

# SUCCESSFUL INFORMATION COMMUNICATION TECHNOLOGY SYSTEM ON ENTERPRISE RESOURCE PLANNING IMPLEMENTATION:

## A CASE STUDY OF METAL-WORK INDUSTRIES IN INDONESIA

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**Abstract**—This article aims to determine whether the support, participation and commitment of top management; change management; and user satisfaction influence the success in information communication technology system via enterprise resource planning (ERP) implementation in Indonesian-based metal-work industries. This work also determined the factors that commonly influence the success and failure of ERP implementation. The results revealed that user satisfaction, change management and top management commitment significantly influence the success of ERP implementation.

**Keywords**—*Top Management Support, Top Management Participation, Top Management Commitment, Change Management, User Satisfaction.*

### I. INTRODUCTION

Information communication technology (ICT) refers to the system that can increase a company's competitive advantage in the market. Enterprise resource planning (ERP) has been widely used by various industries in Indonesia. ERP is the ICT application used by companies to integrate business processes across different departments. With the capability to monitor various activities in real time, companies can quickly and accurately make business decisions. Therefore, in terms of speed, precision and accuracy of decision making, ERP provides a competitive advantage (Davenport, 1998).

The research objectives are as follows:

1. Integrating Application Systems. The company previously used three different applications and decided to replace them with ERP. ERP is expected

to assist in rapid and accurate decision-making, thus eliminating delays.

2. Managing Aggregate Planning, Sales and Inventory. ERP is expected to become one of the tools for accommodating the needs for management of aggregate planning, sales and inventory.

To date, the ERP implementation failure rate is high at around 70% (Gargeya & Brady, 2005). Standish Group (The Standish Group, 1995) showed that only 16.2% of companies successfully completed the implementation of ERP, 31.1% cancelled ERP and 52.7% experienced delays. On the other hand, the total investment in this ICT project is relatively large. Therefore, the correct implementation of ERP stages should be ensured, and the factors determining the success of an ERP implementation project should be considered.

Considering the project data, the project manager comes from ERP vendors, whereas the project controller is represented by an internal general manager (GM). Soja (2006) stated that the management should support and be involved in ERP implementation team. In addition, whether users are satisfied with the ERP software used must be analysed.

This study is expected to answer the following questions:

1. How does the involvement of management, management support, commitment management, change management and user satisfaction affect the successful implementation of ERP in a company?
2. What managerial implications can be considered after determining the influence of the above factors on the success of ERP implementation?

## II. LITERATURE REVIEW

The following are the most important functions of ERP (Well & Lau, 2001):

1. Automation and integration of an organisation's business processes;
2. Sharing common data and practices across the entire enterprise;
3. Production and accessing information in a real-time environment.

Companies use ERP to improve the efficiency of supply chains (Motiwalla & Thompson, 2009). Dezdard (2009) defined successful ERP implementation by a split definition of success: success of the project and success of the business side of the company. Timely implementation, spending within the budget and achievement of project goals at the beginning are considered as successful achievements from the aspects of project implementation. On the other hand, the decline in inventory, fast response to market and resource efficiency are indicators of a company's success.

## III. RESEARCH MODEL

The model of this research can be observed in the following figure.

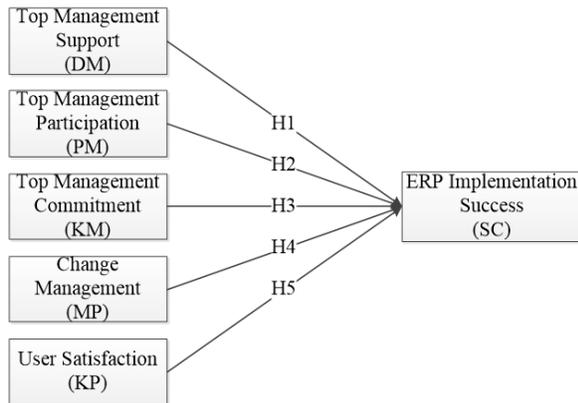


Fig 1. Research Model

### A. Critical success factors of ERP implementation

ERP implementation is a process that features a high level of complexity, featuring numerous influencing factors that can affect its success. These factors could result in success or failure in implementation (Soja, 2006).

