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Effects of the Enterprise Resource Planning (ERP) on Competitive Advantage and Performance of Manufacturing Firms in Indonesia

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Abstract: The purpose of the present study was to analyze a model of the factors affectingthe company's performance, affected by the manufacturing firm's ERP implementation and competitive advantages in Indonesia. Data were tested and analyzed using Structural Equation Modeling (SEM). Population was manufacturing firmsin five major cities of Jakarta, Bandung, Semarang, Surabaya and Balikpapan. Total sample was 250 manufacturing firms. Results showed that the manufacturing firm's ERP implementation positively affected competitive advantage (differentiation strategy and low-cost strategy). ERP provided an integrated system that supplied information rapidly and improved efficiency of the administration system of the companies. The companie's ERP implementationhad no direct effect on their performance but it hada significant effect through the intervening variables, differentiation strategy and low-cost strategy. The ERP implementation was incapable of leading to new product innovations for the manufacturing firms in Indonesia. The ERP system was only used to support the administrative system of integrated companies.

Key words: ERP implementation, differentiation, strategy, low-cost strategy, customer satisfaction

INTRODUCTION

The increasingly complex business competition leads companies to seek to increase their number of customers through quick services and low costsrelative to competitors. One way to achieve the success is through integrating the information systems. Improved efficiency of information systems is capable of leading to a more efficient management of business processes. Improved information systems in terms of the quality of products and services will increase customer satisfaction and improve competitiveness. In conclusion, the ERP implementation had an effect of increasing customer satisfaction in accordance with their expectations and demands.

ERP systems are designed for manufacturing and service firms that integrate and automate business processes within the plant, logistics, distribution, accounting, finance and human resources. ERP implementation is both an investment and a backbone of the company to improve efficiency and performance as well as developing the business. In principle with the ERP systems, an industry or a company can run optimally and reduce inefficient operating costs such as the cost of inventory and the cost of losses due to technical errors. The ERP implementation may have an effect on the process of improvement of the quality of information in the finance, operations, management and marketing division of a company. Such conditions will create business networks, increased efficiency and achievement of excellent business targets (Law and Ngai, 2007).

Manufacturing firms use competitive strategy to improve the competitive position of their products and services in specific industries and market segments (Granados, 2004). A company must devise an effective corporate strategy through identifyingits competitor's strategies, goals, strengths, weaknesses and reaction patterns. Competitive strategies link the company tothe industrial environment (Kotler and Armstrong, 2010). Differentiation strategies are carried out in order to create identifiable differences in the proposition of goods or services in order for the customers to perceive it as value added.Customers perceive the goods or services they purchased better than the other ones. It is such a value added that leads customers to leave competitor'sgoods or services.

A low-cost strategy is a company's effort to provide maximum value for its customers a specified price. It focuses on competitive proposition incorporating a good and consistent quality of products and the ease and rapidity in terms of delivery of products,

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payment processing and process of claims for defective products. Improvements of production lines and operational efficiency can improve a company's competitiveness, especially in terms of cost effectiveness which is the main goal of the quality management system (Valipour *et al*., 2012). The consequence will have an indirect impact of improving competitiveness, especially with regard to low-cost products and services of the company.

Companies achieve a competitive advantage by pursuing strategies not being carried out by competitors (Dehning and Stratopoulos, 2002). Implementation of information systems such as ERP is associated with the ability to offer innovative products and services to use resources effectively, to increase the barriers to entry for new competitors and to increase bargaining power with suppliers and customers. The present study observed the ERP implementation which had effects on the marketing (differentiation strategy) and non-marketing or operational (low-cost strategy) effectiveness and on the performance of the company. The study was conducted at the companiesthat have been implementing ERP or the peak management of the companies committed to the similar process of ERP implementation. Literature review showed the existing methodologies of ERP implementation did not reflect strategies that linked to the performance of a company as an important factor in anintegrated qualitative and quantitative approach.

