



The Role of Organization Maturity Level to Improve the Information System Capability

Gede Rasben Dantes^{1*} 

¹Department of Information System, Universitas Pendidikan Ganesha, Singaraja, Indonesia

*Corresponding author: rasben.dantes@undiksha.ac.id

Abstrak

Tingkat kematangan organisasi jarang dipertimbangkan ketika mengadopsi teknologi baru. Penelitian ini bertujuan untuk mengetahui peran tingkat kematangan organisasi dalam rangka meningkatkan kapabilitas sistem informasi (SI) melalui pendekatan implementasi ERP. Ada empat variabel yang terlibat dalam penelitian ini, yaitu: ERP mendorong Business Process Reengineering (BPR) (X1), BPR mendorong ERP (X2) sebagai variabel independen, tingkat kematangan organisasi (Y) sebagai variabel moderasi, dan kapabilitas SI (Y1) sebagai variabel terikat. Teknik analisis yang digunakan adalah analisis jalur untuk mengidentifikasi pengaruh langsung dan tidak langsung antara pendekatan implementasi ERP dan kemampuan SI melalui tingkat kematangan organisasi. Ada 277 individu kunci dari 37 organisasi yang berbeda yang diwakili 10 sektor industri menanggapi kuesioner. Tingkat respon untuk penelitian survei ini adalah 39,57% dari 700 kuesioner yang disebar. Hasil survei menunjukkan bahwa tingkat kematangan organisasi memiliki peran utama yang dapat meningkatkan kapabilitas SI yang lebih baik dalam organisasi. Terlihat bahwa pengaruh langsung antara X1 dan Y1 ($\rho_{Y1X1}=0,331$) lebih rendah daripada pengaruh tidak langsung antara X1 dan Y1 melalui Y (ρ_{YX1} dan $\rho_{YY1} = 0,369$). Sedangkan pengaruh langsung antara X2 dan Y1 ($\rho_{Y1X2}=0,096$) lebih rendah daripada pengaruh tidak langsung antara X2 dan Y1 melalui Y (ρ_{YX2} dan $\rho_{YY1} = 0,233$). Dapat disimpulkan bahwa organisasi harus lebih berupaya pada tingkat kematangan organisasi untuk mendapatkan kapabilitas SI yang lebih baik, terutama ketika menggunakan pendekatan ERP drive BPR untuk mengimplementasikan sistem ERP.

Kata kunci: Tingkat Kematangan Organisasi, Pendekatan Implementasi ERP, Kemampuan IS

Abstract

Organization maturity level is rarely considered when adopted a new technology. Aim of this study is to find the role of organization maturity level in order to improve the information system (IS) capability through ERP implementation approach. There are four variables involved on this study, namely: ERP drives Business Process Reengineering (BPR) (X1), BPR drives ERP (X2) as independent variables, organization maturity level (Y) as a moderating variable, and IS capability (Y1) as a dependent variable. The analysis technique used is the path analysis to identify direct and indirect effect between ERP implementation approach and IS capability through organization maturity level. There are 277 key individuals from 37 different organization which is represented 10 industrial sectors responded to the questionnaires. The response rate for this survey research is 39.57% from 700 questionnaires which were distributed. Survey result shows that organization maturity level has a major role which can improve to better IS capability in organization. It is shown that a direct effect between X1 and Y1 ($\rho_{Y1X1}=0.331$) is lower than an indirect effect between X1 and Y1 through Y (ρ_{YX1} and $\rho_{YY1} = 0.369$). Whereas, direct effect between X2 and Y1 ($\rho_{Y1X2}=0.096$) is lower than indirect effect between X2 and Y1 through Y (ρ_{YX2} and $\rho_{YY1} = 0.233$). It can be concluded that the organization has to put a more effort on organization maturity level in order to gain a better IS capability, especially when it uses BPR drives ERP approach to implement the ERP system.

Keywords: Organization Maturity Level, ERP Implementation Approach, IS Capability

1. INTRODUCTION

Organization maturity level is one factor which effect to the success of ERP system implementation (Abdelghaffar, 2012; Dantes & Hasibuan, 2011; Davenport, 2000; Katuu, 2020; Ullah et al., 2018). The company with higher maturity level has higher probability of ERP implementation. But that may not always be the case. Other factors may influence as well. The organization maturity level can be classified into three levels: strategic, managerial, and operational. These categories are based on information system (IS) roles in an organization. The indicators which are used to measure the organization maturity level

History:

Received : September 09, 2022

Revised : September 10, 2022

Accepted : October 20, 2022

Published : October 25, 2022

Publisher: Undiksha Press

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(Carvalho et al., 2019; Shang & Seddon, 2000). In the operational level, role of IS has several indicators namely reduction on cost and time cycle and improvement on productivity, quality, and customer service. Meanwhile, in strategic level, the maturity level is indicated by supports of business growth and business alliance, cost leadership, product differentiation, and external linkage (Febrianto & Soediantono, 2022; Lutfi et al., 2022; Odważny et al., 2019).

