Y = 5.879 + 0.476 X_1 + 0.526 X_2$$

Where the upper and lower limits as follows:

$$-2.006 \leq X_1 \leq 2.282$$

$$-3.122 \leq X_2 \leq 1.608$$

Managerial Implications:

ERP System Implementation Readiness Evaluation Based on the research results, it can be seen that according to the respondents they are less informed about the progress of implementation of ERP system which will indirectly make respondents feel is not involved in the implementation of the system. To overcome this problem, it can be done weekly meetings or weekly reports to be sent via e-mail with the person in charge part which will then be submitted to the other members. In addition, the indicators according to the respondents is less prepared scheduling problem of ERP system implementation. This can be addressed by improving the dissemination of information about the implementation of the ERP system to the interested parties. In addition to the two previously mentioned, the training problems was also assessed by the respondents are still lacking. Training is very important because it involves the correct use of the system for the future. In terms of respondents' demographic data, we can see that the majority of respondents aged 36-40 years, and more than half of respondents aged over 36. Looking at the age of the respondents who had entered in the elderly category, then given training delivery methods should also be considered as well as the intensity of the training must also be increased.

This research resulted in 2 (two) new factors that imply for the managerial XYZ Company to pay attention to these factors in order to increase the level of readiness of ERP system implementation at XYZ Company. With the increasing readiness of the ERP system implementation is expected to help increase the success in the implementation of ERP systems.

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Conclusion:

Based on the results of the questionnaire data processing involving as many as 66 respondents, researchers proved that:

1. From the results of factor analysis performed in the study, 2 (two) new factors affecting ERP implementation readiness at PT. Ie XYZ Business Process Availability and Readiness Readiness.
2. Indicators that affect the readiness of ERP system implementation at XYZ Company is:
 - a. Management support and commitment in ERP implementation
 - b. he scope of implementation / modules to be implemented ERP to be implemented is determined at the beginning of implementation.
 - c. Users know the company's business processes are running at the moment.
3. Portrait model of ERP system implementation readiness at XYZ Company is:

$$Y = 5.879 + 0.476 X_1 + 0.526 X_2$$

4. Results of evaluation of ERP system implementation readiness conducted to XYZ Company is:
 - a. Based on the results of the questionnaire obtained the value of ERP system implementation readiness date is 5.88 of the value of 10 which can be said that the preparation of ERP system implementation at XYZ Company is between less and Self.
 - b. Respondents were not well-informed about the progress of the implementation of the ERP system and the training provided is also assessed to be less.

Some things to note, further research can cover an existing shortfall. The suggestions for further research are as follows:

1. Factors affecting ERP system implementation readiness can be added from outside the ERP system readiness theory.
2. Expanding population of respondents in a sample of various other companies that implement ERP, so it will get more varied data.
3. Methods of data collection do not just stare at the questioner, do data collection of facts or phenomena that exist on the object of research, and researchers codified in a way that can be performed statistical tests.

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