MATERIALS AND METHODS

Population was the manufacturing firms in Indonesia which have been implementing ERP. Data of 250 manufacturing firms in five major cities in Indonesia (Jakarta, Bandung, Semarang, Surabaya and Balikpapan) were sampled by using the stratified sampling method. Data were collected by means of a closed-ended questionnaire in which respondents were restricted to providing responses to few alternatives only or to a single response. Hypotheses were tested after the model was considered fit. Testing the hypothesis of the study by looking at the partial test each lane direct influence on the results of the SEM analysis, testing the indirect effect is a by product of direct influence. Hypothesis testing is a direct influence by seeing the value about CR >1.96 and p<0.05 which means that the effect signifikan. The relationship between the ERP implementation of the strategy of product differentiation and low cost strategies seen in the research model as Fig. 1. The research hypotheses are as follows:

- H_1: ERP implementation has a simultaneous and partial significant effect on differentiation strategy
- This hypothesis is supported by Kalling (2003), Beard and Summer, (2004), Kwang (2011), Uwizeyemungu and raymon (2012) and Gattiker and Goodhue (2005)
- H_2: ERP implementation has a simultaneous and partial significant effect on the performance of the company

This hypothesis is supported by Wieder *et al*. (2006) and Maroofi *et al*. (2012):

- H_3: ERP implementation has a simultaneous and partial significant effect on low-cost strategies
- This hypothesis is supported by Tavitiyaman *et al*. (2011) and Banker *et al*. (2014)
- H_4: Differentiation strategies have a simultaneous and partial significant effect on the performance of the company

This hypothesis is supported by Hoque (2004), Cadez and Guilding (2008), Spencer *et al*. (2009) and Fleming *et al*. (2009):

- H_5: Low-cost strategies have a simultaneous and partial significant effect on the performance of the company

This hypothesis is supported by Spencer *et al*. (2009), Fleming *et al*. (2009); Bastian and Muchlish (2012) and Tavitiyaman *et al*. (2011). Effectiveness of a company's ERP implementation is determined by management responsibilities, consultant's capability, employee empowerment, measurement and improvement as well as realization of the product (Hassab *et al*., 2012). To successfully realize aneffective marketing concept, the indicators for differentiation strategiesinclude the planning of the number of administrative staff, number of employees, production capacity, production capacity per period, strategy for product variations (product differentiation strategy) and business philosophy. The indicators for low-cost strategiesinclude increased operational efficiencies through skills development, cost reduction, continuous improvement and organizational development (Valipour *et al*., 2012). The indicators for the performance of the company include operational efficiency, product cost reduction, customer satisfaction and customer loyalty (Madapusi and DSouza, 2012). Flowcharts causality between the construct and its indicators as Fig. 2.

