International Journal Information System and Computer Science (IJISCS)

Full Paper
eISSN : 2598-246X
pISSN : 2598-0793

DEVELOPMENT E-SCM SYSTEM WITH RAPID APPLICATION DEVELOPMENT METHOD TO IMPROVE PRODUCTION MANAGEMENT OF MICRO BUSINESS IN NORTH MERUYA JAKARTA

*Corresponding author
riri.fajriah@mercubuana.ac.id

Riri Fajriah
Department of Information System, Computer Science
Faculty Universitas Mercu Buana, Jakarta, Indonesia
Jl. Meruya Selatan No 1 Kembangan West Jakarta

Article history:
Received September 15, 2020
Revised November 5, 2020
Accepted December 4, 2020

Keywords:
e-SCM;
RAD'
Project Planning;
Production;
Micro-Business

Abstract
Project Planning is an important phase in a production supply chain flow in the business. In project planning, information about the project achievement targets will be described in a series of activities and measurement of the clear target time for completion of work. If this concept of project planning can be applied in the development of micro-business sector in North Meruya Jakarta, so it will greatly assist entrepreneurs especially beginners in planning business operations in a measured and systematic manner. This will also be a solution for how the concept of electronic Supply Chain Management (e-SCM) system can be accommodated in the micro-business sector to increase profitability and economic growth. As we understand that micro-business entrepreneurs often find it difficult to survive in the problems of production, capital and business competition. So they need to understand the right production concepts and tools such as e-SCM. Therefore, this research will try to apply the concept of project planning method with e-SCM. e-SCM system design will use the method of Rapid Application Development (RAD). The final goal of the research is to provide solutions for changing the concept of production management for micro-business entrepreneurs in Meruya Utara Jakarta.

1.0 INTRODUCTION

Project planning management is one of the strategies to manage various projects that may be carried out within a limited time. Different projects or multiple projects must be said to be able to complete various activities in a short time with the availability of a limited amount of human resources. In other research, one of the tools that can measure the success of project planning management (PPM) is using the Earned Value Gantt Chart (EV-Gantt Chart) method [1]. PPM collaboration by implementing EV-Gantt is considered effective to make the project work run systematically, according to the time target, effective utilization of resources and achieve the project target by what is expected.

The proper implementation of project management needs to be applied to the micro-business sectors. A micro-business entrepreneur must also know the supply chain management system to be able to produce and distribute its products appropriately.

Project planning management is one of the strategies that can be applied to supply chain management systems. It because production planning with measurement of resources on activities and work time targets will optimize if it was implemented the supply chain management cycle in their business [2]. Supply chain management system is not only limited to the production area, but its scope related with more sectors such as the selection of suppliers, procurement, manufacturing processes, logistics, distribution and marketing to financial records.

The problem faced by micro-business entrepreneurs in North Meruya is that they still use the traditional system in planning production. This traditional system causes micro business actors were not able to plan activities and business supervision optimally. By implementing an e-SCM System, it is hoped that it can improve production efficiency and make the distribution of goods effectively. E-SCM can integrate overall business management data related to supply chain management from upstream to downstream [3]. The research plan that will be carried out will collaborate on several methods to produce the right e-SCM modelling, as follows :

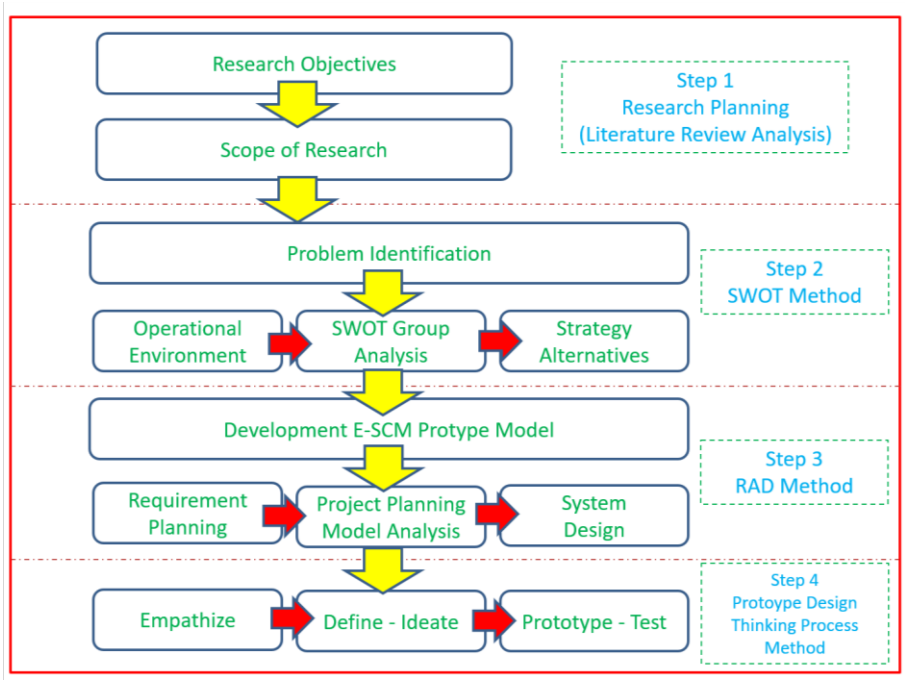

Figure 1. Research Planning of e-SCM Modelling by Implemented Project Planning Management

This research will use several methods starting from observing research objectives by studying the literature review in the analysis of previous research, then doing identification of problems using the SWOT analysis method, after that designing the e-SCM Prototype Model by applying the Rapid Application Development Method and to ensure that the prototype model system that is developed according to or not with the requirements of the final needs is used the Prototype Design Thinking Process Method.

The purpose of this research is to changes in the concept of production scheduling to micro entrepreneurs in North Meruya Jakarta. In other that, we want to introduce the concept of e-SCM design in the initial phase of research to all micro entrepreneurs. Researchers hope that micro-entrepreneurs in North Meruya can understand that one of the strategies to be able to develop their business more optimally is to use a supply chain management system in their business. So that all phases of the production process to the delivery of products to consumers can be planned, managed, monitored and evaluated on an ongoing basis and minimize the occurrence of other business risks.