The critical success factors of ERP are often identified as the key elements necessary for the success of business operations (Hossain & Shakir, 2001). Laudon (2006) defined the critical success factors of ERP implementation as points of general importance that can determine success or failure.

Well mentioned 11 critical success factors of ERP implementation (Well & Lau, 2001). Likewise, Dezdard

(2009) reported a taxonomy showing the key success factors of ERP implementation and defined a successful ERP implementation. The study revealed user training and education, user involvement, top management support and change management as factors affecting the ERP implementation.

### B. Research Hypotheses

#### 1) Top management support

The aspects of top management support can be summarised in the following hypothesis:

H11: Top management support affects the success of ERP implementation.

#### 2) Top management participation

The aspects of top management participation can be summarised in the following hypothesis:

H22: Top management participation affects the success of ERP implementation.

#### 3) Top management commitment

The aspects of top management commitment can be summarised in the following hypothesis:

H33: Top management commitment affects the success of ERP implementation.

#### 4) Change management

The aspects of change management can be summarised in the following hypothesis:

H44: Change management affects the success of ERP implementation.

#### 5) User satisfaction

The aspects of user satisfaction can be summarised in the following hypothesis:

H55: User satisfaction affects the success of ERP implementation.

### 6) DeLone and McLean Information System Success Model

In 1992, DeLone and McLean published their research, in which they attempted to show the awareness and structure of a dependent variable and the success of an information system. They proposed a taxonomy and interactive model as a frame of reference in the successful implementation of an information system.

## IV. METHODOLOGY

The study was conducted to explore the factors influencing the success or failure of ERP implementation in a company. These factors are defined in the form of operational variables in a questionnaire. The number of surveyed users was 66 out of 87 targeted users.

**A. Data Collection**

**Table 1. Variables Operationalisation**

Latent Variables	Variables Operationalisation Statement
Implementation Success	<ul style="list-style-type: none"> <li>Implementation is generally successful, on time and within budget.</li> <li>The goals of ERP implementation are met and in accordance with the scope of the project.</li> <li>Users are satisfied using ERP application.</li> </ul>
Top Management Support	<ul style="list-style-type: none"> <li>Top management supports implementation project.</li> <li>Management allocates employees as core team members of the project and provides a budget and incentives to employees who are involved.</li> </ul>
Top Management Participation	<ul style="list-style-type: none"> <li>A top management representative is involved in the organisational structure of the project and participates in daily project activities.</li> <li>The project is led by a top management representative.</li> <li>The ultimate goal of ERP implementation is jointly prepared by the top management including.</li> </ul>
Top Management Commitment	<ul style="list-style-type: none"> <li>The top management is committed to achieving successful ERP implementation.</li> <li>The top management is responsible for implementation success.</li> <li>The management has consistently taken time to resolve arising problems.</li> <li>The management always evaluates project progress as a commitment.</li> </ul>
Change Management	<ul style="list-style-type: none"> <li>Business processes are altered to fit in with the existing processes in ERP applications.</li> <li>Changes are made in the organisational structure and culture of work to adjust companies' internal processes with ERP.</li> <li>There was awareness building of the existence of ERP implementation.</li> </ul>
User Satisfaction	<ul style="list-style-type: none"> <li>The ERP quality is determined by whether the system is stable, responds quickly, safe, accessible and flexible.</li> <li>The quality of the information generated from the ERP application is determined by whether it is accurate, reliable, always available and in accordance with the wishes of the user.</li> <li>Services of the ERP team include smooth communication established between the user and ERP team.</li> <li>The relationship between ERP and user team is harmonious and indicates the team is supportive.</li> <li>The ERP team trains users properly and users are familiar with the ERP systems used.</li> </ul>