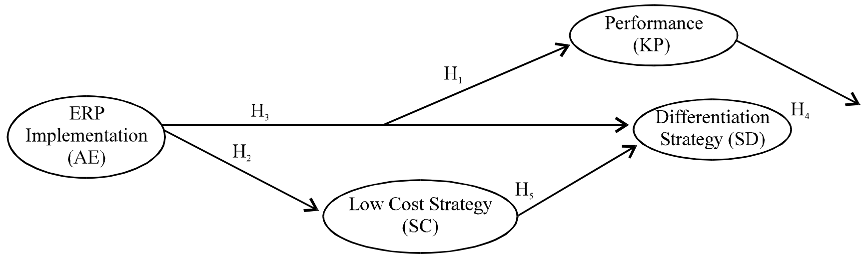

Fig. 1: Research model

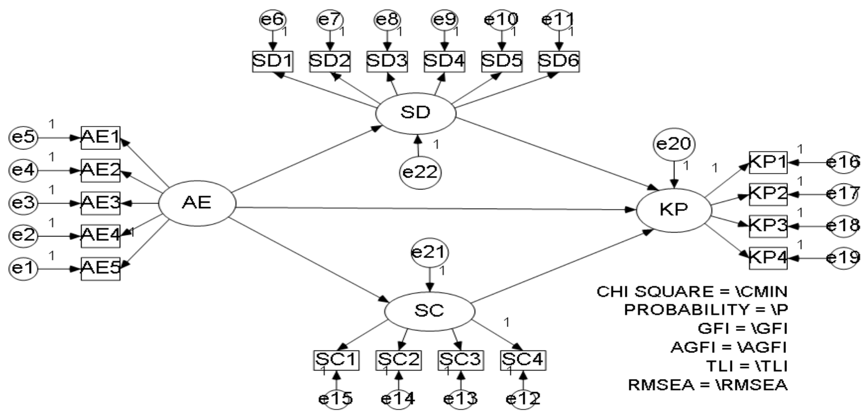

Fig. 2: Flowcharts causality between the construct and its indicators

- AE = ERP implementation
- Indicators: AE1 = Management responsibilities
- AE2 = Consultant's capability
- AE3 = Employee empowerment
- AE4 = Measurement and improvement
- AE5 = Realization of the product
- SD = Differentiation Strategy
- Indicators: SD1 = The planning of the number of administrative staff
- SD2 = Number of employees
- SD3 = Production capacity
- SD4 = Production capacity per period
- SD5 = Strategy for product variations
- SD6 = Business philosophy
- SC = Low-cost strategies
- Indicators: SC1 = Operational efficiency through the skill development
- SC2 = Cost reduction
- SC3 = Continuous improvement
- SC4 = Organizational development
- KP = Performance
- Indicators : KP1 = Operational efficiency
- KP2 = Product cost reduction
- KP3 = Customer satisfaction
- KP4 = Customer loyalty

RESULTS AND DISCUSSION

Structural Equation Modeling (SEM) analysis: Test the feasibility of the model seen by comparing the results of the analysis to the requirements contained in the cut-off value. Chi square value of 152.198 <792.92 concluded that the model is good. Probability value 0.075> = 0.05, GFI value 0.913> = 0.90, 0.924 AGFI value> = 0.90, TLI value = 0.962> 0.95 AND 0.056 RMSEA value <0.08. Thus concluded that the model is good (Fig. 3 and Table 1).

Effect of ERP implementation of the differentiation strategy and low cost strategy and performance of the manufacturing companies in Indonesia. Most of the manufacturing firms in Indonesia focused on efficiency and effectiveness, particularly with regard to their operations with the aim to reduce costs. Manufacturing firm's ERP implementati on had major effectson their operations. ERP implementation had directeffects on their competitive advantage strategies. It had directeffects on both the differentiation strategiesand low-cost strategies of manufacturing firms in Indonesia. ERP implementation would bring about favorable effects on the effectiveness and efficiency of those companies. Generally, effectiveness was achieved in the administrative divisions and particularly the information system department. Despite the ERP implementation systems it did not lead

Table 1: The result of hypothesis testing

		Direct effect		
Independent variables	Dependent variables	CR	p-values	Note
ERP implementation	Differentiation strategy	2.867	***	Significant
ERP implementation	Kinerja perusahaan	1.580	0.354	Non significant
ERP implementation	Low-cost strategies	1.984	***	Significant
Differentiation strategy	Performance	2.142	***	Significant
Low-cost strategies	Performance	2.543	***	Significant