1.2 Problem Formulation

Customer experience, new entrants, technology collaboration versus competition are major characteristics of the new trend and logistics service providers will need to adapt to these changes. Improved running in one of the previously mentioned areas will create and maintain the company's competitiveness and as more modern technological tools and solutions will be used, companies will be able to have more benefits [20]. The problem to be solved in this research is how to develop an e-SCM system that can be used by micro business to control production management in a scheduled and controlled manner.

2.0 THEORETICAL

2.1. Literature Review of Designing e-SCM Systems With the Integration of Project Planning Management Concepts

There are several components indicate the effect of success in implementing e-SCM Systems in an industry that is related to security factors, costs, software, hardware, infrastructure, technology and other factors that contribute to the use of e-SCM in business organizations [4]. The implementation of e-SCM in service companies such as the aviation industry has an impact on providing ease of process and time efficiency of a series of flight activities ranging from booking tickets to flights to destinations [5]. Collaboration on the development of digital supply chain with blockchain technology produces the concept of how data structure processing can be applied through sharing encryption and can also integrate data verification processes through face recognition, the application of artificial intelligence and machine learning [6]. Project management is a method for managing a project, planning costs, resources and development time. Also useful is planning future projects [7]. Critical Chain Project Management (CCPM) is a scheduling method that can be an alternative solution to the problem of schedule control and this method is adopted by eliminating multitasking, student syndrome, Parkinson's law and providing a buffer at the end of the project. One method used is to use a gantt chart which is then broken down in more detail and complete with the relationship between its activities in the form of CPM, then it will be compared with the results of CCPM scheduling [8]. Supply chain management performance can help to determine the company's competitiveness in meeting market demand effectively and efficiently [9]. Project management is a strategy that needs to be done in achieving the efficiency and effectiveness of a company. Project planning can implement Work Breakdown Structure (WBS), Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT)[10]. Based on the presentation of the results of the literature review on the results of research that has been done in the field of supply chain management systems and project management, it can be illustrated in the following schema :

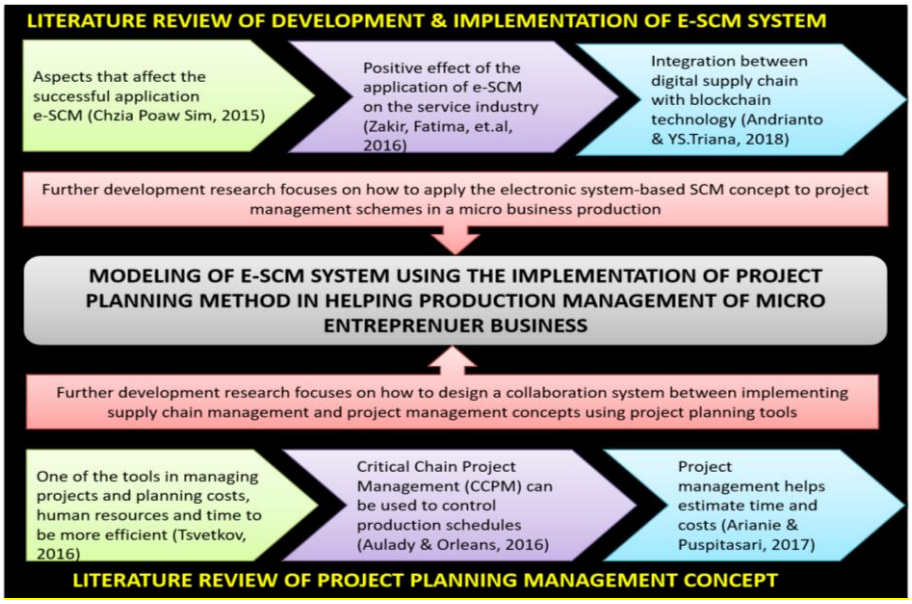

Figure 1. State of the Art from Research Regarding Implementation of e-SCM and Project Planning Management Concept

The application of e-SCM is very helpful for companies in managing production management effectively and efficiently. e-SCM implementation model can be collaborated with several

methods and technologies to increase the productivity of company performance in production management. Project Planning Management is one method of managing projects in a systematic, measurable and able to evaluate projects on an ongoing basis. In the implementation of project planning management can use several techniques such as Gantt Chart, Work Breakdown Structure (WBS), Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) which all aim to be able to plan and control projects appropriately and achieve targets which are expected [10].

2.2. e-SCM Concept

E-Supply Chain Management (E-SCM) is a management concept where companies try to utilize internet technology to integrate all of the company's business partners, especially those related to the supply system of materials or resources needed in the production process [11]. E-Supply Chain Management (E-SCM) is the combined use of technology to increase supply chain operations as well as supply chain management. E-SCM collaborates or combines the use of technology, intending to expand B2B processes and increase speed, agility, real-time control, and customer satisfaction (planning, coordination, and control) [12].

2.3. Problem Identification with SWOT Analysis

SWOT is a strategic planning method used to evaluate strengths, weaknesses, opportunities, and threats in a project or business speculation. This process involves setting specific goals for business or project speculation and identifying internal and external factors that support and which do not achieve these goals. SWOT analysis can be applied by analyzing and sorting out various things that affect the four factors, then applying it in the SWOT matrix image, a where the application is how strengths can take advantage of the opportunities that exist, how to overcome weaknesses that prevent the advantages of opportunities that exist, then how strengths able to face threats (threats) that exist, and the last is how to overcome weaknesses (weaknesses) that can make threats (threats) become real or create a new threat [13].

2.4. Problem Identification with SWOT Analysis

Rapid Application Development (RAD) or rapid prototyping is a model of software development processes classified as incremental engineering [14]. Three phases in RAD that involve the analyst and user in the assessment, design and implementation stages. The three phases are requirements planning (planning requirements), RAD design workshops (RAD design workshops), and implementation (implementation) [15].

