

Designing Business System Model using System Modeling Approach to the Small and Medium Enterprises (SME) of Furniture in Indonesia

Irwan Sukendar¹, Wiwiek Fatmawati², Imam Much Ibnu Subroto³, Rizki Arigama⁴

^{1,2}Industrial Engineering Department, Universitas Islam Sultan Agung Semarang

^{3,4}Electrical Engineering Department, Universitas Islam Sultan Agung Semarang

Email : irwan@unissula.ac.id

Abstract. This paper studies the design of business system model with System Modeling Approach on small and medium enterprises (SMEs) of furniture. Methods used consists of five phases: phase of identification of business processes actual on SMEs of Furniture, phase of identification of deficiencies and improvement of business processes, phase of design algorithm and flowchart business processes, phase of analysis of the elements of the system, and phase of the design of data flow diagram (DFD) , The results of the analysis of the elements of the system are: Products and quantities ordered product consumers and DP paid by consumers identified as elements of system inputs 1,2 and 3. The result of the calculation, payment slips and mail order (SO) are identified as elements of system output 1, 2 and 3. Acceptance of orders, stocks checking of raw materials at the warehouse, calculating raw material requirements, adequacy of raw materials, the price of the contract, and the due date, as well as the submission of the results of calculations to consumers were identified as elements of system components 1, 2, 3, and 4. Admin taking orders, Admin check stocks of raw materials at the warehouse, Admin making calculation, and Admin convey the results of calculations to consumers were identified as an element of interaction system 1, 2, 3, and 4. Consumers were identified as element of environmental systems. Moreover, the boundary between SMEs and consumers were identified as elements of the system boundary.

1. Introduction

According to the Law on SMEs / 2008, micro-enterprises are the efforts that have a net worth of more than Rp 50 million to Rp 500 million, excluding land and building and the Start annual net sales of Rp 300 million to Rp 2.5 billion. Moreover, small business has a net worth of more than Rp 50 million to Rp 500 million, excluding land and building and the Start annual net sales of Rp 300 million to Rp 2.5 billion. The medium-sized businesses have a net worth of more than Rp 500 million up to Rp 10 billion, excluding land and building and the Start annual net sales of Rp 2.5 billion up to Rp 50 billion.

Some of the existing business processes in SMEs in general are: receipt of orders from consumers, preparation of raw materials, production processes, delivery of goods, and report generation. Some characteristics that can be identified on the business process of SMEs are that they still use manual way in the overall business process. SMEs usually do not maximally use computer facilities and the use of information system for supporting business processes. As the result, the weaknesses and shortcomings include: manual data collection on stocks of raw materials written in the book affect data



to be recorded in computerized database to be duplication of data, the amount of raw materials and number of products in the warehouse are not up-to-date and real time, production delay occurs, the data less accurate information and not integrated.

Weaknesses and shortcomings mentioned above hypothetically can be overcome with the use of computer and information system implementation of Enterprise Resource Planning (ERP). ERP is a major innovation in the field of management information systems and organizations that enhance the organization's ability to create a more integrated, consistent, and control information [1]. ERP is defined as a software solution that integrates information and business processes to allow the sharing of information between departments within an organization [2].

Research on ERP is growing rapidly as ERP fairly rapid growth worldwide. Research on ERP so far can be classified into several themes: the theme of the pre-ERP implementation, ERP software design theme, theme, ERP implementation and post-implementation theme. The case study or research objects ERP, among others: the company in general, large companies, SMEs, and educational organizations.

On the theme of the pre-implementation of ERP, the researchers discuss about business processes and Business Process Re-engineering (BPR). Two research on this theme can be found in [3] and [4] which were using a common approach. On the theme of ERP software design, some of the researches include: Gelogo and Kim [5] that designed the architecture of mobile ERP. On the theme of ERP implementation, the researchers discuss: procedures, phases and methodology, Critical Success Factors (CSF), user participation, factors and issues, management and governance, as well as cost analysis in ERP implementation. CSF is defined as factors that significantly improve project implementation [6].