Referring to the ERP implementation in Indonesia, there are 255 companies have been implementing this system. However, there are number of companies who were failed on their implementation. Indonesia still struggles with ERP implementation, where nearly 60% of the implementation in both public and private companies remain unsuccessful (Dantes & Hasibuan, 2011). Such rate is affected by technical and non-technical aspects including organization maturity level, organizational culture, top management support, budget, government policy, political issues, ERP implementation approach, customizing, and selection of ERP product (Bhatti, 2005; Chung et al., 2008; Ehie & Madsen, 2005; Gargeya & Brady, 2005; Somers & Nelson, 2004; Tsai et al., 2005).

Despite the rate of the failure, companies persist to adopt this system due to the reason of investment made by companies, ERP system integration business, and also promises to improve the company's competitive position in the market (Faccia & Petratos, 2021; Luo & Strong, 2004; Thanh, 2022). ERP implementation also offers benefits such as integrated data and application substituting legacy systems, lower cost and faster deployment compared with in-house development, as well as adoption of ERP best practices into business company processes (Markus & Tanis, 2000). The success of ERP implementation discussed, has been centered on ERP implementation approach, both “ERP drive BPR” and “BPR drive ERP” approach. The “ERP drive BPR” is known as clean sheet approach, and “BPR drive ERP” is known as customize approach. But, the result from previous study (Dantes & Hasibuan, 2011), it is shown that neither approach can be judged which one superior. However, “ERP drive BPR” approach has a minimal risk on ERP implementation, rather than “BPR drive ERP” approach (Daniel, 2000).

ERP system implementation usually involves two approaches, namely: (1) Business Process Reengineering (BPR) drives ERP approach, and (2) ERP drives BPR approach (Daniel, 2000; Park, 2018; Puspitasari et al., 2021; Strugar, 2019). An organization with a mature business process usually comes up with the first approach (Cheng & Wang, 2006; Dantes & Hasibuan, 2011; Pattanayak & Roy, 2015; Strugar, 2019). Therefore, the BPR will drive a requirement for information system that support an organization's day-to-day activities. On the other hand, this approach is used by organization to gain a competitive advantage. Meanwhile, the companies without business maturity usually take the second approach which result may serve as a recommendation when it has reengineered the organization business process. While ERP drive BPR approach can be done in two ways namely (1) minimum software change and minimum process change or (2) minimum software change and maximum process change, implementing BPR drive ERP can be done by: (1) maximum process changes and maximum software change or (2) minimum process changes and maximum software change.

On this study, we focus on how ERP implementation approach through organization maturity level can improve the IS capability. There is various indicator that can be used to measure the IS capability (Aydiner et al., 2019; Bi et al., 2010; Roldán et al., 2016). The measurement can be done by identifying leadership, business system thinking, relationship building, architectural planning, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development as a set of nine core of IS capabilities (Feeny & Willcocks, 1998). Meanwhile, information technology practices (ITP), information management practices (IMP), information behaviors and values (IBV) as three

cores IS capabilities (Marchand et al., 2000). The three IS capabilities are further divided into 15 competencies. IT for operational support, IT for business process support, IT for innovation support, and IT for management support comprise ITP competencies. Whilst, IMP competencies cover sensing information, collecting information, organizing information, processing information, and maintaining information. IBV competencies are contained integrity, formality, control, sharing, transparency, and proactiveness. However, on this study, we define the IS capability as a capability of IS that viewed from the system itself and impact to organization. There are five dimensions that used to measure the IS capability, namely the quality of system, information, and service quality as well as the tactical impact and strategical impact. Related to adoption of ERP system, the organization maturity level is rarely considered. Instead, organization maturity level seems play a major role to determine the information system (IS) capability in an organization, and in turn determine the success of ERP system implementation. Therefore, on this study will examine the role of organization maturity level as a moderating variable between ERP implementation approaches and IS capability

2. METHODS

The present study focused on examining a number of issues regarding the role of organization maturity level in order to improve the IS capability through ERP implementation approaches. There are four variables involved on this study, namely: ERP drives Business Process Reengineering (BPR) (X_1), BPR drives ERP (X_2) as independent variables, organization maturity level (Y) as a moderating variable, and IS capability (Y_1) as a dependent variable. On this study, we focus to explore the direct and indirect effect between ERP implementation approach to IS capability with or without organization maturity level as a moderating variable. The ERP implementation approach refers to the score of the approach adopted in ERP implementation whether by conducting BPR prior to ERP implementation or the organization follows ERP's business process.