3.0 METHODOLOGY

The following is a research framework that will be carried out as a guide in conducting research as follows :

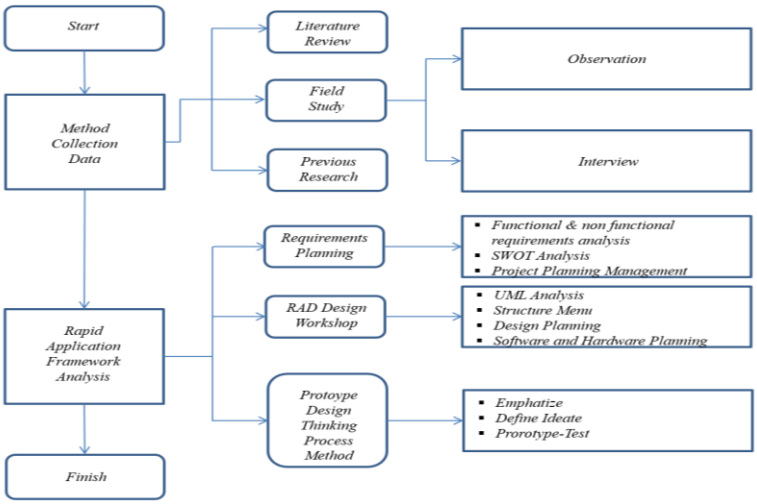

Figure 2. Research Flow Diagram

The picture above illustrates the stages that will be carried out in this research by implementing the Data Collection Method up to the Information System Development Method using Rapid Application Development in building e-SCM modelling.

4.0 RESULANTS AND DISCUSSION

4.1 Requirements Planning

Table 1. Functional & Nonfunctional Requirement

***Requirement Elicitation* Phase I**	
Functional Requirement	
1.	Displays the registration page
2.	Display the login page
3.	Displays the service menu & service management page
4.	Display the help menu & help management page
5.	Displays the administrator page
6.	Displays the business owner page
7.	Displays the employee page
8.	Displays the user's main page
9.	Display the account menu & the user account management page
10.	Display the profile menu & the web profile management page
11.	Display the product menu & product management page
12.	Displays the employee menu & the employee account management page
13.	Display the production menu & production management page
14.	Display the report menu & production report management page
15.	Print reports with button commands
16.	Administrator has access rights to the menu : a. Administrator home menu b. Service management menu c. User account management menu d. Report management menu
17.	Business owners have access rights to the menu : a. Business owner's homepage b. Employee data management menu c. Product data management menu d. Production data management menu e. Report management menu
18.	Employees have access to the menu : a. Employee home menu b. Product data management menu c. Production data management menu d. Report management menu
Non-functional	
1.	Showing an attractive user interface
2.	Showing user experience that is easy to understand
3.	The system can be used on all browsers
4.	The system can protect the security of user data

After determining all system requirements, the next step is to identify the current problems. The method used to identify the problem is to use SWOT analysis.

4.2 SWOT Analysis

SWOT analysis involves setting specific goals from business or project speculation and identifying internal and external factors that support and which do not achieve those goals. SWOT analysis (or SWOT matrix) is a strategic planning technique used to help a person or organization identify strengths, weaknesses, opportunities, and threats related to business competition or project planning [16]. It is designed for use in the preliminary stages of decision-making processes and can be used as a tool for evaluation of the strategic position of a city

or organization. The SWOT analysis in identifying current system problems is illustrated in the table below :

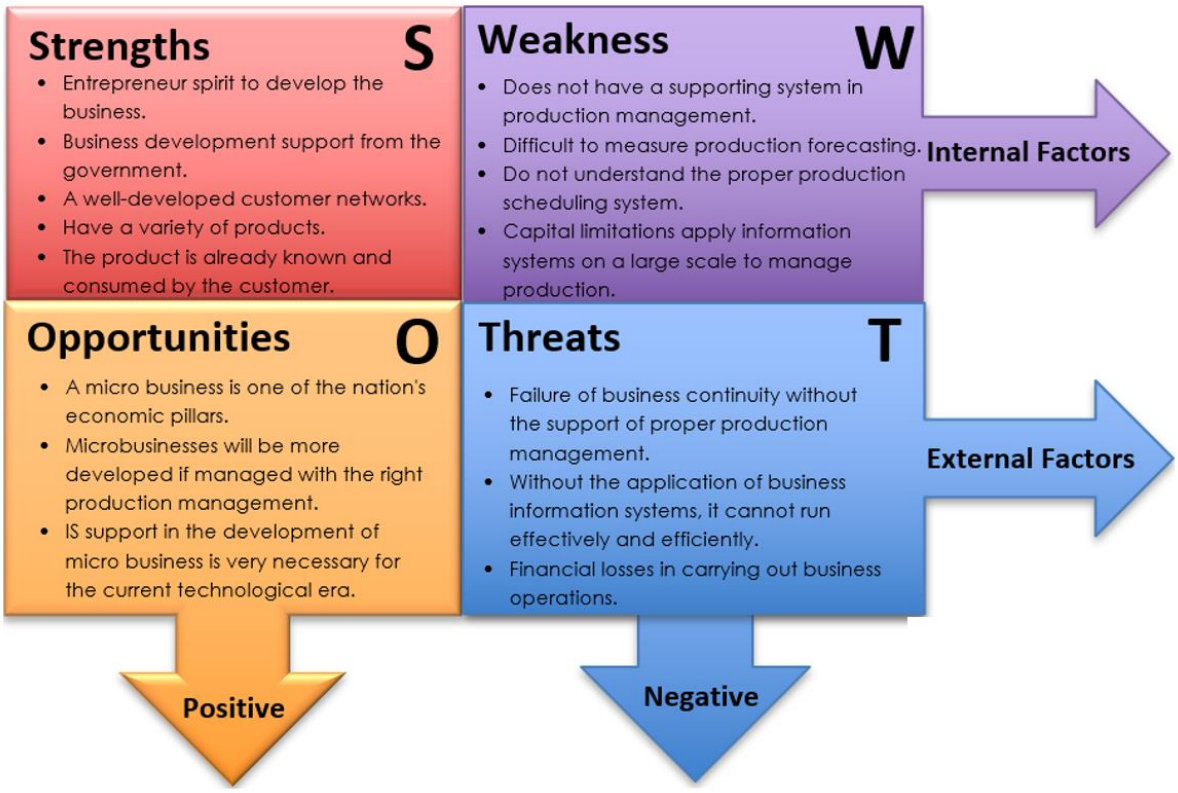

Figure 3. SWOT Analysis Diagram

After understanding the existing problems, the next project system scheme will be created using the work break down method.