**B. Result**

**Table 2. Descriptive Statistics**

Variable	All Respondents			Staff/Senior Staff		
	N	Mean	SD	N	Mean	SD
ERP Success	66	3,20	0,99	45	3,27	0,94
Top Management Support (DM)	66	4,40	1,11	45	4,36	1,12
Top Management Participation (PM)	66	4,59	0,87	45	4,48	0,94
Top Management Commitment (KM)	66	4,20	1,14	45	4,26	1,07
Change Management (MP)	66	4,37	0,93	45	4,31	0,97
User Satisfaction (KP)	66	3,97	1,07	45	3,93	1,08

- Measurement scale: 1 (strongly disagree), 2 (disagree), 3 (somewhat disagree), 4 (somewhat agree), 5 (agree) and 6 (strongly agree)

Table 2 indicates that most of the 66 respondents were of the view that the ERP implementation in their companies was not successful. Users tend to judge the

direction of scale rather than agree with the general statement about successful implementation and implementation of ERP goals on time and within budget. The respondents also agreed that they should support the management of ERP implementation projects in their company. Judging from participation shown by the management, of the respondents agree. While the views of whether management is committed for implementation runs, respondents tend to be somewhat agree. Likewise, considering the management change, the respondents agreed that the business processes change the management and organisational structure to support the successful implementation of ERP.

Thus, on the basis of analysis of statistical calculations and review, conclusions about the study can be drawn, as shown in Table 3 below.

**Table 3. Hypothesis Result**

Research Hypothesis	Statistic Hypothesis	p-value	Conclusion
Top management's support affects the success of ERP implementation	<ul style="list-style-type: none"> <li>H11: Support research hypothesis if <math>\beta_1 \neq 0</math></li> <li>H01: Reject research hypothesis if <math>\beta_1 = 0</math></li> </ul>	.397	Reject hypothesis H11
Top management participation affect the success of ERP implementation	<ul style="list-style-type: none"> <li>H22: Support research hypothesis if <math>\beta_2 \neq 0</math></li> <li>H02: Reject research hypothesis if <math>\beta_2 = 0</math></li> </ul>	.528	Reject hypothesis H22
Top management commitment affect the success of ERP implementation	<ul style="list-style-type: none"> <li>H33: Support research hypothesis if <math>\beta_3 \neq 0</math></li> <li>H03: Reject research hypothesis if <math>\beta_3 = 0</math></li> </ul>	.015	Support hypothesis H33
Change management affects the success of ERP implementation	<ul style="list-style-type: none"> <li>H44: Support research hypothesis if <math>\beta_4 \neq 0</math></li> <li>H04: Reject research hypothesis if <math>\beta_4 = 0</math></li> </ul>	.000	Support hypothesis H44
User satisfaction affects the success of ERP implementation	<ul style="list-style-type: none"> <li>H55: Support research hypothesis if <math>\beta_5 \neq 0</math></li> <li>H05: Reject research hypothesis if <math>\beta_5 = 0</math></li> </ul>	.000	Support hypothesis H55

**C. Discussion**

Based on the regression analysis results, the first hypothesis was rejected owing to the absence of a significant relationship between the top management

support and successful ERP implementation in a company, as expressed by the p-value of 0.397 (above 0.05). Another similar research stated that this factor results in a significant effect, but it showed no influence in this study. However, other studies also suggest that the support and involvement of top management causes no effect on the success of ERP implementation, although the top management commitment is more influential (Hartijasti, 2011).

Other factors outside of top management support showed a more significant effect. Interviews also revealed that communication factors and project manager were regarded as more significant contributors. Opportunities were supposedly described in 63.4% of variables that were considered as other factors exerting more influence on the ERP implementation.

Hypothesis 2, which states that top management participation affects the success of ERP implementation in this study, was rejected owing to the lack of statistical significance supporting the existence of such influence. The results for inadequate participation of the top management in the successful implementation included support and commitment, which play important roles in the success of ERP implementation instead of management participation. Participation should only be shown in the level that provides oversight and resolves crucial issues and not in the level of day-to-day activities.

The survey results indicate that the management, represented by GM, participated in the implementation team. This finding was evident from the average number of respondents who agreed with the statement indicating the involvement and participation of management in managing ERP implementation.

