Business Process Requirements for Indonesian Small Medium Enterprises (SMEs) in Implementing Enterprise Resource Planning (ERP)

P. W. Handayani, A. N. Hidayanto, and I. Budi

***Abstract*—Based on Central Agency on Statistic (Badan Pusat Statistik – BPS), the growth of SMEs in Indonesia is increasing rapidly. In order to increase their competitive advantage, SMEs need to implement ERP system. However, most of ERP systems in the today market are very complex and not suitable for Indonesian SMEs. This paper presents the requirements of Indonesian SMEs' main business processes which are focusing in marketing, distributing, selling and production processes. The requirements were formulated by randomly distributing questionnaires to SMEs participating in International Handicraft Trade Fair (INACRAFT) 2012 event that held in the Jakarta on 28-29 May 2012. Finally, we have successfully formulated main processes that are needed to be standardized and implemented in ERP system due to their strategies to increase their market share.**

***Index Terms*—Enterprise resource planning, small medium enterprise, business process, ERP system comparison**

I. Introduction

Pursuant to data published by the Ministry of Cooperative and SMEs Republic of Indonesia data, one of the biggest contributions of Indonesian GDP is SMEs which shares 57.12% of GDP in year 2012 and the biggest Indonesian SMEs is home and small scale industry (equal to 98% from total number of SMEs in Indonesia). Based on the BPS, a small scale business is identical to small scale industry and home industry. BPS classified the type of industry based on the number of employees as follow:

- Home industry: 1-4 employees; revenue ≤ 1 billion Rupiah/year
- Small industry: 5-19 employees; revenue ≤ 1 billion Rupiah/year
- Medium industry: 20-99 employees; revenue 1-100 billion Rupiah/year
- Big Large industry: > 100 employees; revenue ≥ 100 billion Rupiah/year

One of the critical missions of Ministry of Cooperative and SME of the Republic of Indonesia is to increase the number of SMEs in Indonesia so that the growth of Indonesian economic is expected to remain constant positively. Considering the tight competitions in the future among SMEs and large companies, SMEs must have beneficial values that enable them to minimize cost and maximize profits. The option to this case is to implement ERP concept and system so that they could simplify, automate and integrate their process and system. As result of implementing ERP, theoretically and practically SMEs could reduce their operating costs and improve their performances e.g. providing better customer services, reducing lead time and providing faster information [1]. However, Indonesian SMEs have their own characteristics, particularly they face several main issues such as low of IT adoption awareness, limited human resources, knowledge, IT infrastructure, and funding, undefined operational procedure and simple business processes. To be a winner in the today tough market competition, SMEs need to equip themselves with necessary tools to support their growth and existence.

Based on study from Saini regarding to ERP implementation key success factors in Indian SMEs, one of the success factors is SMEs need to align their business processes to match ERP system in order to minimize the amount of customization needed [2]. Unfortunately, most of the SMEs in Indonesia are still operating their business manually and traditionally without a defined operational procedure to manage their data because of small number of transactions activities. Study from Fathul Wahid and Lizda Iswari [3] on 146 SMEs in Yogyakarta showed that there is only a small portion of those SMEs that have adopted IT. The barriers of this adoption are mainly due to financial constraint and the view that IT has insignificant portion to support their business activities.

Although ERP systems can bring competitive advantage to organizations, it is the high failure rate in ERP implementation that is the major cause of concern across the industries [4]. Therefore, in order to make it successfully adopted by SMEs in Indonesia, we need to customize and localize to suit the needs of SMEs. Considering this, our paper discusses the study on the requirements of best practices business process to simplify the ERP implementation in SMEs. We formulate simple business processes that are expected meet with the Indonesian SMEs requirements.

The remaining of the paper is organized as follow. Section 2 explains the previous works, while the research methodology explained in section 3. Analysis of business processes requirements for SMEs and ERP systems comparison are discussed in section 4. Final section discusses the conclusions and future works of this research.

Manuscript received June 24, 2012; revised August 17, 2012.

