

SELECTION OF OPEN SOURCE ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM FOR FURNITURE MANUFACTURING SMEs AS A COMPETITIVE STRATEGY

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ABSTRACT

Enterprise Resource Planning is very important for the progress and growth of the company at the present time. Competition is very strong among companies with different advantages making the quality and effectiveness of a company is strongly needed. Enterprise Resource Planning is one of the solutions that makes all data could be seen by everyone in the same interface and single database. Open source ERP System is the alternative options that can be used by Small Medium Enterprises (SMEs). Open source ERP system with a free license offer solutions for SMEs that have constraints in terms of finances and human resource. This study discusses about SMEs manufacturing furniture, business processes and selection of open source ERP system using Analytical Hierarchy Process (AHP). The result of this study is an open source ERP system selection process in accordance with the SMEs process business: finance, material management, marketing and customer, production and distribution. Final result Compiere obtained with weights 0.472, 0.401 for Openbravo and Adempiere 0,127.

Keywords : Enterprise Resource Planning (ERP), Open Source System, Small and Medium Enterprises (SMEs), Analytical Hierarchy Process (AHP)

1. INTRODUCTION

Small and Medium Enterprises (SMEs) is currently an economic power of its own based on small businesses, managed and developed by the community. SMEs in Indonesia have been able to contribute to Indonesia's GDP by 57.12% based on data of the Central Bureau of Statistics, 2012. Small and Medium Enterprises are types of small businesses managed by individuals and groups. The Central Bureau of Statistics classifies the type of industry based on the number of employees: for small enterprises, the number of employees is 5 ~ 19 people with a maximum turnover of 1 billion rupiah per year; for medium enterprises, the maximum number of employees is 99 people with a maximum turnover of 100 billion rupiah per year (Handayani et al, 2013). According to Law Number 20, 2008 on SMEs, Micro Enterprises have maximum total assets of 50 million rupiah with a maximum turnover of 300 million rupiah. Small Enterprises have assets between 50 million rupiah up to 500 million rupiah with a turnover between 300 million rupiah up to 2.5 billion rupiah. And Medium Enterprises

have assets between 500 million rupiah up to 10 billion rupiah with a turnover between 2.5 billion rupiah up to 50 billion rupiah.

The definition of SMEs according to foreign institutions and other countries as written by Bryant et al. (2011) among others are based on the number of employees, revenues and total assets. The World Bank divides SMEs into 3 types, namely medium enterprises with a maximum number of employees of 300 people, annual income up to \$ 15 million and total assets up to \$15 million; small enterprises with a number of employees less than 30 people, annual income not exceeding \$ 3 million and total assets not exceeding \$3 million. Japan divides SMEs by several criteria, among others mining and manufacturing, with a maximum number of employees of 300 people or an amount of stock capital up to US\$ 2.5 million; wholesale, with a maximum number of employees of 100 people or an amount of stock capital up to US\$ 840 thousand; retail, with a maximum number of employees of 54 people or an amount of stock capital up to US\$ 820 thousand; and service, with a maximum number of

employees of 100 people or an amount of stock capital up to US\$ 420 thousand.

To compete in domestic and foreign markets, SMEs need a new business strategy development and to use new technology (Caldeira, 2003). SMEs generally have limited human and financial resources so that they are less prepared and less able to make changes (Caldeira, 2003). Saputro et al. (2010) wrote that Enterprise Resource Planning (ERP) application can be one of the solutions to help SMEs to simplify, integrate and automate business processes. The ERP application that will be applied in practice can reduce operational costs and increase business performance, such as improving consumer service and reducing lead time. ERP applications can simplify and facilitate a strong interaction between the production department, the sales department, the accounting department and the marketing department, where each person can be in one same yard. Furthermore, by using ERP applications, SMEs will be assisted in the development of an understanding on how different business processes can be integrated and have an impact on each other on those processes (Saputro et al., 2010). ERP based on open source is present to offer ERP advantages with a relatively cheaper investment cost compared to paid ERP, and this is in accordance with SMEs with issues of limited funds. Considering the importance of the use of ERP, then with this system to be reviewed, it is expected that SME resource planning as a whole will be optimized and the performance of SMEs will be maximized with the gain of a large profit. Open Source ERP according to Open Source Initiative (OSI) is as follows: 1) Distributed free of charge, including its use as a basic component in companies and without any additional costs. 2) The source code must be available in a format that is easy to read.