The third hypothesis, which states that the success of ERP implementation is influenced by the commitment of top management, was accepted. However, the observed relationship was negative, that is, an increase in management commitment will hamper the success of ERP implementation. The average respondents also agreed with the commitment given by top management during implementation, although they rated the company's ERP implementation to be less successful.

For users who were also respondents, the top management demonstrated their commitment through involvement in solving problems that occur specifically after the live phase. This period in the company was the busiest time for the team and top management, who support themselves because of many problems arising from the commencement of Acumatica-IT software as a substitute for old systems that had already been used. In addition, the use of ERP is still unstable in the company. Thus, most respondents considered the failure of ERP implementation. Thus, on one hand, the respondent has not considered ERP implementation to be successful, and the top management commitment has been

supposedly demonstrated. On the other hand, the negative relationship between the commitment of top management and success of ERP implementation is also explained.

Hypothesis 4 supports the influence of change management on determining the success or failure of ERP implementation, that is, the change management affects the success of ERP implementation in a company. The conclusions resulting from these factors exhibited statistical significance. However, the relationships were formed inversely, i.e., improved top management commitment would reduce the success of ERP implementation.

The company changed several business processes across multiple departments to adjust the business flow to ERP applications. Customisations were conducted on screening, reports and business flow. Errors hampered system performance in terms of speed of information flow. The information flow was hindered as the implementation team needed time to troubleshoot the errors. Steps were also taken to slow down the impact of information flow on the company's operations. For example, an error in the display Vendor bills, which causes inaccessibility of the module, resulted in failure of invoice print out. This finding was also confirmed by the results of interviews with GM stating that the system often encounters error, which ultimately affects the other processes. Therefore, from the above results, the negative relationship between the management of change with ERP implementation success results from customisation, which ultimately leads to errors that then inhibit data flow.

The fifth hypothesis was accepted, that is, the success of ERP implementation is influenced positively by the ERP user satisfaction. Among all the variables studied, user satisfaction was one of the most dominant factors influencing the success of ERP implementation. This finding agrees with the understanding and experience of the author, who was involved in several ERP implementation projects. These results are also consistent with those of previous studies, which suggested a positive relationship between user satisfaction and the success of ERP implementation.

User satisfaction consists of three elements that cannot be separated from each other. The purpose of inseparability is to analyse user satisfaction during a successful implementation of technology products, which should be viewed from the aspect of quality of information produced, quality of the system and quality of support or services given by a support team to respond and resolve user problems. This finding is consistent with that of previous studies suggesting a positive influence user satisfaction, which is represented by the quality of ICT system used, in the success of ERP implementation.

## V. CONCLUSION

User satisfaction positively influences the success of ERP implementation, whereas top management commitment and change management result in a negative effect. A positive influence means that an increased user satisfaction will increase the success rate of ERP implementation. On the other hand, negative effects mean the increased commitment of top management, whereas change management reduces the level of ERP success. Meanwhile, management support and participation showed no effect on the success or failure of ERP implementation. However, other factors, accounting for 63.4% of all studied variables, are believed to impact the success of ERP implementation. For companies that use ERP, this type of planning is considered as one aspect of technology that can be used to improve operational performance. This study showed that ERP has started to show positive effects. Given the visible impact of positive responses from the interview with the GM, as revealed by the use of data set and integrated information, the company could rapidly make strategic decisions.

Nevertheless, good training is a key in reducing transaction entry errors. With a good knowledge gained by the user, the errors should be minimised. In addition to minimising errors, a good training will also facilitate the data flow between departments in the company.

From a vendor's perspective, these results are useful when recommending a better implementation strategy for a company that will implement the ERP in its next project. Consultants play important role in the implementation, that is, they can formulate the right strategy.

For ERP consultants, the results have shown that the change management holds one of the key roles that determine the success or failure of ERP implementation. Through these results, ERP consultants can prioritise how to manage changes to adapt a new system. From the aspect of user satisfaction, consultants should be careful in analysing ERP applications, which are selected for compatibility between applications and business processes to reduce user complaints. The difficulty of the user to understand the ERP system will usually result in inaccurate data input and a number of errors. These errors will result in inaccurate data generated from the ERP application.

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