Studies that discusses the theme of the pre-implementation, namely: [6], [2], [7], [8], [9], [1], [10], [11], [12] and [13]. Refs. [8] and [13] discusses procedures, phases and implementation methodology of the study ERP. Both studies took a case study on the company in general. On the other hand, Refs. [6], [1], [14], and [13] discuss Critical Success Factors (CSF) implementation ERP. The first two research case studies were on large-scale enterprises, while the next two studies were case studies on company in general. Meanwhile, Ref. [9] discusses the role of user participation in the implementation of this ERP. [7] and [10] discusses the factors and issues that affect the implementation of ERP. The study is the first case study on the company in general, while the second study takes a case study on the Small and Medium Enterprise (SME).

The management and governance in the implementation of the first ERP have been elaborated by [1], [11] and [12]. The research is a case study on a large-scale enterprises, while two further research took a case on companies in general. The cost of implementing this ERP was analysed in [2]. Last theme is the theme of post-ERP implementation. Research on this theme was carried by [15] as case study on the company in general.

ERP in the international research so far can be classified in several themes, namely: pre-implementation, software design, implementation, and post-implementation. In the pre-implementation phase, the researchers discuss about business processes and business process re-engineering (BPR). BPR is a concept of process improvement in a dramatic approach. Keywords BPR is fundamental, radical, dramatic and processes. BPR must make fundamental changes to improve productivity and quality [4]. Several studies on the scope of the BPR mostly take general. Meanwhile, this paper conducts research within the scope of the BPR took the approach of system modelling. The modelling system is a simple representation of a real system by eliminating things that are not important, but retains the character of the system [16]. In order to improve and intensify research in the areas of ERP, this paper models to the study design of business systems with the System Modeling Approach on SMES of Furniture. Using System Modeling approaches in the design of BPR, this paper reports performance on ERP research.

2. Methods

This study is divided into five stages. Five phases of business processes identification can be explained as follows:

2.1. *Phase of Identification of the actual business process IKM Furniture*

At this stage, the actual business process IKM Furniture identified

2.2. *Phase of Identification of deficiencies and improvement of business processes (Business Process Reengineering)*

At this stage, deficiencies in the actual business processes are identified. Furthermore, the proposed improvement is provided.

2.3. *Phase of Design Algorithm and process flowchart binis*

At this stage, to design algorithms and flowcharts on the basis of improved business processes.

2.4. *Phase of Analysis of the business system elements*

The design method of business system model in this study using system modeling approach. Based on this approach, business processes will be analyzed for every element of the system. Therefore, at this stage, the business processes have been improved and designed in the form of algorithms and flowcharts, will further analyze the elements of his system. The elements of the system are:

2.4.1. input

Input is everything that comes from the environment to the system

2.4.2. output

Output is anything that comes out of the system towards the environment

2.4.3. Component

Components are all things that exist in the system and interact processing inputs into outputs

2.4.4. Interaction between components

Interaction is the relationship between components in the system in order to process the input into output

2.4.5. Environment.

Environment is everything that is outside the system. There environments provide input to the system, and there is also an environment that accepts the output of the system

2.4.6. Boundary

Boundary is the boundary between the system and the environment

2.5. *Stage Design Data Flow Diagrams (DFD)*

In order to prepare for the manufacture of computer program, then the next stage, the business system model will be designed in the form of Data Flow Diagrams (DFD)

3. Results

3.1. *Phase of Identification of the actual business process IKM Furniture*

The actual business process IKM Furniture can be outlined in the following:

First time customer will order to admin. Furthermore, the admin will check stock levels of raw materials in the warehouse and calculate the price. After that the admin will return to the office by indicating the amount of costs to be paid by consumers. If the consumer does not agree, the transaction will be stopped. Meanwhile, if the consumer agrees, the admin will make mail order as many as 3 copies of admin, owner, and production parts. After the production received a letter from the admin orders, it will soon be the production process in accordance with the order. Once in the form of finished products, the production department will make a note number 2 copies of finished products for admins and owners. Furthermore, the admin will send the products to the customer order.

The actual business process can be described as in Figure 1.