4.3 Work Breakdown Structure

A work-breakdown structure (WBS) in project management and systems engineering, is a deliverable-oriented breakdown of a project into smaller components [16]. A work breakdown structure is a key project deliverable that organizes the team's work into manageable sections. The following is the WBS scheme in the research conducted :

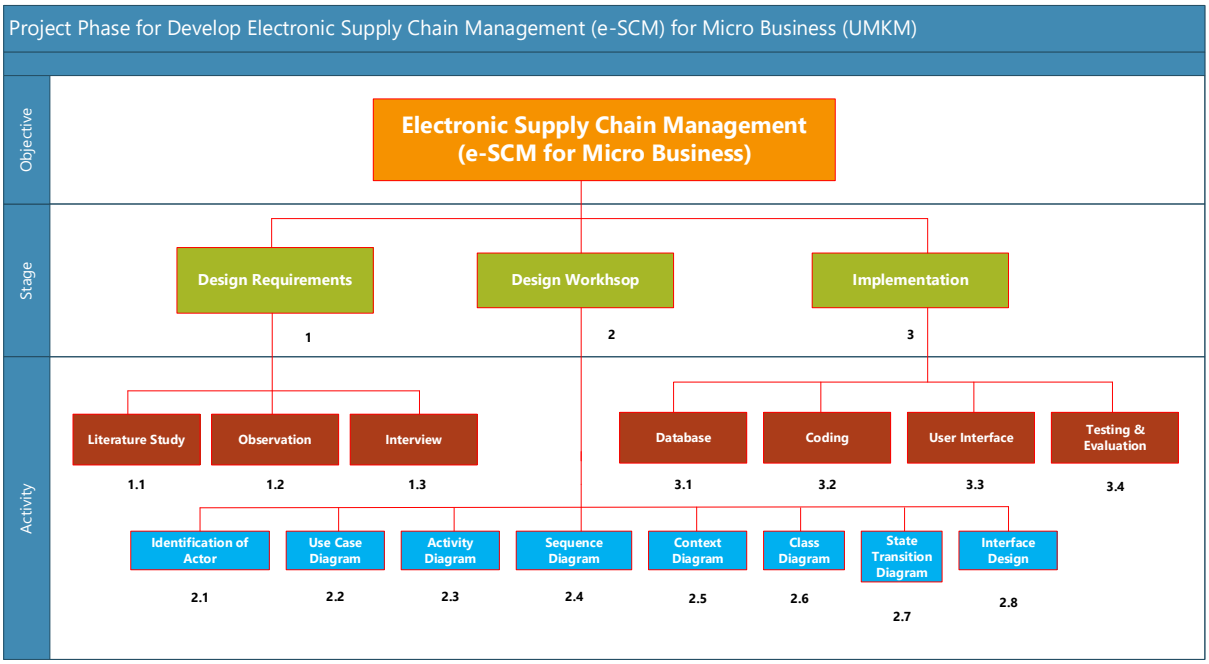

Figure 4. Work Breakdown Structure for Development e-SCM System

4.4 UML Analysis

4.4.1 Use Case Diagram

The following is a use case diagram depiction on an e-SCM system plan :

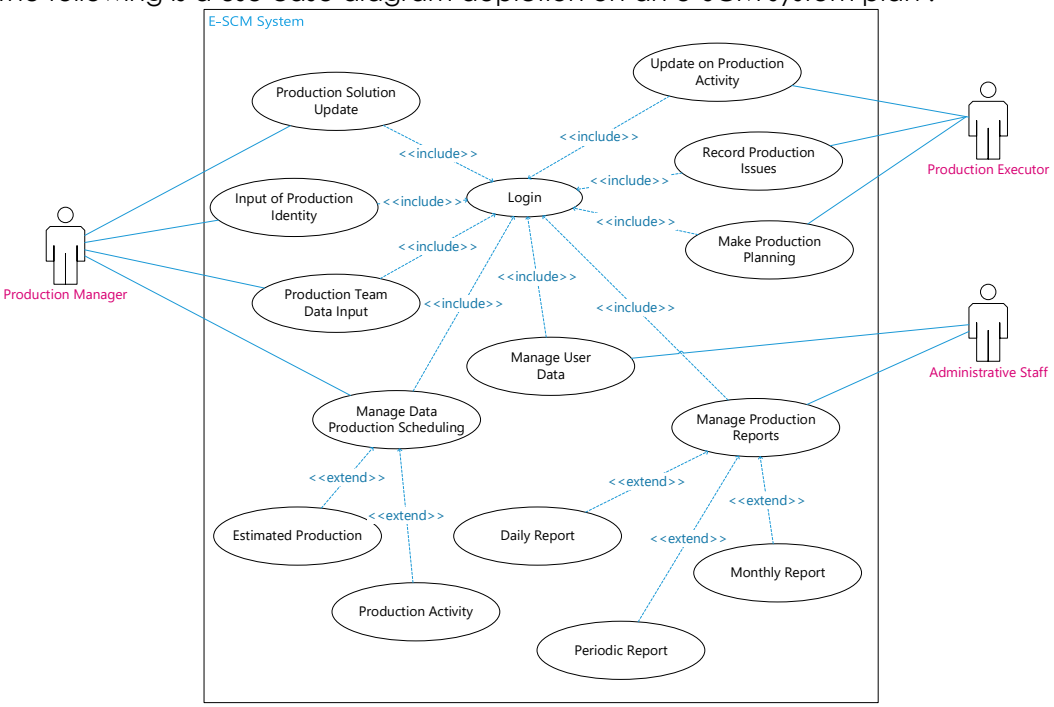

Figure 5. Use Case Diagram e-SCM System for Micro Business Integrated With Project Management

Based on the description of the use case diagram above it can be understood that there are several actors in the system with different function

4.4.2 Activity Diagram

Activity diagram represents only the structure of the process; however, it is useful to have comprehensive data model associated with the RAD for analysis and improvements [17]. Production scheduling is a crucial stage in the management of production in a micro-business, as illustrated in the following activity diagram (figure 6) :