The authors are with Computer Science, Universitas Indonesia (e-mail address: putu.wuri@cs.ui.ac.id).

II. Previous Work

The importance of cost reduction and efficiency improvement objectives of ERP system adoption was emphasized in all the companies regardless of their size. Also, the findings suggest that small companies experience more knowledge constraints than their larger counterparts in ERP adoption [5]. Study from Govindaraju and Chandra found that most of Indonesian SMEs participating in the study have strategic plans to adopt higher level of e-commerce, though majority of the firms currently still adopt e-commerce at the lower level [6].

Fahmi has conducted study of ERP open source software customization for furniture SMEs using OpenBravo. His study concluded that ERP system customization and localization is one of the key success factors for ERP implementation due to SMEs' limitations such as lack of funds and resources [7]. Zain's study tried to minimize the problems of ERP implementation for small to medium cigarette company such as lack of accurate good information in inventory, disintegrated systems among departments and obsolete systems through Framework for Applications of Systems Thinking (FAST) [8].

III. Methodology

In order to achieve our objectives, we conducted a set of activities by firstly identifying the standard business process for marketing and distribution, procurement and production process. This standard process will also be compared with top open sources and proprietary systems namely SAP Business One, Microsoft Dynamic NAV, Compiere 3.3 Community Edition and Openbravo ERP 3.0 Community Edition. We analyzed the similarity of business processes between those systems to formulate our questionnaire.

We distributed this questionnaire by convenience sampling to participants of INACRAFT (International Handicraft Trade Fair) 2012 event that held in the Jakarta on 28-29 May 2012. INACRAFT is the largest gift and craft trade event and held every year in Indonesia. Most of the SMEs that took part in the survey are engaged in manufacturing and retail industries. Respondents involved in the survey of business process analysis consisted of 24 SMEs. SMEs are scattered in various area of Java and Sumatera. Considering this fact, we aim that we get samples that represent the characteristics of Indonesian SMEs. Lastly, we tabulated and analyzed the result of questionnaires and constructed conclusions.

IV. Analysis

A. Identification of Business Processes Standardization for Marketing and Distribution, Procurement and Production Processes

Based on Gartner research in year 2010 and our observation in ERP system criteria selection, it can be concluded that the best proprietary ERP systems are SAP Business One dan Microsoft Dynamics NAV. Due to SMEs' limitations, they tend to choose open source ERP systems which are highly supported by online community and have high interoperability such as Compiere and Openbravo ERP. Those ERP systems are choosen because of their top three rank for the best ERP systems in year 2009 (http://tech.gaeatimes.com) and in year 2010 (www.forecastingclouds.com).

SAP Business One application is an integrated business management solution designed specifically for small scale and midsizes enterprises which leverages a single application to automate business processes and deliver an accurate, unified picture of critical, up-to-minute business information across all functional business areas and could be easily integrated with other version of SAP application. Compiere is an open source ERP and CRM business solution for SMEs in distribution, retail, services and manufacturing. Next, Openbravo ERP is a web-based ERP business solution for small and medium sized companies that is released under the Openbravo Public License. Table I summarizes the SAP, Microsoft Dynamics NAV, Compiere and Openbravo modul.

Based on Table I, best practice SAP will be used as a base reference to set questionner instrument to the Indonesian SMEs to identify their business processes due to its completeness functions that could cover marketing, procurement and production processes.

B. Analysis of Indonesian SMEs Business Processes

Analyses were performed to identify the number of SMEs that use the similar business processes to support their operational activities. If there are SMEs which are using the similar process above 50 percent then we concluded that the process is generally required by SMEs in Indonesia.

Table II shows that all SMEs indeed really need marketing and distribution processes as their main process to support their activities. However, due to their limited market segment which most covered only individual customer than they do not need manage inquiry and quotation process. In addition, the procurement process is required by SMEs to be automated and integrated with other processes. Because the SME has a simple organizational structure and business processes then process of managing purchase requisition is not required. If there is a request from certain department to procure then such department will directly inform to the procurement department to issue a purchase order which will automatically sent to the relevant vendor. Due to most of SMEs is a manufacturing SME then production process is needed to be implemented in ERP system to support other processes.

