Controlling Production Activities Using Information Systems to Improve Cost Efficiency

R Sidik1*, V F Lestari2, M B Winanti3
1,2,3Department of Information System, Universitas Komputer Indonesia, Jl. Dipatiukur 112-114 Bandung 40132, Indonesia
E-mail: rangga.sidik@email.unikom.ac.id

Abstract. The aim of this study is to control the production and reduce the company's production costs at Rail and Query (RAQUER) by using information system implementation. This study found the problems that arise in production activities, causing leakage of high production costs in RAQUER. RAQUER is a medium-scale cottage industry engaged in the business of bag-making convection. This study was conducted by applying a qualitative descriptive approach and system development using a prototype model. System development included the identification of needs, data modeling, interface design, and application models. System testing was done to meet user needs that had been obtained from the identification of needs. The results achieved from this study are systems that able to control the production of bags at RAQUER so they can create production costs that are used more efficiently. If RAQUER is able to control its production process through this information system, cost efficiency can be achieved because there is no more random and useless production.

1. Introduction
Rail and Query (RAQUER) is a company that focuses on producing bags. The production section is one of the vital parts of the RAQUER, because it is the heart of the company. In carrying out its production, RAQUER still found several obstacles that resulted in the accumulation of goods in the warehouse. Production is carried out without prior production submission. Another obstacle that arises is inventory in the warehouse is not monitored properly, because the process out of the goods is not recorded properly. The problem that arises has implications for making a disturbing report. Because what raises these problems is the use of records in books that often experience record damage and difficulties to read. The use of paper is the main problem, and the use of computers is not optimal.

To get the quality and number of products produced according to criteria, production planning needs to be done. With production, planning can control existing raw materials and oversee the stock in the warehouse. Good production planning which can have implications for the cost of production itself. Production and costs have relations that are strongly related to input and output. Decisions regarding the allocation of raw material use become an important point in estimating production relations with the number of relative costs that must be spent by the company. Computer-based information systems can be a solution to solve these problems. Although to achieve effectiveness needs to be measured further[1]. At least the information system can be developed to reduce the level of problems that exist.

The application of information systems to control production study has actually been done a lot. Tiara Anggraini Putri in his research focused on implement production control information systems to determine the number of drugs to be produced through the Material Requirement Planning (MRP) approach. The stock of drugs in the warehouse can be monitored properly using this production planning and control information system [2]. Production planning and control with the implementation of information systems was also carried out by Muchtar Hariyanto. Computerized systems in information systems create a solution in solving problems in the functions of production planning and control
activities in the workshop business unit and prototype of PT. Pindad [3]. RAQUER itself has been studied before in the role of improving market quality using e-commerce development, whereas interface they are use web-based platform [4].

Looking at the studies that have been carried out, of course, planning and controlling the production in RAQUER is very possible to apply. So that the application of production control information systems in RAQUER can be done by monitoring the production process flow from the beginning to the end, application-based information systems must be able to provide solutions that have been occurring in the production and warehouse section at RAQUER. However in the last research about RAQUER, there is no mention of planning and production control. Information system implemented to solve the definitive problem that occurs in the existing running system is the purpose of this study. Therefore, there was no more overload product situation in warehouse and production section working as plan that can be affected to production performance more effective.

2. Methods

The research method that the writer used to be able to solve the problems described previously was using descriptive qualitative. The method was very suitable to describe the actual condition of the object of research so that the results achieved would be right on target. In addition, the prototype was a system development model that was used. Prototype makes it easy to develop software could easily be accepted by the user, because the user was involved in developing the system. Although the prototype had a high risk of system changes, it had a very short timeframe[5]. The prototype model was related to the application system, where prototypes were incremented to produce the application system, prototypes were a part of the application specification, and also prototypes served to clarify the problem only[6]. The following is shown in Figure 1 the method used for this study.