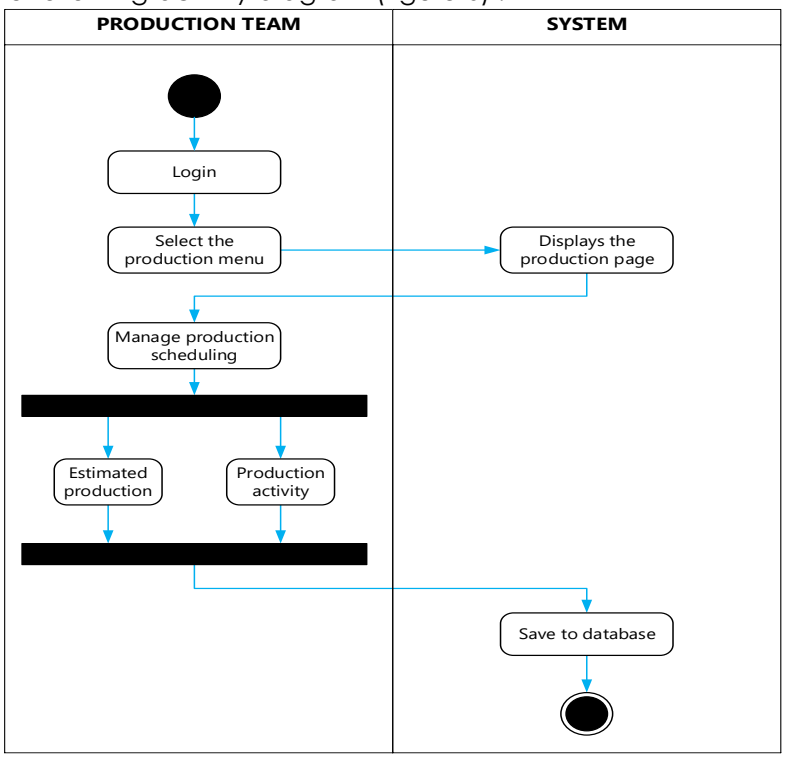

Figure 6. Activity Diagram Manage Production Scheduling

4.4.3 Sequence Diagram

The design of the e-SCM system also provides a solution in the production update process which has not been properly managed in the process, as shown in the following sequence diagram below [figure.7] :

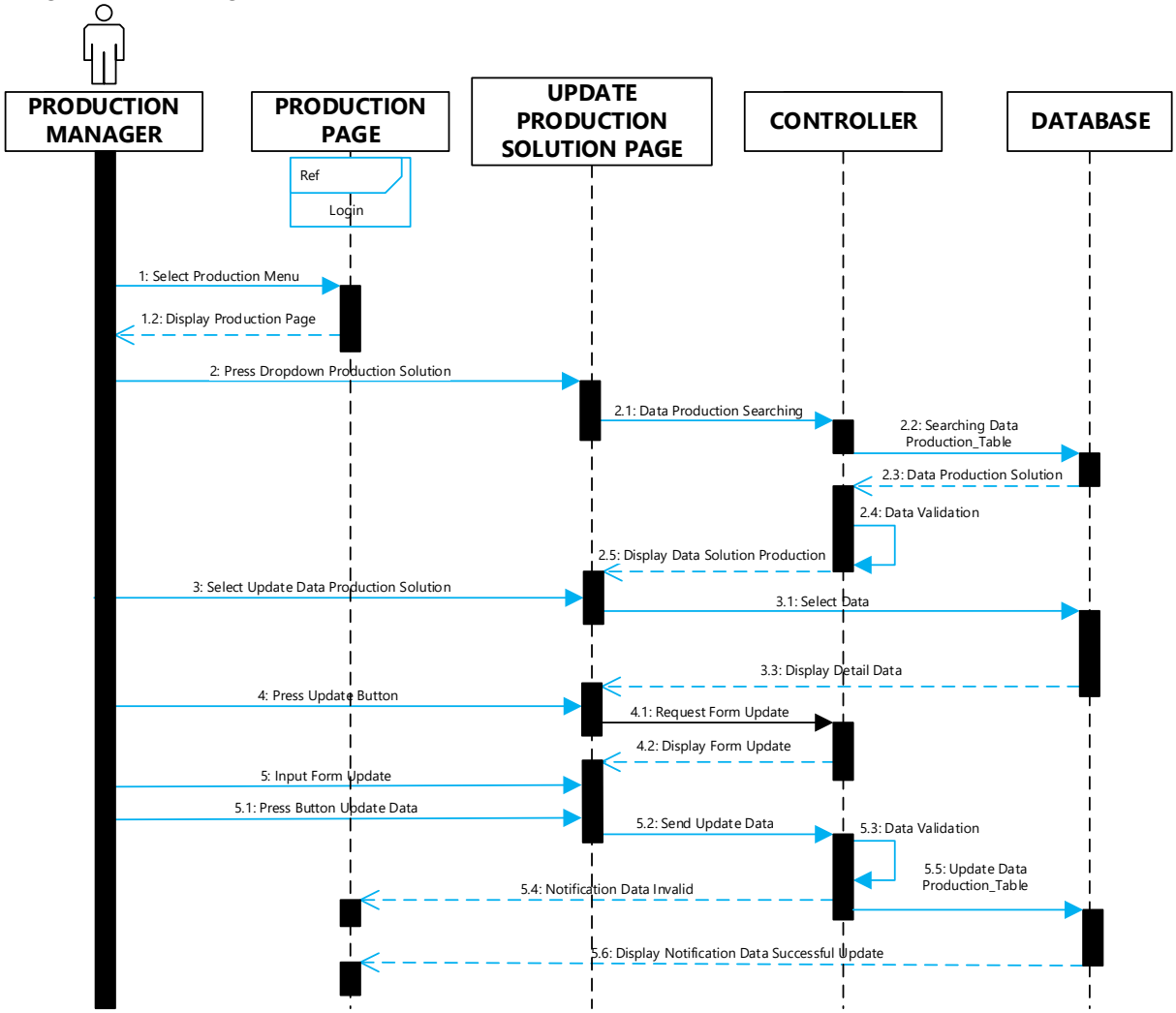

Figure 7. Sequence Diagram Update Product Solution

Based on the sequence diagram above we know that in every production process, a production manager must update information related to every production process that takes place to be able to find out the constraints and the right solution in case of problems in a series of production processes.