Whereas, organization maturity level is the score of the role of IS in organization (Shang & Seddon, 2000). The organization maturity level includes operational, managerial, and strategic level. Distinguished measurement indicators comprise each the organization maturity level that are used in mapping the organization maturity level. The IS capability is the score of benefit that company has through ERP implementation and also the quality of the system. The benefit can be classified into tactical and strategical. The indicators measured include time efficiency, improve decision quality, improve productivity, manage data resources, support e-business, create competitive advantage, business growth, business innovation, cost leadership, create product differentiation, etc. The constellations of the variables above are illustrated in Figure 1.

The data consists of 37 companies with 277 respondents who included top level management, middle level management, users/keyuser, IT staff, project managers and consultants both technical and functional. The companies that become samples in this study represented 10 different industrial sectors, including: agro-industry, construction & engineering, energy, IT services, manufacturing, government, air flight service, banking, retail, telecommunications and automotive (see Table 1).

The response rate for this survey research is 39.57% from 700 questionnaires which were distributed. Structured and unstructured interviews and document observation were conducted to support the data gained from the survey. The questions posed were focused on: (1) the organization maturity level, (2) implementation approach and (3) the IS capability.

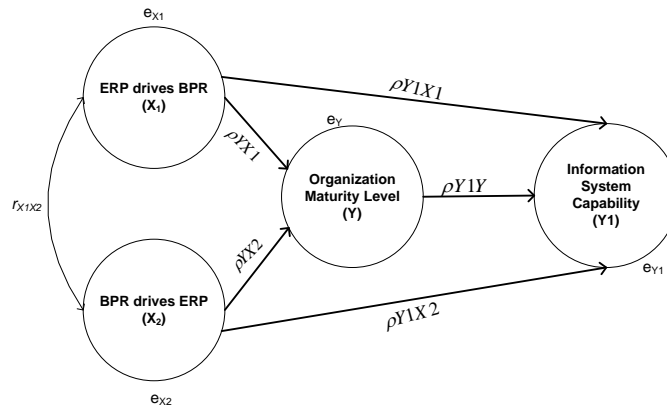


Figure 1. The Hypothetical Model

Table 1. Sample Characteristics

Industrial Sectors	Number	Percentage	ERP Products	Number	Percentage
Agroindustri	1	2.70%	SAP R/3	23	62.16%
Automotive	2	5.41%	Oracle Enterprise	5	13.51%
Government	6	16.22%	Axapta	3	8.11%
IT Services	8	21.62%	JD Edward	4	10.81%
Manufacturing	4	10.81%	Open source	2	5.41%
Oil, Gas, Energy & Mining	5	13.51%			
Air Flight Company	2	5.41%			
Banking	3	8.11%			
Retail	2	5.41%			
Telecommunication	4	10.81%			

Periods of ERP Implementation	Number	Percentage	Number of Employees	Number	Percentage
<= 1 year	2	5.56%	0 – 100	2	5.68%
1 – 2 years	4	10.00%	101 – 500	7	19.32%
2 – 3 years	9	24.44%	501 – 1000	4	10.23%
4 – 5 years	4	11.11%	1001 – 5000	11	28.41%
>5 years	18	48.89%	5001 – 10,000	9	25.00%
			>10,000	4	11.36%

3. RESULTS AND DISCUSSION

Result

The Relationship between ERP Implementation Approach and IS Capability

Refer to hypothetical model, we find the correlation between “ERP drive BPR” approach (X₁) and IS capability (Y₁) is more significant than the correlation between “BPR drive ERP” approach (X₂) and (Y₁). It shows by the coefficient correlation between X₁ and Y₁ is 0.410 and the coefficient correlation between X₂ and Y₁ is 0.262 (see Table 2). In additional, by using path analysis we find that the direct effect between X₁ and Y₁ is 0.331, and the direct effect between X₂ and Y₁ is 0.096. It implies that “ERP drive BPR” approach

has more significant effect to improve the IS capability, rather than “BPR drive ERP” approach.