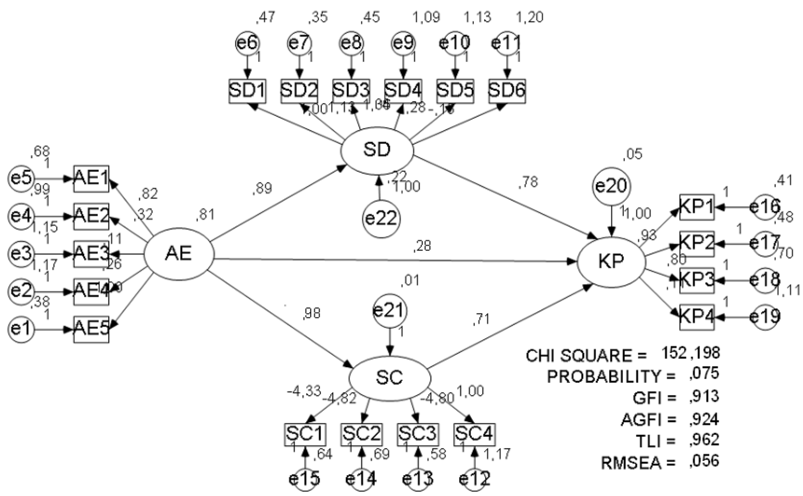

Fig. 3: The result of structural

those companies to come out with new product innovations; instead, ERP was only used to support integrated administrative systems. At the end, ERP implementation had no significant effect on the performance of manufacturing firms in Indonesia. In addition, the manufacturing firms in Indonesia which were the respondents the present study were only recently implementing ERP. Results of the present study support those of Ince *et al*. (2013) that there is no significant performance improvement over the first to third year of implementation.However, a slight increase in performance is found in the third year. This indicates that the outcome of ERP implementation will be observed only in the long term. Poston and Grabski (2001) stated that after the ERP implementation, there was no improvement of financial performance in general but there was a decrease in the ratio of employees and a decrease in the cost of sales with regard to the company's revenue. Kallunki *et al*. (2011) argues that the ERP implementation does not provide a significant improvement of financial performance during the first two years of implementation.

Results of the present study are in contrast to those of Wieder *et al*. (2006) that ERP implementation has an effect on the performance and profits of the company. Daoud and Triki indicate that ERP implementation has an effect on the company's performance. ERP advantages of reducing costs and improving efficiencies were demonstrated in the present study. According to Maroofi *et al*. (2012) the presence of such an information technology as ERP provides various advantages for companies. ERP is capable of facilitating the complex business activities. ERP generates reliable, relevant, timely, complete, easy-to-understand and verified information in the context of planning, control and management decision making. Additionally, the efficiency of the company's operations and performance can also be improved. Rom and Rohde argue that ERP implementation can run well and improve financial performance when it takes into account the internal factors at the time of ERP implementation. These internal factors are related to the function of marketing, operations and finance.

The company'smanagers continually insistthe operationsdivision, especially production department, to create innovations in order for decreased operating costs and efficiencies to occur (Yen and Sheu, 2004). ERP implementation has an effect on differentiation strategies, especially with regard to the provision of the costs of each product variation (Gattiker and Goodhue, 2005). Almost the majority of respondents stated that the purpose of ERP implementation was to provide all departments with information at the same time and in a certain standard. ERP implementation was able to provide the companies with detailed and complete information. In addition, the high efficiency, especially in the operations division was due to receiving the right information at the right time.

ERP implementation has an effect on competitive advantage in the future (Bradford and Florin, 2003). ERP implementation helps companies gain competitive advantage by increasing the value of the company's resources (Kalling, 2003). There are three reasons why companies implement ERP. First, ERP is implemented to generate real-time information. Second, it facilitates decisionmaking and meets the needfor integration of applications. Third, it increases financial flexibility which is the most important benefit in accounting associated with financial capability (Gupta and Kohli, 2006). Companie's financial flexibility can be seen from the extent to which theycapitalize on unexpected opportunities. Financial capability enables companies to make the most of their resources as their environment changes and the influx of new information into the company as a result of ERP implementation (Hassab *et al*., 2012).