4.4.4 Class Diagram

A class is a specification that, when installed, will produce an object and is the core of object-oriented development and design. Classes describe the state of the attributes of a system and offer services for manipulating functions. Classes and objects can be identified based on external entities that produce and use information that will be used by computer-based systems [18].

To define the class of a system, it can be started from the use case model that has been created by specifying what objects are needed on the system. The following figure is a depiction of the class diagram that explains the data process in the e-SCM system that will be built :

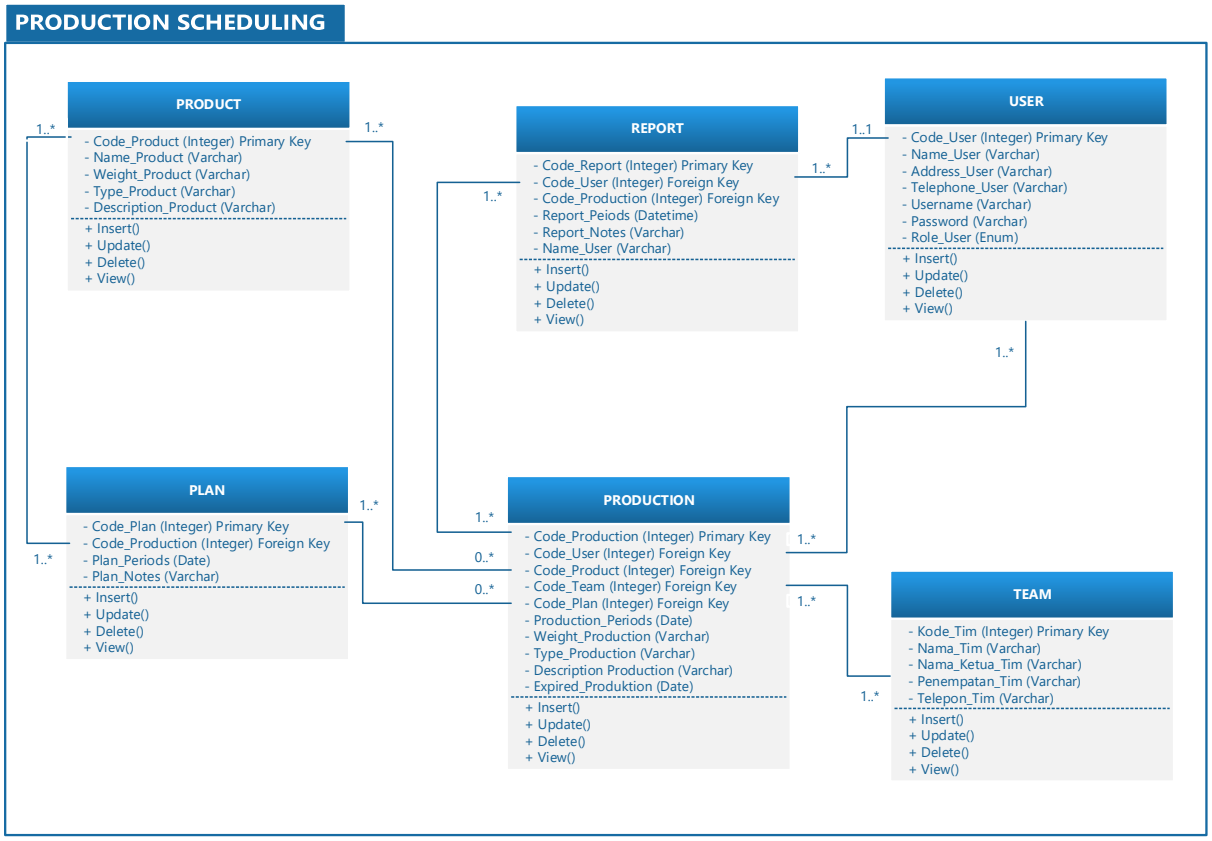

Figure 8. Class Diagram e-SCM (Supply Chain Management System) Production Management of Micro Business in North Meruya

in the class diagram above there are 6 class objects associated with the transaction process and master data.

4.5 Architecture e-SCM System

Information systems development architecture can help provide an overview of the system process flow and the development of the technology infrastructure of the system to be implemented [19]. The following is a description of the information system architecture that will be developed by developer in the next phase :

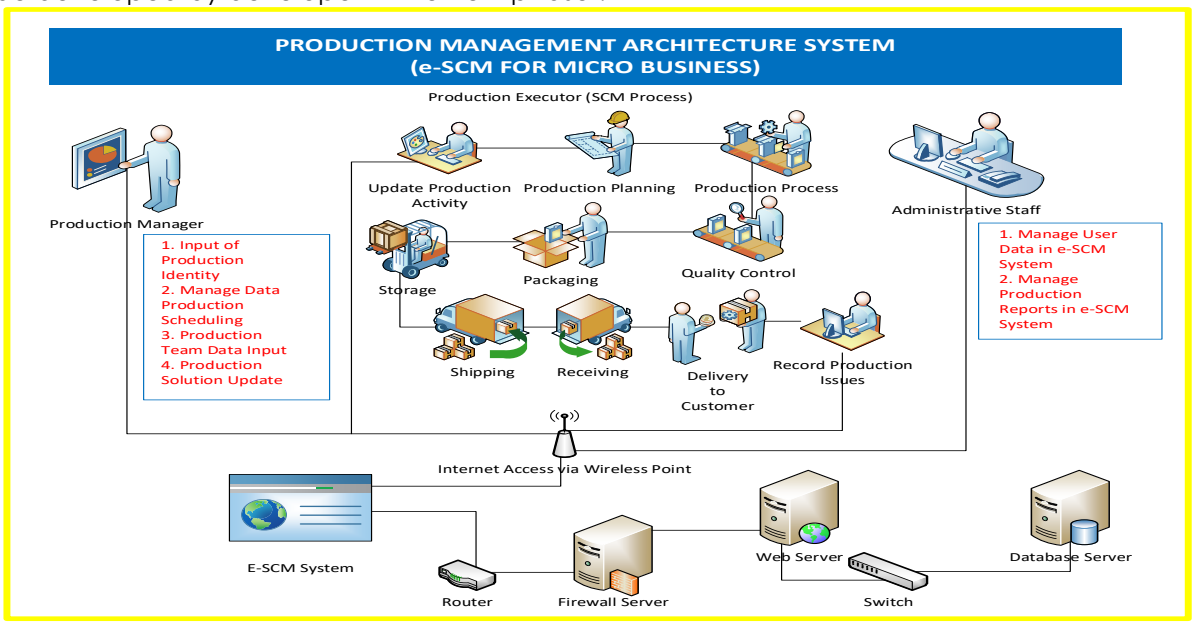

Figure 9. e-SCM (electronic Supply Chain Management) Architecture System

The e-SCM System will be used by 3 users, namely production managers, production executives and administrative staff. The information system will manage all production activities starting

from the production planning process, production implementation, quality control, packaging, storage, shipping, receiving, delivery to customer, and record production issues.