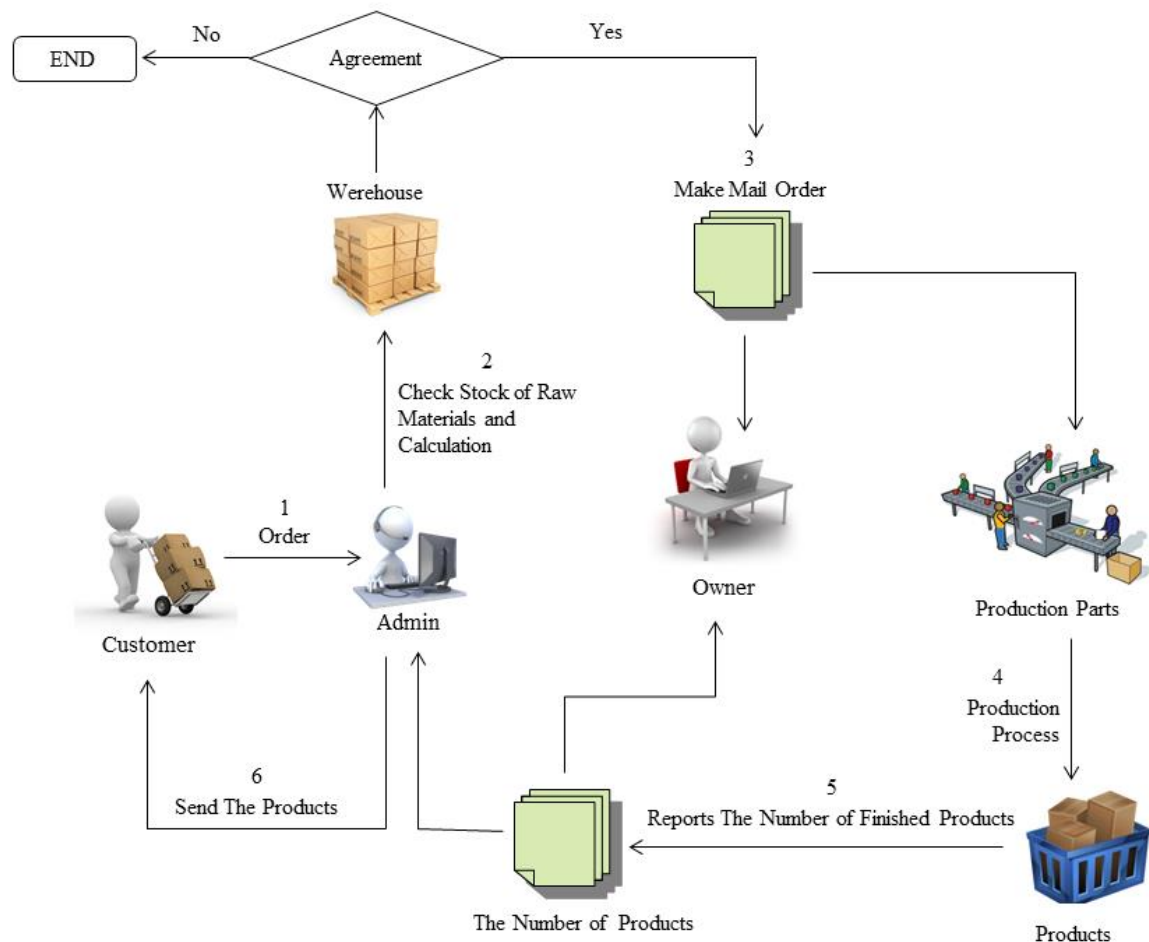


Figure 1. The actual business process in SME of Furniture

3.2. Phase of Identification of Lack and improvement of business processes

Shipping information occurs in the admin or customer orders are as follows:

Consumers come to the company to make a reservation. After that the admin has to check the stocks of raw materials in the warehouse and price calculation. This process takes as long as 20 minutes. If the consumer does not agree then the process will stop, whereas if the consumer agrees admin will convey the information to the owner. This process is performed for 5 minutes. Then the admin will make mail order as many as three sets that are for admin, owner, and production parts. The process of the making of the order carried out for 15 minutes. Thus, if the consumer agrees, then the time required is 40 minutes.

