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Conference Paper

Business Process Evaluation of ITS Medical Center using Value Stream Mapping

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ABSTRACT

Patients at ITS Medical Center are the main subject of the healthcare business process. they tend to expect satisfactory service especially when ITS Medical Center serves as a first-rate health facility for BPJS. At the time of this research pre-conducted, their business process has not been visually described in the Business Activity Monitoring (BAM), which makes management cannot foresee the efficient business process. Previous research on the implementation of Value Stream Mapping (VSM) in the Emergency Department shows the possibility to apply VSM in a clinic. Therefore, we decided to evaluate the existing business processes by gathering information from the Event Log Review and conducting employee interviews. To propose future business processes, we followed the Lean Manufacturing practice from Toyota always looks at product value from the customer's point of view. The evaluation consists of Business Process Model and Notation (BPMN) between four actors; doctor, patients, medical records department, and pharmacy. Continued picturing it using VSM using criteria of ineffectiveness from Lean Manufacturing. ITS Medical Center's current VSM shows three areas of opportunities for improvement consisting of Movement, Transportation, and Extra Process. Whereas its future VSM finding results from the comparison of the current with the future business process, predicted that service time can be faster by a ratio of 8%, non-value-added time is reduced by 15%, and at the end of the day, average inefficiency is reduced by 27.54%. With more than quarterly efficiency can be decision support for new business model improvement and implementation.

Keywords: Business process, value stream mapping, BPMN, lean manufacturing, business activity monitoring

Introduction

Organizations or companies take many ways possible to improve their performance, products, and satisfaction of the parties associated. Start from evaluating employee performance, and improving company facilities to improving business processes. Talking about business processes, many companies do not realize that the last method previously mentioned can contribute to improving the main goals of a company. The business process according to Davenport in Gyngell (1994) is a measurable and structured activity to produce certain outputs for certain customers. There is a strong emphasis on "how" the work is done in an organization, unlike the focus of a product which focuses on the "what" aspect. Therefore, the process is a specific sequence of work activities across time and space, with a beginning and an ending, that clearly defines inputs and outputs.

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ITS Medical Center as Technical Service Unit (Unit Pelaksana Teknis in Indonesian, abbreviated as UPT) engaged in the health sector for the ITS academic community in particular and the surrounding community in general. The ITS Medical Center is under the supervision of ITS, so the input and output are under the control of ITS. As a UPT engaged in the health sector, their main business process is medical services, although within the scope of the ITS Medical Center there are of course other business processes. Patients as the main subject in the patient service business process expect satisfactory service from the Medical Center, which is of course the vision and mission of the ITS Medical Center.

Although ITS Medical Center already has a business process that has not been visually described in the BPMN, it is already listed in the standard work procedures of each unit. Because their business processes have not been notated according to BPMN standards, so the effectiveness of these business processes cannot be measured. Therefore, we decided to evaluate the existing business processes, so that we can make the best business processes for the ITS Medical Center. So that it can be decided which steps in their service business process can be reduced, handed over, or eliminated. To evaluate the service business process at the ITS Medical Center, the problems that were raised in this research include:

1. What is the current ITS Medical Center medical service business process and model?
2. What is the evaluation of the ITS Medical Center patient service business process?
3. What are the results of the evaluation of the ITS Medical Center patient service business process?

The study conducted by Setiawan et al. (2021) shows that the healthcare industry sector implement VSM the most with 26% of paper publication because it has several implications such as; can scale back waste known in hospital services like waiting times and body processes (Usman & Usman, 2020), costs associated with medicine storage decreased by 47.22% (Ludwiczak, 2018), there was a 51% increase in idle time, going from 31,224 to only 15,232 seconds (Haron & Ramlan, 2015), reducing the time spent waiting compared to the time the patient got services (Hoffmann et al., 2018), the treatment period was drastically cut from 187 days to 60 days (Henrique et al., 2015), 16.4% less time spent waiting for patients to be treated in the emergency room (Firman et al., 2019). With these positive findings about VSM in the healthcare industry, it is worth evaluating and implementing VSM also at ITS Medical Center.