Product differentiation strategies emphasize product innovation as the spearhead of the company. Companies that implement these strategies tend to regard rapid market entry as a top priority. Differentiation strategies allow them to set higher prices and gain a wider market share. The target market is consumers who are willing to pay more for functional excellence of products offered and are generally less sensitive to the price (Pertusa *et al*. 2008). It is this understanding of consumer desires that will constitute the competitive advantage gained by the company in which according to the RBV theory, the characteristics of competitive resources are non-imitability and non-substitutability.

ERP development reflects the company's competitive advantage strategies (Kaling, 2003; Somers and Nelson, 2003); Uwizeyemungu and Raymond, 2012). Competitive advantage strategies can lead to company's optimum performance. Selection of strategies positively affects performance (Hoque, 2004). Types of strategies and formulation of strategies have effects on increased performance (Cadez and Guilding, 2008). Differentiation strategieshave an effect of improving organizational performance (Spencer *et al*., 2009). Level of competition and uncertainty have an effect on strategies and strategies have aneffect on performance (Fleming *et al*., 2009). Business strategies and organizational performance are positively and significantly related. Competitive strategieshave a direct effect on hotel performance and competitive information technology strategy has a direct effect on financial performance (Tavitiyaman *et al*., 2011). Competitive strategies positively and significantly improves the performance of companies (Parnell *et al*., 2014). Differentiation strategies are related to three measures of performance (product quality, product innovation and process innovation) (Karabag and Berggren, 2014; Kalkan *et al*., 2014). Competitive advantage strategy is an important key of the company to generate a positive performance. In particular, differentiation strategies show a more positive effect on performance than that of low-cost strategy (Banker *et al*., 2014).

CONCLUSION

ERP implementation reflects the competitive advantage strategy of manufacturing firms in Indonesia. A competitive advantage strategy is a key to improving the performance of manufacturing firms in Indonesia. Low-cost strategiesare usually built on the achievement of operational efficiency while differentiation strategiesare usually developed around innovations not quickly imitable by competitors, especially in the currently fierce competition of business world. Thus, innovation and effectiveness of corporate governance are key factorsto build a competitive advantage. Optimum performance can only be created when a company is capable of building a competitive advantage. Therefore, a differentiation strategy constitutes an answer that should be chosen by companies to face the competition. Results of the present study support the conclusion on this matter.

REFERENCES

Banker, D.R., R. Mashruwala and A. Tripathy, 2014. Does a differentiation strategy lead to more sustainable financial performance than a cost leadership strategy?. Manage. Decis., 52: 872-896.

Beard, J.W. and M. Sumner, 2004. Seeking strategic advantage in the post-net era: Viewing ERP systems from the resource-based perspective. J. Strategic Inform. Syst., 22: 129-150.

Bradford, M. and J. Florin, 2003. Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems. Int. J. Acc. Inf. Syst., 4: 205-225.

Cadez, S. and C. Guilding, 2008. An Exploratory investigation of an integrated contingency model of strategic management accounting. Accounting Organizations Soc., 33: 836-863.

Dehning, B. and T. Stratopoulos, 2002. DuPont analysis of an IT-enabled competitive advantage. Int. J. Accounting Inf. Syst., 3: 165-176.

Fleming, D.M., C.W. Chow and G. Chen, 2009. Strategy, performance-measurement systems and performance: A study of Chinese firms. Int. J. Accounting, 44: 256-278.

Gattiker, T.F. and D.L. Goodhue, 2005. What happens after ERP implementation: Understanding the impact of interdependence and differentiation on plant-level outcomes. MIS Quarterly, 29: 559-585.

Granados, E.R., 2004. Preservation of competitive advantages by aligning capabilities to firm's strategy. Ph.D Thesis, IESE Business School-University of Navarra, Barcelona, Spain.

Gupta, M. and A. Kohli, 2006. Enterprise resource planning systems and its implications for operations function. Technovation, 26: 687-696.

Hassab, E.H.R., W. Hwang and M.A. Vonderembse, 2012. The impact of ERP implementation on organizational capabilities and firm performance. Benchmarking Int. J., 19: 618-633.