The focus of this study is whether the open source ERP can be used to simplify business processes of manufacturing SMEs; what are the needs of the ERP modules that are appropriate with the business processes of manufacturing SMEs; and what ERP system based on open source is suitable for manufacturing SMEs. The selection of open source ERP uses the Analytical Hierarchy Process method with the

Expert Choice program. The study is limited to 3 furniture manufacturing SMEs located around Jakarta.

2. THEORETICAL BACKGROUND

The strict competition between SMEs and large companies, SMEs must seek competitive superiority that can help them to minimize cost and maximize profits. Manufacturing SMEs currently require changes in order to increase competitiveness Saputro et al. (2010). One of the strategies that can be done by SMEs is using information technology to transform business processes quickly, accurately and efficiently. Case studies conducted in Europe showed more than 50% productivity is achieved through investment in information technology (Van Ark et al., 2003).

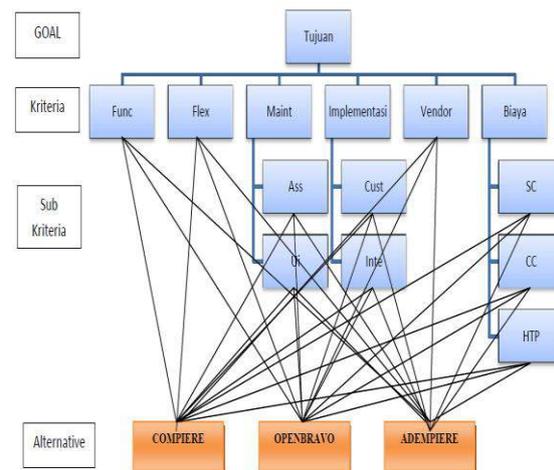


Figure 1. Hierarchy of selection open source ERP

Fougatsaro (2009) mentioned 11 important factors that influence the success of ERP implementation, namely: ERP team, management change and corporate culture, top management support, plans and vision of the company, process business with minimum customization, project management, work evaluation monitoring, effective communication, software development testing and troubleshooting, project leader, appropriate business and IT legacy systems.

Handayani et al. (2013) in their study wrote that the main process businesses

required to standardize and formalize the SMEs main business processes are distribution, marketing, procurement and production process. In this study, the business process functions were obtained, namely financial function, materials management, marketing and customer. The four process business functions become the basis in the selection of ERP modules needed by furniture manufacturing SMEs. The need for SMES ERP moduls which are translated from the main business processes are: financial modul, marketing modul, CRM, management order, production modul, quality and inventory, as well as delivery modul.

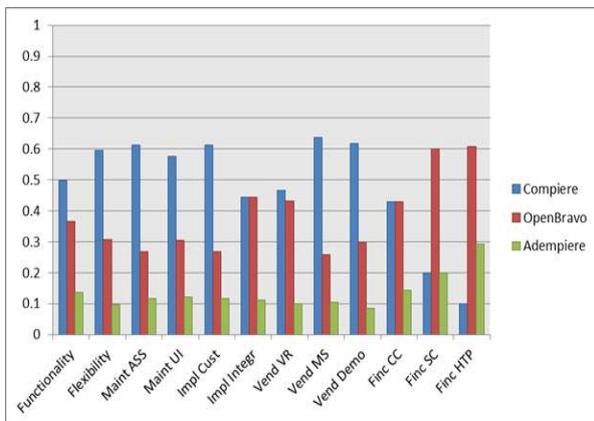


Figure 2. Business processes of furniture SMEs

3. RESEARCH METHODS

Methods that can be used for the ERP selection process with computational intelligence techniques among others are Weighted Scoring Method, Analytical Hierarchy Process, Fuzzy Logic, Analytic Network Process, Systematic Help ERP Acquisition, Priority Matrix, Promethee, and Technique for Order Preference by Similarity to Ideal Solution (Comer, 2012). The Analytical Hierarchy Process (AHP) introduced by Saaty (1980) explains how to determine priority from a group of data alternative and the degree of interest of each attribute in various criterias of decision making. Saaty (2000) described the AHP work principle, namely decomposition, comparative assessment, priority synthesis and logical consistency. In figure 1, data decomposition based on criteria and sub

criteria as well as the chosen alternative software are explained.