It is a paradox, when the company wants to gain a competitive advantage or strategic benefit through an ERP implementation by using the “BPR drive ERP” approach. However, this approach has no significant effect to improve the IS capability and has a higher risk of failure on ERP implementation. Therefore, some questions will be raised, how can the organization use the “BPR drive ERP” approach to improve the IS capability?

Table 2. Pearson Correlation Matrix of All Variables (N = 277)

Variable	Mean	SD	ERP drive BPR (X ₁)	BPR drive ERP (X ₂)	OML (Y)	ISC (Y ₁)
ERP drive BPR (X ₁)	6.52	1.215	—	—	—	—
BPR drive ERP (X ₂)	5.67	1.386	0.425***	—	—	—
OML (Y)	34.59	7.250	0.229**	0.150*	—	—
ISC (Y ₁)	93.97	12.179	0.410**	0.262**	0.259**	—

* $P < 0.05$; ** $P < 0.01$; *** No Multi-Co linearity

Legend:

OML : Organization Maturity Level

ISC : IS Capability

Role of Organization maturity level to Improve the IS Capability

On this section, we focus on the role of organization maturity level in order to improve the IS capability. To address the objective of this research, we use path analysis to find the direct and indirect effect between ERP implementation approaches and IS capability through organization maturity level. First, we have to find out the coefficient correlation among variables by using Pearson Correlation Test (see Table 2). The result shows that all variables have a significant correlation at 0.01 or 0.05 level. The “ERP drives BPR” approach and IS capability has most significant correlation. This approach is almost chosen by organization when implemented the ERP system.

Based on the Table 2 and refer to the hypothetical model, we formulate the path equations (see Figure 2). Thus, it finds that the direct effect between “ERP drive BPR” approach (X₁) and IS capability (Y₁) ($\rho_{X_1Y_1} = 0.331$) is lower that indirect effect between X₁ and Y₁ through organization maturity level (Y) (and $\rho_{Y_1Y} = 0.369$). Whereas, the direct effect between “BPR drive ERP” approach (X₂) and Y₁ ($\rho_{Y_1X_2} = 0.096$) is lower than indirect effect between X₂ and Y₁ through Y (ρ_{YX_2} and $\rho_{Y_1Y} = 0.233$). It means that the organization maturity level has an important role to gain a better IS capability. Especially when the organization chooses the “BPR drive ERP” approach. It is shown by a significant increasing of path coefficient from 0.096 to 0.233 with considering the organization maturity level as a moderating variable.

It can conclude that whatever approach is taken when the company has a higher level of organization maturity, then it can gain a better IS capability (see Figure 3). The higher level of organization maturity will make the organization ready to accept a radical change on the process which is caused by implementation of ERP system. Implementation of ERP system is not like a normal information system. It needs more effort on the process change rather than the technology change.

$$\begin{aligned}
 r_{X1Y1} &= \rho_{Y1X1} + (r_{X1X2} * \rho_{Y1X2}) + (r_{X1Y} * \rho_{Y1Y}) \\
 0.410 &= \rho_{Y1X1} + 0.425 \rho_{Y1X2} + 0.229 \rho_{Y1Y} \dots\dots\dots (1) \\
 \\
 r_{X2Y1} &= \rho_{Y1X2} + (r_{X1X2} * \rho_{Y1X1}) + (r_{X2Y} * \rho_{Y1Y}) \\
 0.262 &= \rho_{Y1X2} + 0.425 \rho_{Y1X1} + 0.150 \rho_{Y1Y} \dots\dots\dots (2) \\
 \\
 r_{YV1} &= \rho_{Y1Y} + (r_{X1Y} * \rho_{Y1X1}) + (r_{X2Y} * \rho_{Y1X2}) \\
 0.259 &= \rho_{Y1Y} + 0.229 \rho_{Y1X1} + 0.150 \rho_{Y1X2} \dots\dots\dots (3) \\
 \\
 r_{X1Y} &= \rho_{YX1} + (r_{X1X2} * \rho_{YX2}) \\
 0.229 &= \rho_{YX1} + 0.425 \rho_{YX2} \dots\dots\dots (4) \\
 \\
 r_{X2Y} &= \rho_{YX2} + (r_{X2X1} * \rho_{YX1}) \\
 0.150 &= \rho_{YX2} + 0.425 \rho_{YX1} \dots\dots\dots (5)
 \end{aligned}$$