Hoque, Z., 2004. A contingency model of the association between strategy, environmental uncertainty and performance measurement: Impact on organizational performance. Int. Bus. Rev., 13: 485-502.

Ince, H., S.Z. Imamoglu, H. Keskin, A. Akgun and M.N. Efe, 2013. The impact of ERP systems and supply chain management practices on firm performance: Case of Turkish companies. Procedia Soc. Behav. Sci., 99: 1124-1133.

Kalkan, A., O.C. Bozkurt and M. Arman, 2014. The impacts of intellectual capital, innovation and organizational strategy on firm performance. Procedia Soc. Behav. Sci., 150: 700-707.

Kalling, T., 2003. ERP systems and the strategic management processes that lead to competitive advantage. Inf. Resour. Manage. J., 16: 46-67.

Kallunki, J.P., E.K. Laitinen and H. Silvola, 2011. Impact of enterprise resource planning systems on management control systems and firm performance. Int. J. Accounting Inform. Syst., 12: 20-39.

Karabag, S.F. and C. Berggren, 2014. Antecedents of firm performance in emerging economies: Business groups, strategy, industry structure and state support. J. Bus. Res., 67: 2212-2223.

Kotler, P. and G. Armstrong, 2010. Principles of Marketing. 13th Edn., Pearson Prentice Hall, New Jersey, USA.

Law, C.C.H. and E.W.T. Ngai, 2007. ERP systems adoption: An exploratory study of the organizational factors and impacts of ERP success. Inform. Manage., 44: 418-432.

Madapusi, A. and D.D. Souza, 2012. The influence of ERP system implementation on the operational performance of an organization. Int. J. Inf. Manage., 32: 24-34.

Maroofi, F., M.A. Kyani and M. Nazaripour, 2012. Impact of enterprise resource planning systems on company performance and management control systems. Int. J. Bus. Environ., 5: 51-73.

Parnell, J.A., J.E. Spillan and E.C. Mensah, 2014. Competitive strategy and performance in southern ghana. Int. J. Manage. Enterp. Dev., 13: 109-129.

Pertusa, O.E.M., C.E. Cortes and M.J.F. Azorin, 2008. Strategy, structure, environment and performance in Spanish firms. Eur. Med. J. Bus., 3: 223-239.

Poston, R. and S. Grabski, 2001. Financial impacts of enterprise resource planning implementations. Int. J. Account. Inform. Syst., 2: 271-294.

Somers, T.M. and K.G. Nelson, 2003. The impact of strategy and integration mechanisms on enterprise system value: Empirical evidence from manufacturing firms. Eur. J. Oper. Res., 146: 315-338.

Spencer, X.S.Y., T.A. Joiner and S. Salmon, 2009. Differentiation strategy, performance measurement systems and organizational performance: Evidence from Australia. Int. J. Bus., 14: 83-103.

Tavitiyaman, P., H. Qu and H.Q. Zhang, 2011. The impact of industry force factors on resource competitive strategies and hotel performance. Int. J. Hospitality Manage., 30: 648-657.

Uwizeyemungu, S. and L. Raymond, 2012. Impact of an ERP system's capabilities upon the realisation of its business value: A resource-based perspective. Inf. Technol. Manage., 13: 69-90.

Valipour, H., H. Birjandi and S. Honarbakhsh, 2012. The effects of cost leadership strategy and product differentiation strategy on the performance of firms. J. Asian Bus. Strategy, 2: 14-23.

Wieder, B., P. Booth, Z.P. Matolcsy and M.L. Ossimitz, 2006. The impact of ERP systems on firm and business process performance. J. Enterprise Inform. Manage., 19: 13-29.

Yen, H.R. and C. Sheu, 2004. Aligning ERP implementation with competitive priorities of manufacturing firms: An exploratory study. Int. J. Prod. Econ., 92: 207-220.