V. Conclusion and Future Works

In order to gain competitive advantages with other companies, SMEs need to implement ERP system to simplify, integrate and automate their business processes. One of the key success factors in implementing ERP is SMEs need to standardize and formalize their main processes. Based on our analysis, the main business processes which are urgently required by SMEs are marketing and distribution, procurement and production processes. However, most of SMEs are still focusing in

standardizing and implementing their marketing and distribution processes due to their strategies in acquiring more customers to enlarge their market areas. Besides focusing in standardizing which can be fit with the best practice, SMEs need to consider other key success factors in implementing ERP systems such as people and technology. Finally, the business requirements that we have defined could be used to customize the chosen ERP system.

TABLE I: DESCRIPTION OF SAP, MICROSOFT DYNAMICS NAV, COMPIERE AND OPENBRAVO MODUL

SAP Modul (www.sap.com)	**Microsoft Dynamics NAV Modul (www.microsoft.com)**	**Compiere Modul (www.compiere.com)**	**Openbravo Modul (www.openbravo.com)**
Marketing and Sales Process			
Pre sales activity (opportunities and pipeline management; contact management and quotation); Generate sales order (maintain order); **inventory checking availability** (checking inventory); **shipping** (deliveries); **generate customer invoice** (maintain invoice); **customer payment** (posting payment)	**Pre sales activity** (manage customer and sales data; create marketing campaigns; organize service resources; manage contracts and service agreements); **inventory checking availability** (forecast and track parts consumption)	**Generate sales order** (sales orders); **shipping** (shipments); **generate customer invoice** (sales invoices); **customer payment**	**Generate Sales Order** (sales order); **shipping** (good shipment); **generate customer invoice** (invoice); **customer payment**
Procurement Process			
Purchase order; **payment** (purchase credit notes)	**Not Available**	**Generate purchase requisition** (manage requisition); **manage quotation from vendor** (manage RFQ); **manage purchase order; manage vendor receipt; payment**	**Purchase requisition; purchase orders; purchase invoice**
Production Process			
Production planning (forecasting); **production process** (Material Resource Planning); **order settlement** (reports)	**Production process** (production orders, supply planning, capacity requirements planning)	**Production process** (Material management rules, product setup, price list setup, product transactions, inventory move, move confirmation, physical inventory, internal use inventory, production, ship/receipt confirm, bill of materials explode, attribute set instance)	**Not Available**

TABLE II: SUMMARY OF MARKETING, DISTRIBUTION, PROCUREMENT AND PRODUCTION PROCESSES NEEDED BY INDONESIAN SMES

Process	**Sub Process**	**%**	**Process**	**Sub Process**	**%**
Marketing and Distribution Process			**Procurement Process (cont-)**		
Pre-sales Activity	Manage Customer Master Data	75	Purchase Requisition (cont-)	Create Material Master for Trading Goods	96
	Manage Material Master Data	92		Update Material Master for Trading Goods	96
	Manage Pricing Master Data	96		Manage RFQ	0
	Manage Inquiry	25	Maintain Quotation	Maintain Quotation from Vendors	0