Material and Methods

Business process management

Business Process Management (BPM) is a unification of disparate disciplines such as Process Modeling, Simulation, Workflow, Enterprise Application Integration (EAI), and Business-to-Business (B2B) which are integrated into a single standard. BPM uses a systematic and continuous approach to improving business effectiveness and efficiency to create innovation, flexibility, and integration with technology. So, BPM allows organizations or companies to be more efficient, effective, and better able to deal with system changes compared to traditional approaches ((Owen & Raj, 2003).

Developing business processes and software platforms can be done by looking at the business process lifecycle. This is useful for understanding the relevance of concepts and technology to BPM. The business process cycle consists of 4 interrelated phases. These phases include Design and Analysis, Configuration, Enactment, and Evaluation. Generally, the business process cycle starts from the Design and Analysis phase. In this phase, analysis is carried out using validation, simulation, and verification techniques to be represented a business process model. In the Configuration phase, the business process model will be implemented. One of the issues is setting policies and making procedures for implementing the business process model. The business process model needs to be tested and improved before being implemented. Only if it is correct, the model can be run which includes the Enactment phase. During the process, the system will continue to be monitored and execution data collected in the form of log files. In one cycle, the last

phase is Evaluation. The collected log files are then evaluated through business activity monitoring and process mining techniques (Weske, 2007).

Business activity monitoring

The concept of Business Activity Monitoring (BAM) includes: measuring business performance; monitoring in real-time and ensuring complete processes; detecting problems when running business processes; diagnosing the root cause, and making reports on business operations into the business process cycle. This will help identify business issues, check for exceptions, and improve process efficiency. IT or infrastructure monitoring focuses on how computers are run, whereas BAM focuses more on how business is conducted. The goal of BAM is to ensure business objectives are related to revenue, such as expenses, income, and customer satisfaction (Kolář, 2009).

Lean manufacturing

Lean manufacturing is a production practice that considers all existing resource expenditures to get economic value to customers without any waste, and this waste is the target to be reduced. Lean always look at product value from the customer's point of view, where the value of a product is defined as something that customers are willing to pay for (Wilson, 2022). Fundamentally, lean manufacturing is centered on "getting value with as little work as possible". Lean manufacturing is a philosophy developed by Toyota in the Toyota Production System (TPS). TPS is known for its focus on reducing waste or what is known as "MUDA" (Japanese), to increase overall customer value, but there are several perspectives on how to achieve this. The seven inefficiencies (Monden, 2011) are as follows: (1) Overproduction, (2) Movement, (3) Waiting, (4) Transportation, (5) Extra Process, (6) Inventory, (7) Damaged or defective.

Value stream mapping

Value Stream Mapping is a method for creating a “one picture” of a process that occurs in a company, from the customer ordering the product, until the customer receives the product in its place. The purpose of value stream mapping itself is to describe the flow of material and information that flows and throughout the Value Adding Process must produce and deliver products to customers. Value Stream Maps document all processes used to manufacture and deliver products, both value-adding and non-value-adding processes (Martin & Osterling, 2022).

The measure of value is seen from the customer's point of view. Value-added activity is an activity that adds or provides value for customers. While non-value added is everything that is in the process that does not add value to the customer, the customer still has to "pay" for it to get the product or service. A value stream is defined as all activities (value added and non-value added) required to produce a product, service, or a combination of both for customers (Koelling et al., 2005). There are four stages in implementing VSM (Silva, 2012), namely: (1) Identity what product or product group to map (2) Create the current state of VSM (3) Identify improvements that can be made to reduce waste (4) Create future VSM.

Information gathering

This stage is carried out to collect information related to the Medical Center patient service business process. There are two methods used, namely conducting a review of the event log and interviews. The results obtained from this stage are that the ITS Medical Center already has a business process, but the business process is not in the form of a diagram. So the business process still needs to be modeled into BPMN.

Evaluation

At this stage, monitoring of the implementation of the business process model is carried out. The monitoring results obtained are then analyzed to identify problems, in this case in the form

of inefficiencies, in existing business processes. The trick is to implement the VSM technique. The implementation of the VSM technique requires selecting a specific type of product or service to be mapped. So, in this task, what will be evaluated in the process of serving general poly patients at the ITS Medical Center. After that, the current business process looks at the types of waste based on lean manufacturing and determines the solution.