4.6 Prototype Design

The following is a prototype of the e-SCM system design which will be implemented in the micro business in North Meruya :

Figure 10. Home Menu Display of e-SCM System

This is the home page of the e-SCM web system which will be developed in North Meruya. Every entrepreneur from a micro business who will use the system must have an account. User accounts will be managed by administrative staff in North Meruya Village who are in the micro business development section in the region. The e-SCM system being developed is still in a simple stage for business management in the UMKM sector in North Meruya.

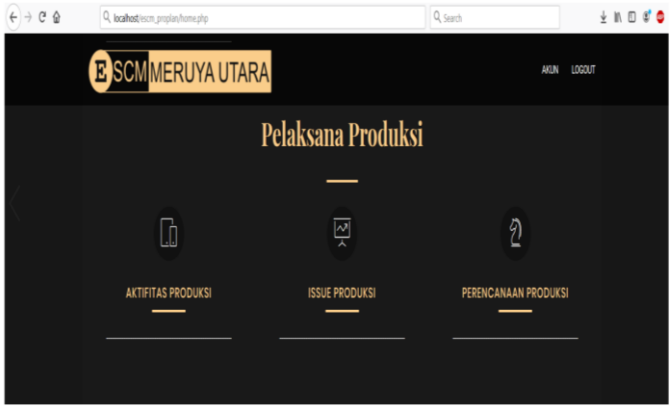

Figure 11. The Menu of e-SCM System

As for the current process, every micro business entrepreneur does not have tools in proper production control. Therefore, the system developed will change the simple production process in today's micro business. This is because by using the system an entrepreneur must be able to record production activities, problems in the production process and production scheduling in each batch so that supervision can be carried out properly and reduce the risk of production failure.

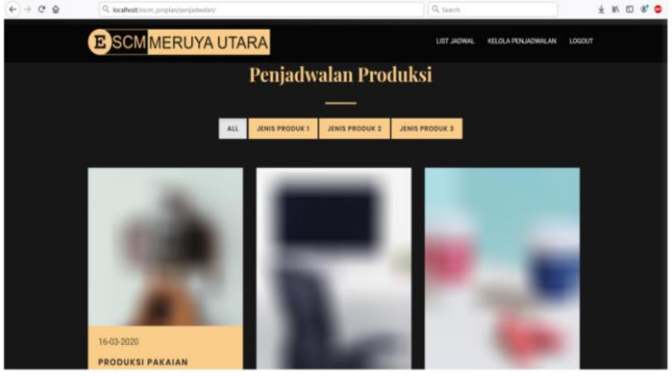

Figure 12. Entry Production Schedule

The data collection that needs to be done in the production scheduling is the production start date, the raw materials used, the estimated length of production, the amount of production, the product has failed quality control, the packaging process and the plan to deliver the production to the customer. The production scheduling process is a critical stage in the management of a production implementation project in a micro business.

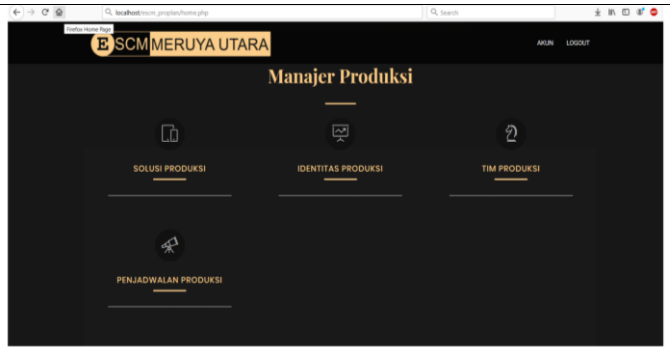

Figure 13. The Menu for Production Manager

In the development of the e-SCM system, there is a difference between conventional production systems, namely that there is a critical role in the supervision of a production manager. In this system, a manager must enter solution data to production constraints, production identities, names of production-related teams and production scheduling information.

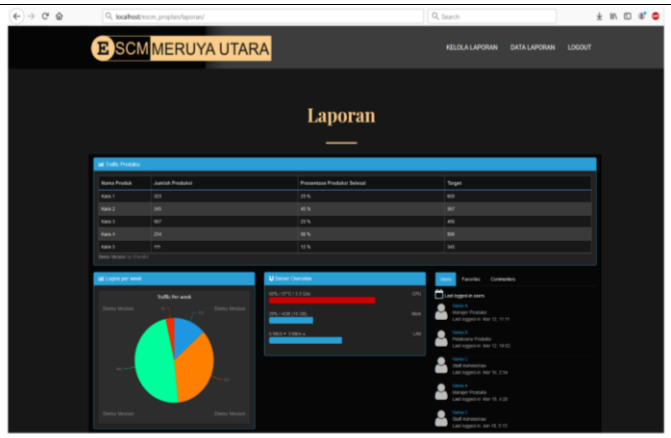

Figure 14. The Menu of Dashboard Report

To monitor production activities carried out by micro business entrepreneurs, the system will have a reporting dashboard that makes it easier for production managers to monitor the production process and any obstacles that may occur. This dashboard function also makes it easier for the production team to see the production results that have been carried out in each batch. In purpose to make effectively report production reports to the system, the entire production team must update the data of each production activity carried out.

5.0 CONCLUSION

5.1. Conclusion

Designing e-SCM modelling by applying the concept of project planning lies in how business managers can list production schedules with the right team division. Besides that, it is also necessary to pay attention to the issues in each production process to be recorded so that decisions can be made on the obstacles faced in the series of production processes.