Boonyaprasit et al. (2010) wrote 6 selection criteria for open source system that will be implemented in the selection of ERP systems, among others: 1) Functional Fit, 2) Flexibility, 3) Maintenance System, with after sales service and training and updating and inquiries sub criteria, 4) Implementation, with customization and ease of integration sub criteria, 5) Vendor, with vendor reputation sub criteria, market share and demonstration of previous implementation, 6) Cost, with software cost, consulting cost and maintenance, and how to pay the investment sub criteria; whereas alternative options for open source ERP systems are Compiere, Openbravo and Adempiere. Compiere and Openbravo are selected because both open source system were selected as the top three best ERP systems in 2009 (<http://tech.gaeatimes.com>) and in 2010 (www.forecastingclouds.com) based on the research of Handayani et al. (2013). Adempiere which is still a derivative of Compiere was selected not only because it was included in the top10 best ERP systems (<http://erp-software.findthebest.com>), but also because it is widely used in the manufacturing industry.

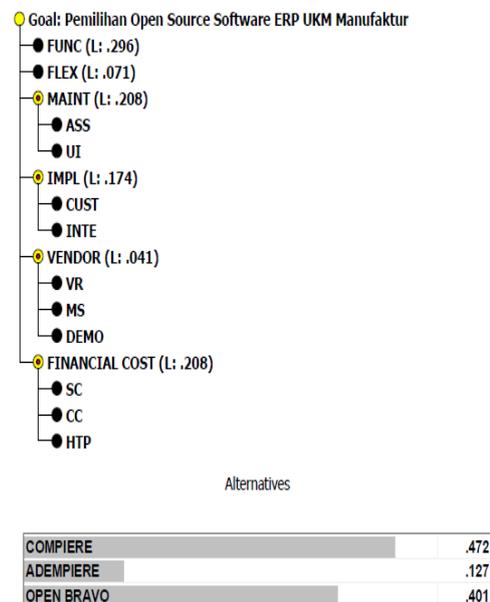


Figure 3. Result weight criterias and total score alternatives

This study uses the following flow of study: 1) Literature study on SMEs, ERP and open source ERP. 2) Determination of SMEs for

Compiere looks easier in terms of maintenance, due to the architecture of Compiere. Compiere allows meta data based on customization on the fly without shutting down the system (Herzog, 2006). In the criteria of maintenance updating inquiries, Compiere has a weight of 0.537. In the criteria of implementation customization, Compiere has a weight of 0.614. On Compiere, customization can be done without shutting down the database and is supported by meta data stored in the database with 114 tables called application dictionary.

In the implementation integration criteria, Compiere and Openbravo each have the same weight of 0,444. Compiere offers a comprehensive solution for the process of integration and Openbravo with its web service offers ease of integration from the old system to the new system online. For the vendor reputation criteria, Compiere has a weight of 0.466 and differs a little from Openbravo with a weight of 0.433. Compiere and Openbravo are listed as the top three of the best ERP software in 2009 (<http://tech.gaeatimes.com>) and in 2010 (www.forecastingclouds.com).

For the vendor market share criteria, Compiere has a weight of 0.637. The market share of paid ERP by 40% is controlled by SAP and Oracle (Fougatsaro, 2009). The rest is controlled by Microsoft Dynamic NAV, Baan and open source ERP is dominated by the top 10, including Compiere, Openbravo and Adempiere. For the vendor demonstration for previous implementation criteria, Compiere has a weight of 0.644. The Southern Book Company, Pertronix, Johnson Controls Inc., and Construcciones Explanaciones ECO SA are examples of the successful applications of Compiere, Openbravo and Adempiere.