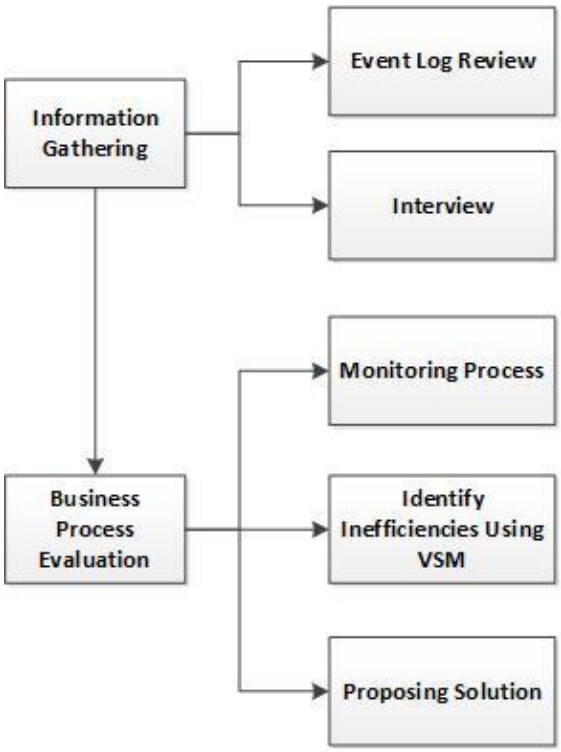

Figure 1.Methodology

Results and Discussion

In this chapter, the results of the research on measuring the evaluation of the service process for general poly patients will be explained at the ITS Medical Center.

BPMN of medical service

Business process modeling using BPMN was created to provide a clearer picture of the patient care business processes at the ITS Medical Center. This BPMN model was made based on event logs, interviews, and patient service observations at the ITS Medical Center. There are 4 actors inside ITS Medical Center which is the center of activity. Patients can start as new or already registered patients that have medical record numbers to save their medical data in case they come back just need to show a Student Card or ID Card depending on how they register first. The activity ended with three options; go straight home, get a prescription and exchange for medicine at the pharmacy, or be referred to a bigger hospital. The BPMN model of the patient care process at the ITS Medical Center can now be seen in Fig. 2.

Future state VSM

After the identification of waste has been completed, the future state VSM model is then made. The future state VSM model can be seen in Fig. 4. From the two figures (current state and future state VSM) comparison can be seen easily by a visual diagram between the current state VSM and the