From the explanations above, there are frequent duplications of mail order and reports of finished products, as well as the workflow for ordering customer is too long and convoluted. The other drawback is the owner is in place only at certain times, while ordering customer can not be predicted. Customer orders resulting in frequent delays due to waiting for the owner to be in place and also admin poorly informed about the amount of raw material available.

If duplication of mail order and report the finished product can be minimized, and the process is too long and convoluted can be shortened, there will be an increase in work time. Moreover, it can reduce the use of paper that is too much and could reduce the error rate.

3.3. Phase of the design of algorithms and business process flowchart

3.3.1. The design of algorithms of business processes

Algorithm of Business processes designed on SME Furniture is as follows:

- a. Customer order products to admin.
- b. Admin will check stock levels of raw materials in the system.
- c. If the stock in the warehouse fewer than the number of orders, then the admin will negotiate with the customer.
- d. Once that happens the price agreement between the admin and customer. If the customer refuses, then the transaction is stopped. Meanwhile, if the customer agrees, then the admin will enter the data of customer orders menu and menu order supplier.

3.3.2. Phase of Designing business process flowchart

Flowchart Business processes are designed on SME Furniture is shown in Figure 2.

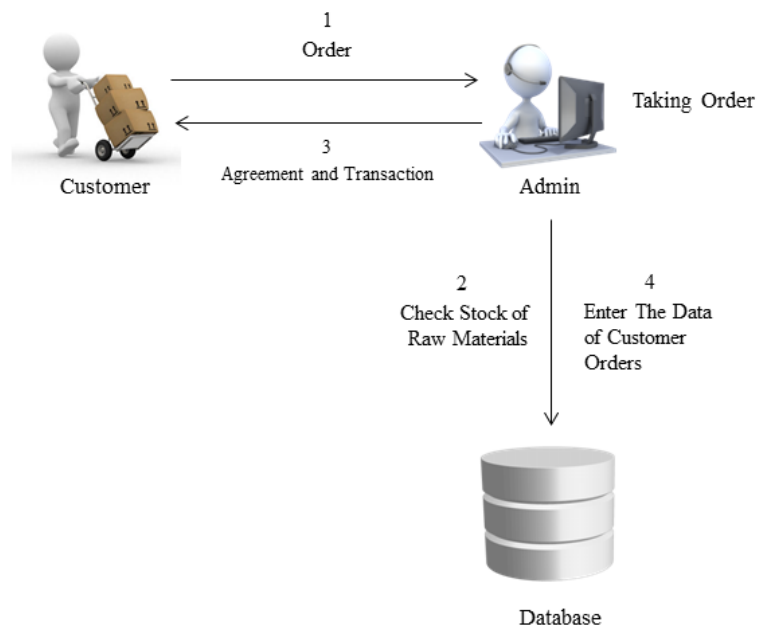


Figure 2. Flowchart design business processes

3.4. Phase of analysis of elements of a business system

With the approach to modeling the system, the next step is the analysis of the elements of a business system. The following table lists the elements of the business system:

Table 1. Elements of the business system of SMEs Furniture

No	Item	elements of the system
1	Model of consumer products ordered	input 1
2	The number of products ordered Consumers	input 2
3	DP of consumers	input 3
4	The results of calculations	output 1
5	payment slip	output 2
6	SO (mail order)	output 3
7	receipt of order	component 1
8	Checking the stock of raw materials in the warehouse	component 2
9	Calculating raw material requirements, adequacy of raw materials, the price of the contract, due date	component 3
10	Presentation of the calculation to the consumer	component 4
11	Admin accepting orders	interaction 1

12	Admin check stocks of raw materials at the warehouse	interaction 2
13	Admin makes calculations	interaction 3
14	Admin convey the results of calculations to consumers	interactions 4
15	Consumer	environment 1
16	The boundary between the SME and Consumer	boundary

3.5. Phase of Design of Data Flow Diagrams (DFD)

The last stage of this research is the design of Data Flow Diagrams (DFD). DFD business systems at IKM Furniture are designed as in Figure 3.