For the criteria of financial cost consulting and maintenance upgrade cost, Compiere has a weight of 0.429. Compiere can be deployed on premise or on cloud in order to reduce the cost of consultation and maintenance. Hinweis (2004) wrote that the Compiere cost for partner contract is USD 6000 and silver support at USD 3000. Openbravo claims maintenance cost of 1500 euros plus 500 euros per user. Celeste et al. (2010) stated that maintenance cost is about 25% of the total initial implementation

cost. In the financial cost – software cost, Openbravo has a weight of 0.600. Alphamedia consultant claims free software cost in terms of licenses, implementation cost for around 50 million rupiah, training cost for 25 million rupiah, as well as custom fee at 4 million rupiah per man days. Financial cost how to pay the investment can be done by the SMES by determining the cost scheme to be done on their own, i.e. whether to buy software directly to a vendor or to a consultant.

One of the major issues faced by SMEs is the limited resources and financial capability possessed. In addition, most of the business processes owned by SMEs are still done manually and only a small proportion of SMEs are able to implement applications to help their operational activities, and most of the operational activities done are still separated (Saputro et al., 2010). The corporate organizational culture apparently also contributes to the situation. Such a situation may not have a major impact because the number of transactions carried out by SMEs is still low and the volume of data is still possible to be managed. Jutras (2010) in his study on Enterprise Resource Planning in Small and Medium Enterprises said that there are five things that cause most SMEs in the world not to implement the ERP applications, namely: limited funds; SMEs feel that they are already able to function effectively without the help of an application; application fee and consultation service that is needed; as well as that ERP application is too complex to use. There must be a strong encouragement especially from the top management (internally) as well as encouragement from the government (externally) that can provide opportunities, in this regard, sales opportunities such as export, as well as soft loans to SMEs. The government, in this case the Ministry of SMEs, the Ministry of Industries and Bank Indonesia may synergize in promoting SMEs; in this study, manufacturing SMEs in particular.

The following facts can be used as a basis for the necessity of implementing ERP in furniture manufacturing SMEs, i.e.:

1. Companies with an annual turnover of 2.5 billion rupiah up to 10 billion rupiah

which have been categorized into Medium Enterprises should have applied ERP in their business processes.

2. Competition among furniture manufacturing SMEs and competition with large furniture companies: Competition can occur in terms of product variety (differentiation strategy), lower prices, better quality, faster delivery, greater market share, and service to customers will be maximized.
3. Competition occurs not only within the country, but also between countries. With the opening of the 2015 Asian free trade, then certainly many goods produced in other countries, especially furniture, will enter the Indonesian market share. With almost the same price and quality, goods produced abroad will enter Indonesia.
4. The ordering process that commonly occurs in the furniture business where customers/agents manually give furniture model orders still seems slow. Errors between the ordered goods and the ready-made furniture often occurs. This may occur where there is no basic Standard Operating Procedure (SOP) regarding the job or work orders in the company's system.
5. Southeast Asian countries such as Thailand, Malaysia, the Philippines and China have widely applied ERP in their SMEs. Although there are still some unsuccessful stories in its application, at least other countries have previously applied the ERP system on SMEs in their countries. Indonesian products must dominate the domestic market. Although it has a selfish impression, if we want SMEs to progress further, buying our own products would be very good for the national economy.

5. CONCLUSION

In this study, an underlying conclusion can be drawn regarding the business process for furniture manufacturing SMEs as well as an ERP module that is suitable for the SME business process. The four business processes of the research results are financial function, material management, marketing and customer, production and

distribution. Selection results on ERP open source system is also obtained based on 6 criteria and 3 optional alternatives of open source system. Compiere was selected as ERP open source system with the highest rate, Openbravo in second place with a non-significant difference in weight. The results of this selection is just the beginning stages of ERP implementation in SMEs.

However, the implementation of ERP in SMEs remains dependent from several factors that become critical success factors of ERP implementation in SMEs. With a spirit of the desire to promote SMEs in Indonesia and with the support of various parties, Insha Allah the noble purpose in order that Indonesia can be more progressive by promoting SMEs will be quickly carried out.

This study is limited to only furniture manufacturing SMEs. With more and more types of SMEs business and the expectation of more progress on SMEs in Indonesia in general, suggestions for further research can be done on manufacturing SMEs in other areas or SMEs in other areas of business.

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