Figure 2. The Path Equations Refer to The Hypothetical Model

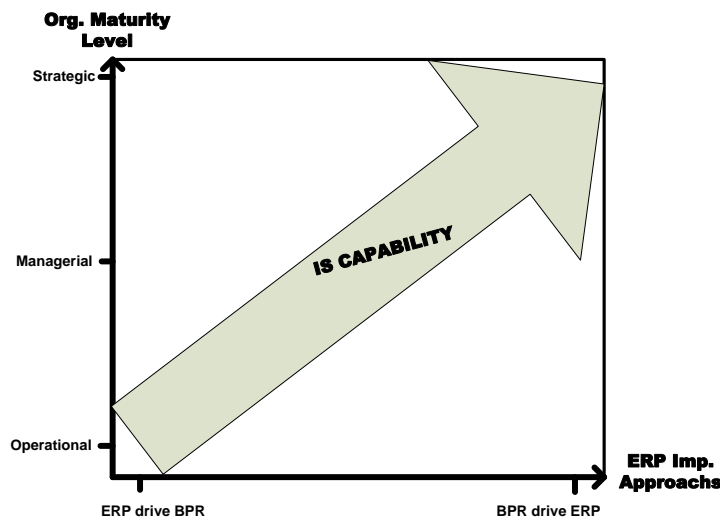


Figure 3. The relationship among ERP implementation approach, organization maturity level, and IS capability

Discussion

There are two approaches which are normally used on implementation of ERP system, namely: (1) “ERP drive BPR” and (2) “BPR drive ERP” approach. The first approach will give a smaller failure rather than the second approach (Daniel, 2000). However, the “ERP drive BPR” approach only gives a tactical benefit for the company instead of strategical benefit (Dantes & Hasibuan, 2011). Especially in Indonesia, more companies used the ERP drive BPR approach rather than the other approach. Because the companies want to avoid the failure on ERP system implementation. Yet, they only gain a tactical benefit through the implementation of this system. The previous study shown that 7.58% respondents stated that the company used “BPR drive ERP” approach, whereas 10.61% stated that the company used “ERP drive BPR” approach to adopt the system.

Although “BPR drive ERP” approach has a bigger risk of failure. However, the company who success used this approach will gain a strategic benefit or even create a competitive advantage. Because the company still can sustain the organization’s unique

process and also improve the existing business process before implement the ERP system. ERP is a software package. The ERP system can be implemented by every company to support their business. To make a different with other company or improve the company's competitiveness, then the organizations have to maintain the company's unique process (Daniel, 2000; Davenport, 2000; Porter, 1985) and to conduct the BPR prior the ERP implementation.

The organization maturity level seems play a major role to determine the IS capability, and in turn determine the success of ERP implementation. However, the organization maturity level is rarely considered as a major role in ERP system implementation. Especially in Indonesia, many companies adopted this system which is driven by technology itself rather than organization's business need. This implies that the implementation of ERP has not given significant impact for those companies (Dantes & Hasibuan, 2011). The higher organization maturity level, the better IS capability will gain by the company. However, number of companies in Indonesia who implemented the ERP system was laid in the operational and managerial level. It shown that organization maturity level does not become a main reference when the companies implement the ERP system (Dantes, 2010).

In line with the findings of this study which discovers that organization maturity level has a significant role in order to gain a better IS capability for the company, future research needs to be conducted to explore the effect of ERP implementation approach to business capability through organization maturity level. The future research is an extended hypothetical model of this study.

4. CONCLUSION

Organization maturity level has a major role in order to gain a better IS capability. It is not depending on ERP implementation approach which is taken. The organization maturity level has a significant role when company chooses the "BPR drive ERP" approach. It is shown that the effect this approach to IS capability is increasing significantly from $\rho = 0.096$ to $\rho = 0.233$. Although the BPR drive ERP approach plays a major role in increasing the IS capability, yet this approach cannot be conducted by all companies. It is required a higher level of organization maturity and mediocre budget & time. The organization culture may be also relevant on this case. The "BPR drive ERP" approach needs to choose by company who want to gain a strategic benefit or even to create a competitive advantage through implementation of ERP system. On the other hand, the "ERP drive BPR" approach has a significant effect to IS capability, compare to the "BPR drive ERP" approach. It shown from the indirect effect between the "ERP drive BPR" approach and IS capability through organization maturity level is 0.369, whereas the indirect effect between "BPR drive ERP" approach and IS capability is 0.233. However, the "ERP drive BPR" approach only gives a tactical benefit for the company. This approach is most used by company who wants a smaller risk on implementation of ERP system. At last, the findings of this study are expected to improve knowledge about the role of organization maturity level in order to gain a better IS capability and also to give a holistic view on selection of ERP implementation approach which can create a competitive advantage for the company.

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