	Manage Quotation	25	from Vendors	View Price Comparison	0
Sales Order Processing	Manage Sales Order	100		Reject Quotation	0
	View Document Flow	100	Purchase Order (PO)	Manage PO	100
Manage Inventory	View Inventory Availability	83	Invoice Receipt	Manage Invoice Receipt	100
Shipping	Manage Shipping	100	Payment to Vendor	Manage Financial Accounting	92
	Create Outbound Delivery with Reference to Sales Order	100		Post Payment to Vendor	88
	Update Outbound Delivery	100		View Vendor Balance	83
	Pick Product	100		View G/L Account Balance	83
	Post Goods Issue	100	**Production Process**		
	View Outbound Delivery	100	Production planning	Create consumption values for finished products (forecasting)	88
Customer Invoice	Maintain Billing Due List	100		Manage bill of material (BOM)	96
	View Billing Due List	100		Manage finished product routing	88
	Create Invoice	100		Manage product group	92
	Create Invoice with Reference to Outbound Delivery	100		Manage Sales and Operation Plan (SOP)	71
	Create Invoice with Reference to Sales Order	100	Production process	Transfer SOP to demand management	75
	Update Invoice	100		Run MPS with MRP	100
	View Invoice	100		Review stock/requirement list	100
Customer Payment	Manage Financial Accounting	92		Convert plan order into production order	100
	Post Receipt of Customer Payment	96		Review production order status and documents	100
	View Customer Balance	92		Confirm production completion	100
Procurement Process				Receipt of goods from production order	100%
Purchase Requisition	Manage Purchase Requisition	4	Order settlement	Review costs assigned to production order	100
	Manage Vendor Master Data	100		Order settlement	100
	Manage Material Master Data	100			

ACKNOWLEDGEMENTS

This research is supported by Universitas Indonesia through 'Riset Madya' grant No. 2139/H2.R12/HKP.05.00/2012. It is a pleasure to convey our gratitude to our university for their continuous support, particularly for Research and Public Service Directorate for their excellent services.

REFERENCES

[1] M. Sumner, *Enterprise Resource Planning*. Prentice Hall, 2005

[2] S. Saini, S. Nigam, S. C Misra. Success Factors for Implementing ERP in SMEs in India: A Conceptual Model. In *Proceedings of the 2nd IEEE International Information Management and Engineering (ICIME) Conferences* – 2010.

[3] F. Wahid and L. Iswari. Adopsi TI oleh Usaha Kecil Menengah di Indonesia. Seminar Nasional Aplikasi Teknologi Informasi (SNATI), Yogyakarta, 2007.

[4] T. H. Davenport 1998. "Putting the Enterprise into the Enterprise System". *Harvard Business Review*. Jul- Aug, pp. 121-131.

[5] S. Laukkanen, S. Sarpola, P. Hallikainen. ERP System Adoption - Does the Size Matter? In *Proceedings of the 38th Hawaii International Conference on System Sciences* – 2005.

[6] Govindaraju and Chandra. E-Commerce Adoption by Indonesian Small, Medium, and Micro Enterprises (SMMEs): Analysis of Goals and Barriers. In *Proceedings of the 3rd International Conference on Communication Software and Networks* – 2011.

[7] M. H. Fahmi, Pelokalan Dan Kustomisasi Aplikasi Erp Open Source Openbravo Erp Untuk Implementasi Pada Ukm Furniture. *Jurnal Penelitian Dinamika DotCom*, vol. 1, no. 2, Juli 2010, pp.156-175.

[8] M. Y. Zain. Minimizing The Problems Of Enterprise Resource Planning (ERP) Implementation For Small To Medium Cigarette Company Through Framework For Applications Of Systems Thinking (FAST). *Media Informatika*, vol. 6, no. 1, pp. 57-69. ISSN: 0854-4743, Juni 2008.

Putu Wuri Handayani is a lecture in Faculty of Computer Science University of Indonesia. She obtained her master degree from University of Applied Science Fulda, Germany. Her research interest are related to information system/information technology such as e-commerce, enterprise resource planning, supply chain and customer relationship management.

Achmad Nizar Hidayanto is Head of Information Systems/Information Technology Department, Faculty of Computer Science, Universitas Indonesia. He obtained his PhD in Computer Science from Universitas Indonesia. His research interests are related to information systems/information technology, e-learning, information systems security, change management, distributed systems and information retrieval.

Indra Budi is a lecture in Faculty of Computer Science University of Indonesia. He obtained his doctoral degree from University of Indonesia. His research interest are related to information system/information technology, database, information extraction/retrieval, and e-learning system.