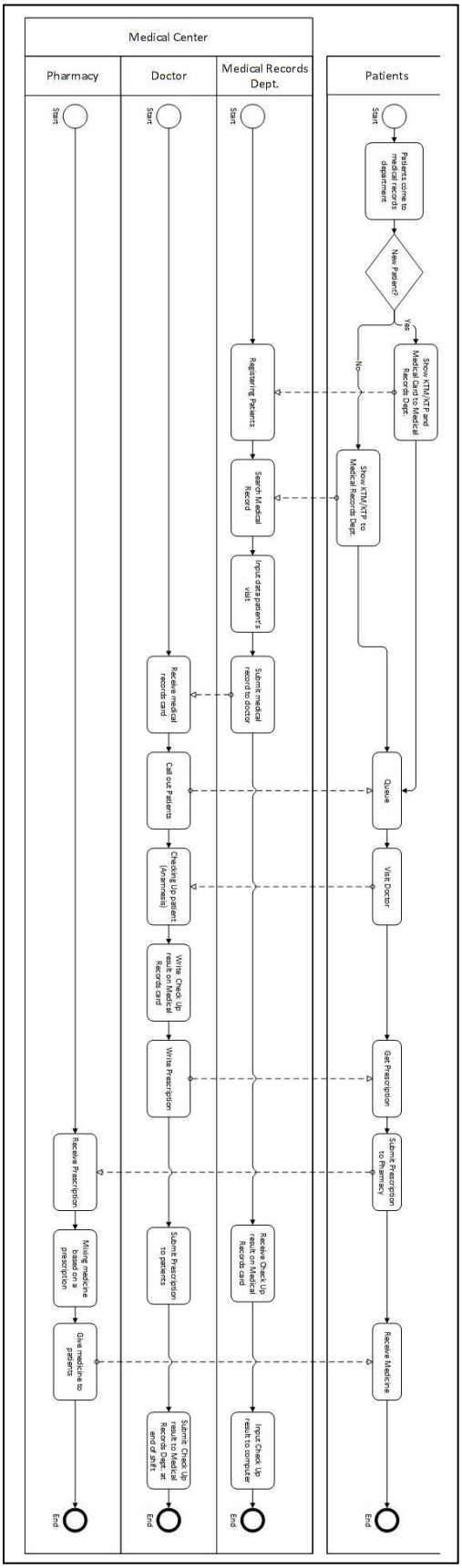

Figure 2. BPMN

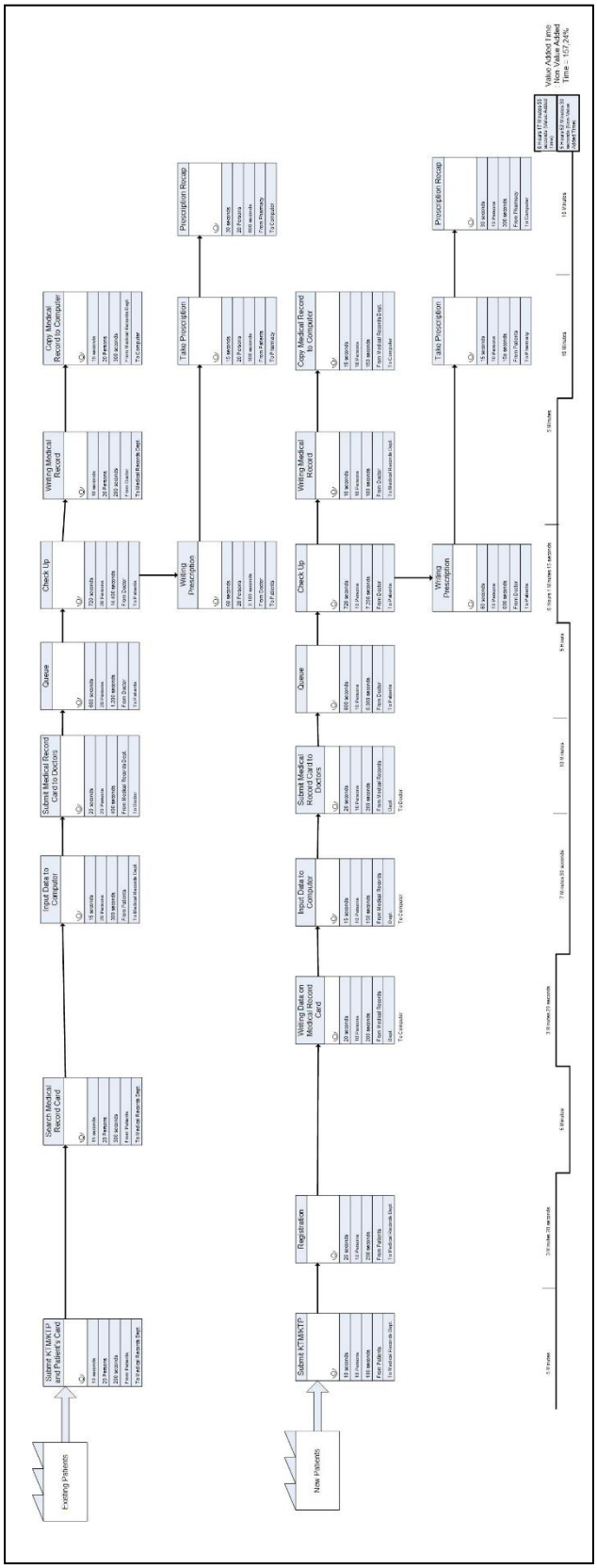

Figure 3.Current state VSM

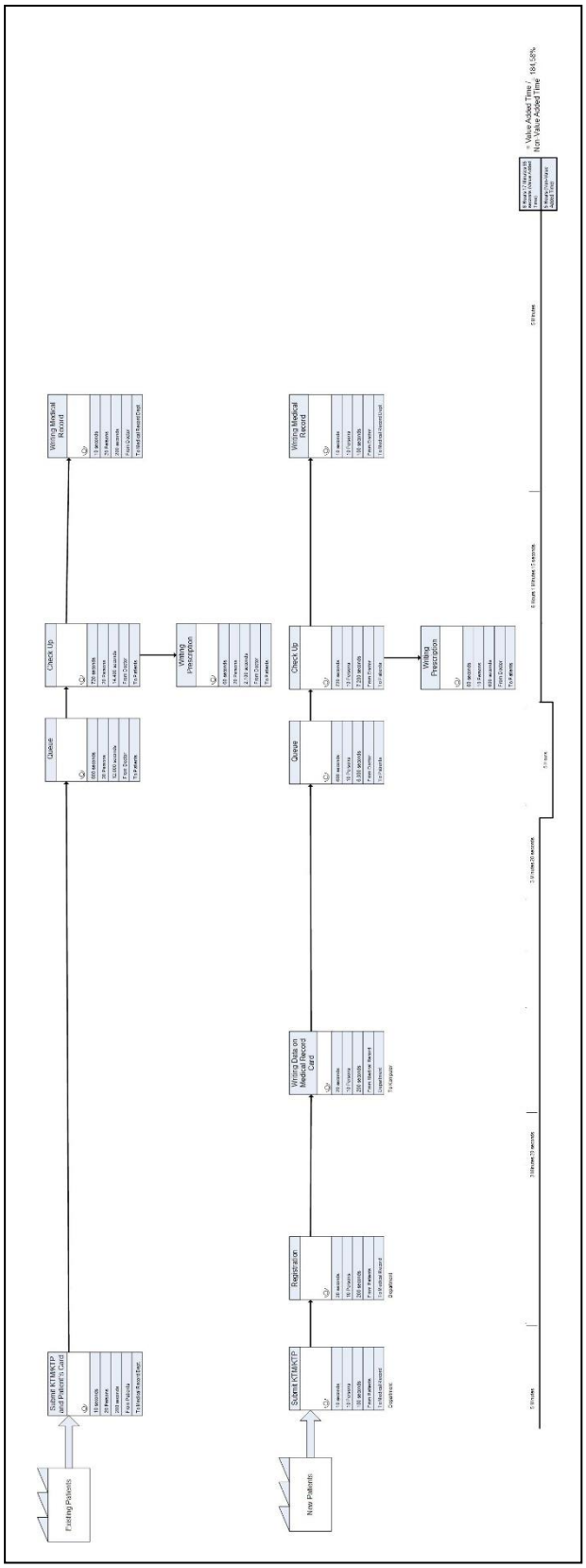

Figure 4. Future State VSM

future state VSM. It shows two-step can simply be removed if VSM is implemented in their internal information system that leading to reducing ineffectiveness.

Table II shows the comparison of the current business process with the proposed one, categorized based on time as productive measurements like Service Lead Time, Value-added Time, and Nonvalue-added Time, and concluded by looking for a value of VA/Non-VA. From the calculation on the VSM diagram, we count hours and convert them into a percentage, namely the service time can be faster by a ratio of 8%, non-value-added time is reduced by 15% and inefficiency is reduced by 27.54%.

Table 2. Comparison results

	Current State	***Future State***	***Change (%)***
Service Lead Time	12 hours	11 hours	-8 %
Value-added Time	6,3 hours	6,3 hours	0
Nonvalue-added Time	5,875 hours	5 hours	-15
VA/Non VA	157,24 %	184,58 %	27,54

Conclusion

Business Activity Monitoring (BAM) can help to start initial business process within patients, medical record department, doctor and pharmacy at ITS Medical Center, to create comparison of current and future Visual Stream Mapping (VSM). It concluded that is possible to find efficient value of time by comparing, it predicted that service time can be faster by reducing from non-value-added and average inefficiency from MUDA concept of Lean Manufacturing. With more than quarterly efficiency result, we hope that this research can be decision support for management to renew their business model improvement and implementation.

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