The design of information systems by making an e-SCM system model uses three stages of system development by following the application of the Rapid Application Development method. The stages of developing the information system consist of design requirements, design workshops and implementation. At the design requirements stage, a literature study process, observation and interviews are carried out to the research object. After this stage, the design workshop stage was carried out using the information system design through the UML technique. After that, the final stage of e-SCM system design is to carry out the implementation limited to testing the prototype design system that has been developed.

The new findings of this study from previous research are that the concept of e-SCM development can be integrated with the concept of implementing project management to plan production appropriately by following the availability of resources. Besides that, the application of the e-SCM concept can be applied to small scale industries such as micro businesses. Therefore, a micro business can develop if the management of the product or service production process is planned with the right principles based on information systems.

5.2. Suggestion

In further research, we recommend following up research into the system development stage to realize from the form of a prototype system to an application system that can be used at the end-user side of the system.

REFERENCES

[1] Hong Yeow Ong, Chen Wang & Nurshuhada Zainon. (2016). "Integrated Earned Value Gantt Chart (EV-Gantt) Tool for Project Portfolio Planning and Monitoring Optimization". Engineering Management Journal, 28:1, 39-53, DOI : 10.1080/10429247.2015.1135033.

[2] Rabiu Yusuf et.al.,. (2017). "The Review of Supply Chain Management Systems and Firm Performance". International Journal of Management Research & Review. IJMRR/Feb 2017/Volume 7/Issue 2/Article No-5/113-122. ISSN : 2249-7196.

[3] Adi Baskara Joni, I. Dewa Made. (2018). "Analisa Implementasi E-SCM Pada Model Bisnis Distribution Outlet (DISTRO)". Jurnal Pendidikan Teknologi dan Kejuruan Vol. 15, No.1, Januari 2018, Hal : 146. P-ISSN : 0216-3241;E-ISSN : 2541-0652.

[4] Sim, Chzia. P,. (2015). "RFID in SECM and Factors Including Identification Technology Evidence from BSA Manufacturing, Automotive-Malaysia". Jurnal UMP Social Sciences and Technology Management. Vol. 3, Issue 1, 2015.

[5] Zakir, Fatima, et.al. (2016). "Effect of e-Supply Chain Management on the Business Process of Airline Industry". International Journal of Management Sciences and Business Research. July-2016 ISSN (2226-8235) Vol-5, Issue 7.
[6] Susilo, Ferri, A. & Triana YS. (2018). "Digital Supply Chain Development in Blockchain Technology Using Rijndael Algorithm 256". International Conference on Design, Engineering and Computer Sciences 2018. Doi : 10.1088/1757-899X/453/1/012075.
[7] TSVETKOV, Konstantin. S. (2016). "Project Management for Students From University of Agribusiness and Rural Development and Software for Its Application". Balkan and Near Eastern Journal of Social Sciences. Tsvetkov, 2016 : 02 (03).
[8] Aulady, M & Orleans, C. (2016). "Perbandingan Durasi Waktu Proyek Konstruksi Antara Metode Critical Path Method (CPM) dengan Metode Critical Chain Project Management (Studi Kasus : Proyek Pembangunan Apartemen Menara Rungkut)". Jurnal IPTEK, Vol.20 No.1, Mei 2016. ISSN : 1411-7010. e-ISSN : 2477-507X.
[9] Kurniawan, Ardy & Kusumawardhani, Amie. (2017). "Pengaruh Manajemen Rantai Pasokan Terhadap Kinerja UMKM Batik di Pekalongan". Diponegoro Journal of Management. Volume 6, Nomor 4, Tahun 2017, Halaman 1-11. ISSN (Online) : 2337-3792.
[10] Arianie, Ganesstri. P & Puspitasari, Nia. B. (2017). "Perencanaan Manajemen Proyek Dalam Meningkatkan Efisiensi dan Efektifitas Sumber Daya Perusahaan (Studi Kasus : Qiscus Pte Ltd)". J@ti Undip : Jurnal Teknik Industri, Vol. 12, No. 3, September 2017.
[11] Indrajit, R.E dan Djokopranoto. (2003). "Konsep Manajemen Supply Chain : Cara Baru Memandang Mata Rantai Penyediaan Barang". Jakarta : Grasindo.
[12] Turban, et.al. (2010). "Electronic Commerce 2010 : A Managerial Perspective 6th Edition". Prentice Hall; 6 edition.
[13] Sairun & Ranggadara, Indra. (2018). "Development of Pre Order Syar'i Clothes Based on Android Application". International Research Journal of Engineering and Technology (IRJET). Volume 05 Issue 12, Dec 2018. E-ISSN : 2395-0056. P-ISSN : 2395-0072.
[14] Aswati, et.al. (2017). "Studi Analisis Model Rapid Application Development Dalam Pengembangan Sistem Informasi". Jurnal Matrik Vo.16. No.2, Mei 2017. ISSN : 1858-4144.
[15] Kendall, J.E. & Kendall, K.E. (2010). "System Analysis and Design". Prentice Hall Press.
[16] "Glossary of Defense Acquisition Acronyms and Terms: Contract Work Breakdown Structure (CWBS)". Defense Acquisition University. Retrieved 19 September 2017.
[17] Sommerville, Ian. (2016). "Software Process Models." In Software Engineering Tenth Edition, 47. Pearson, 2016.
[18] Kurnianda, Nia Rahma. (2018). "Database Design for Customer Retention and Loyalty Administration Information System". IJCSMC :: International Journal of Computer Science and Mobile Computing, Vol. 7, Issue. 10, October 2018, pg.1-8. ISSN 2320-088X.
[19] Retnowardhani, Susilo and Yaya S. Triana. (2018). "Design Of Service Application For Auto Detailing : A Case Study Of Jetwash Auto Spa Tangerang". IRJCS :: International Research Journal of Computer Science, Volume V, 422-434.doi://10.26562/IRJCS.2019.AUCS10081.
[20] Erceg, Aleksandar and DS, Jovanka. (2019). "E-Logistic and E-SCM : How to Increase Competitiveness". Scientific Journal of Logistics 2019, 15 (1), 155-169. doi : 10.17270/J.LOG.2019.323.