![Figure 1. Research Methodology](image)

Divided into 3 stages as shown in figure 1, the first stage was carried out for the process of analysis of business, problems, and limitations. The next step was to start prototype development based on the results of the first stage. And the last was a prototype that had been developed towards the implementation and evaluation of the suitability and acceptance of the system.

3. Results and Discussion

3.1. Problem Identification

As seen in Table 1, problems that can be identified as many as four problems found in the flow of business processes that occur in RAQUER. Existing problems can be key to how production control information systems can be developed.
Table 1. The existing system Problem Identification

| No. | Problems                                                                 | Entity                        | Solution                                                                 |
|-----|---------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------|
| 1.  | The production process does not work as it should, causing goods to accumulate in the warehouse because production is not based on prior consideration. | Production section            | Creating an integrated system for all parts to make it easier to monitor data and information as a reference for making production considerations. |
| 2.  | The process of checking the stock and checking the entry and exit of goods has difficulty also in the process of checking orders because it is still done by recording data in the book so that if the record is not stored properly it will be damaged, lost, hard to find even difficult to understand. | Warehouse section and Ordering section | Creating a computerized system and integrated with each other to make it easier to check and input data. |
| 3.  | Difficulties in checking availability of raw materials because data availability is still in the form of notes written by the book so that the length of the checking and recording process will be difficult to understand when the writing is illegible. | Raw material management section | Creating a computerized and integrated system related to raw material data. |
| 4.  | Difficulties in making reports because data and documents are still in conventional records making it difficult to find data. | Production Section            | Creating a system that is able to store and process data from all parts that are useful for making reports, so that the report can appear automatically. |

3.2. Prototype development

Proposed system design is done using a prototype model to produce results that are faster and user-oriented. The proposed system involves the stages of business process analysis, especially in the flow of documents between sections in RAQUER. As previously known in Table 1, one of the problems that arise is integration between sections of production and other sections.

After the evaluation of the existing system, analyzing the process, and giving a system proposal, the next step is to define entity relationships, do database design, and describe the network architecture design for production control information systems in RAQUER and develop in kind of user interface as shown in Figures 2 and 3.
Figure 2. Stock Management View Form

Figure 3. Production Control View Form
Figure 2 describes a view list interface to manage a product in the warehouse; the flow of the product can be easily monitored. If the product in minimum stock, system notify a user to make a production. And for the form of production monitoring can be seen as shown in Figure 3. The proposed system has a feature to monitor production stages, from planning, controlling, and product storing. Even in the case of production failed, it can manage to re-planning and re-produce the failed product.

3.3. Implementation and evaluation
To implement this system, it does not require high software and hardware specifications. The web-based system makes it easy for companies to invest in information technology to support this proposed system. This proposed system can run with browser support as a helper application for users. As shown in figure 5, business activities contained in the proposed information system include: 1) production planning 2) raw material management 3) raw material control and 4) production monitoring (see Figure 4).

Business activity in Figure 4 transformed into a web-based information system that is integrated with the relevant part of the planning process production to production monitoring and e-commerce part that has been developed in the RAQUER last study [4]. So that every activity from the product production process in RAQUER can be monitored as shown in figure 4. In addition, production planning is better so that the problems as shown in table 1 can be solved. As a result, no more production is carried out without the planning and management of raw materials becoming better organized so that the warehouse will not experience excess product stock. When the production cost is suppressed, the cost-effectiveness of production becomes better.

Information technology implemented has an effect on cost, quality, and efficiency[12]. Raquer implements e-commerce as one of its marketing tools. E-commerce designed by Raquer can be a way to expand market areas and as a promotional media[4]. To support the implementation of e-commerce in Raquer, it is necessary for the implementation of the production planning information system to solve its problem (see Table 1). This system is able to provide real data conditions for products originating from orders. Consequently, e-commerce and production planning system can be align as a part of business proses that affected to efficiency and effectivity of performance activity.