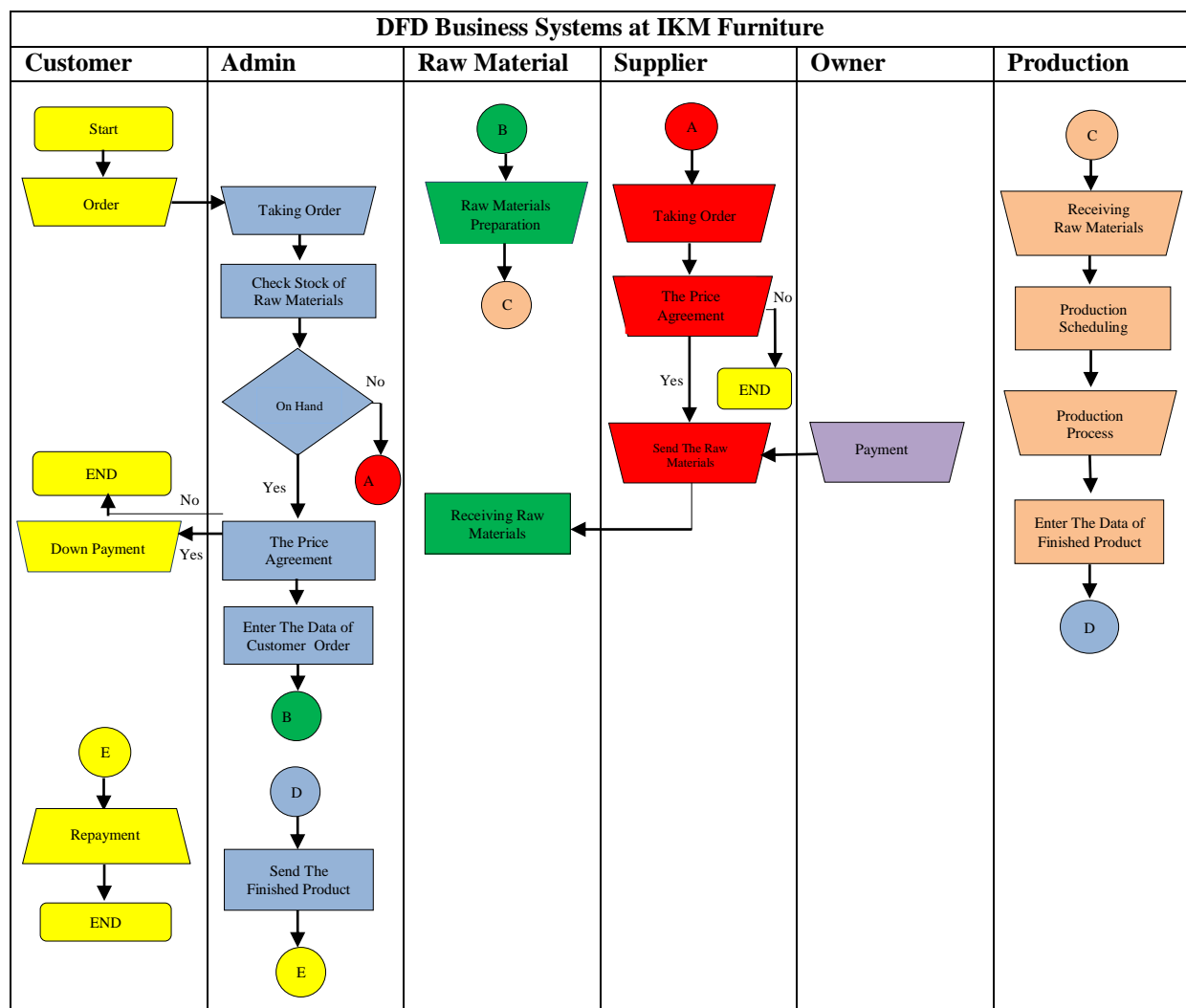


Figure 3. DFD business system

4. Conclusion

There are some shortcomings in the initial system, such as: the time required to provide the results to the admin consumers about 40 minutes too long. Furthermore, the final decision to order the production of raw materials in the hands of leaders who are more often not be in the SME. The system built in this paper, is planned to reduce the waiting time for consumers only be about 5 minutes.

in addition, the new system is built on this study, make recommendations to the deputy leader or manager to be able to take a decision to purchase raw materials production, or allow the leader to make decisions online wherever he is.