In this study, production control is only based on ordering products from consumers who are passed on to the management of raw materials until they reach the production process. There is no use of certain techniques in the production process at RAQUER, especially in scheduling. To get a high level of production efficiency, of course, certain techniques and production planning are needed. The Last Planner might be applied to be able to see how the production system works and achieves effectiveness[7]. Or production schedules within uncertainties factor gives a wide perspective of implementation an algorithm[8], even artificial intelligence, mathematical techniques, and a genetic algorithm can be adapted to control the production in an organization to achieve effectiveness and optimization of job and cost[9].

In the industrial era 4.0, RAQUER should be able to adapt through the use of information technology. Production scheduling can be integrated with the flow of raw materials and information services that are running so that a raw material supply network can be developed[10]. Furthermore, in future research, this study can accommodate the measurement of the success of creating efficiency using IS flexibility-
to-use, IS flexibility-to-change, and task performance outside of an IS (manual operation) [11]. Thus, the cost-effectiveness of production can be measured clearly after the application of this information system.

4. Conclusion

Based on the results of the discussion and analysis that has been carried out and the results of the design of the production control information system application, conclusions can be drawn as follows: 1) By implementing this production control information system can minimize the problem of accumulation of goods in the warehouse. 2) With this new system, it can reduce the difficulty in the warehouse when checking the stock and in the ordering section when checking orders. 3) The new system can minimize difficulties in the raw material section when checking the availability of raw materials. The new production control system can help in the process of making a report because all data has been integrated into all parts so that it only has to print it directly from the database.

Acknowledgments

We would like to express our very great appreciation to all fellow researchers for his valuable and constructive suggestions during the planning and development of this research work. Her willingness to give his time so generously has been very much appreciated. We are also grateful for the funding of our conference chance provided by Universitas Komputer Indonesia.

References

[1] Grover V, Seung Ryul Jeong, Segars AH 1996 Information systems effectiveness: The construct space and patterns of application. Inf Manag 31 177–191
[2] Putri TA 2016. Sistem Informasi Perencanaan dan Pengendalian Produksi dengan Pendekatan Material Requirement Planning (MRP) di PT. Tanabe Indonesia. J Ilm Komput dan Inform 8 1–8
[3] Haryanto M 2005 Sistem Informasi Perencanaan dan Pengendalian Produksi di Unit Usaha Bengkel dan Prototype PT. Pindad. Universitas Komputer Indonesia, https://repository.unikom.ac.id/6717/ (accessed 10 February 2019).
[4] Wahab DA, Lestari VF. The Role of E-Commerce in Improving Quality in Raquer. IOP Conference Series: Materials Science and Engineering 407. Epub ahead of print 2018. DOI: 10.1088/1757-899X/407/1/012186
[5] Sabale R, Dani A. Comparative Study of Prototype Model For Software Engineering With System Development Life Cycle. IOSR J Eng.
[6] Budde R, Kautz K, Kuhlenkamp K, et al 1992 Prototyping: An Approach to Evolutionary System Development. Springer Berlin Heidelberg, Epub ahead of print 1992. DOI: 10.1007/978-3-642-76820-0
[7] Ballard G, Hammond J, Nickerson R 2009 Production control principles. Construction 489–500
[8] Aytug H, Lawley MA, McKay K, et al 2005 Executing production schedules in the face of uncertainties: A review and some future directions. Eur J Oper Res 161 86–110.
[9] Jones A, Rabelo LC. Survey of Job Shop Scheduling Techniques. In: Wiley Encyclopedia of Electrical and Electronics Engineering. Wiley, pp. 1–33
[10] Sokolov B, Ivanov D 2015 Integrated scheduling of material flows and information services in industry 4.0 supply networks. IFAC-PapersOnLine 48 1533–1538
[11] Gebauer J, Schober F 2006. Information system flexibility and the cost efficiency of business processes. J Assoc Inf Syst 7: 122–147
[12] Khayyat NT 2010. Effects of Information Technology on Cost, Quality and Efficiency in Provision of Public Services. Inf Commun Technol Policies Pract 84: 1355–1361