In the business system of SME of Furniture, Products and the number of products ordered customers and DP paid by consumers identified as elements of system inputs 1,2 and 3. The result of the calculation, payment slips and mail order (SO) are identified as elements of system output of 1.2, and 3. Acceptance of orders, stocks checking of raw materials at the warehouse, calculating raw material requirements, adequacy of raw materials, the price of the contract, and the due date, as well as the submission of the results of calculations to consumers identified as elements of system components 1, 2, 3, and 4. Admin accept orders, Admin check stocks of raw materials at the warehouse, making calculation, and Admin convey the calculation results to consumers identified as an element of interaction system 1, 2, 3, and 4. Consumers identified as an element of environmental systems. While the boundary between SMEs and consumers identified as elements of the system boundary.

References

- 1 Zaitar, Y., and Ouzarf, M.: 'ERP Projects: Key success factors and risk of failure a proposed model of governance of enterprise resource planning', *International Journal of Computer Applications*, 2012, 46, (8), pp. 34-39
- 2 Supramaniam, M., Abdullah, A., and Ponnann, R.: 'Cost Analysis on ERP System Implementation amongst Malaysian SMEs', *International Journal of Trade, Economics and Finance*, 2014, 5, (1), pp. 72
- 3 Tsai, W.-H., Chen, S.-P., Hwang, E.T., and Hsu, J.-L.: 'A study of the impact of business process on the ERP system effectiveness', *International Journal of Business and Management*, 2010, 5, (9), pp. 26
- 4 Yahya, B.N.: 'BUSINESS PROCESS REENGINEERING: CONCEPTS CAUSES AND EFFECT', *Jurnal Teknik Industri*, 2004, 4, (2), pp. 102-110
- 5 Gelogo, Y.E., and Kim, H.: 'Mobile integrated enterprise resource planning system architecture', vol, 2014, 7, pp. 379-388
- 6 Ijaz, A., Malik, R., Lodhi, R.N., Habiba, U., and Irfan, S.M.: 'A qualitative study of the critical success factors of ERP system-A case study approach', in Editor (Ed.) (Eds.): 'Book A qualitative study of the critical success factors of ERP system-A case study approach' (2014, edn.), pp. 2556-2566
- 7 Jayawickrama, U., and Yapa, S.: 'Factors affecting ERP implementations: client and consultant perspectives', *Journal of Enterprise Resource Planning Studies*, 2013, 2013, pp. 1
- 8 Manoj, P.: 'ERP Implementation', *International Journal of Computer Science & Applications (TIJCSA)*, 2013, 1, (11)
- 9 Matende, S., and Ogao, P.: 'Enterprise resource planning (ERP) system implementation: a case for user participation', *Procedia Technology*, 2013, 9, pp. 518-526
- 10 Dixit, A.K., and Prakash, O.: 'A study of issues affecting ERP implementation in SMEs', *Researchers World*, 2011, 2, (2), pp. 77
- 11 Jidong, Z., and Liyan, W.: 'ERP Implementation: A Corporate Governance Perspective', *International Journal of Public Information Systems*, 2010, 6, (1)
- 12 Mabert, V.A., Soni, A., and Venkataramanan, M.: 'Enterprise resource planning: Managing the implementation process', *European journal of operational research*, 2003, 146, (2), pp. 302-314
- 13 Umble, E.J., Haft, R.R., and Umble, M.M.: 'Enterprise resource planning: Implementation procedures and critical success factors', *European journal of operational research*, 2003, 146, (2), pp. 241-257

- 14 Al-Mashari, M., Al-Mudimigh, A., and Zairi, M.: 'Enterprise resource planning: A taxonomy of critical factors', *European journal of operational research*, 2003, 146, (2), pp. 352-364
- 15 Daoud, H., and Triki, M.: 'Accounting information systems in an ERP environment and Tunisian firm performance', 2013
- 16 Daellenbach, H.G.: 'Systems and Decision Making: A Management Science', 1994