Lean Business Process for Better Environmental Performance: A Case Study of ERP System Adoption

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Abstract— Along with the rising of environmental issues, this paper attempt to contribute a better environmental performance of the organization through a lean business process. Specifically, this paper studies business process improvement in healthcare clinic as one form of small medium enterprises in the healthcare business. Assessment of current business process in the object of the case study using business process mapping (BPM) methodology shows the significant amount of delay and transport activities that considered being a waste. To eliminate the waste activities, this paper proposes ERP system adoption as the supporting information system of the clinic. It is expected the new business process supported by ERP system can give positive environmental impacts through the lean business process.

Index Terms— lean business process, enterprise resource planning, business process mapping, environmental performance.

I. INTRODUCTION

The rising of environmental issues, such as global warming, greenhouse gases, and pollution, has encourage companies to have more concern about environmental sustainability issues in their practices [1]. Further, a significant amount of carbon footprint may arise from organization that practicing inefficient paper-based business process [1]. There are many perspectives in reducing environmental impact caused by the operation of an organization. Yang (2011) [2] suggests that an organization can have better environmental performance when they have successfully reduced wasted and nonvalue added activities in their business process. Or in other words, when they already practicing lean business process. The implementation of lean methods can improve patient satisfaction through improve actions and process [3].

The sustainability issues mentioned above are not only a concern of big enterprises, but also small medium enterprises. To be more specific, this paper focusing the issues on small medium enterprises in healthcare business. Aligned with Yang (2011) [2], this paper studies business process improvement in healthcare clinic as one form of small medium enterprises in healthcare business, such that by having improved and lean business process, they can have better environmental performance.

TABLE I.	OBSTACLE IN CURRENT BUSINESS PROCESS
I ABLE I.	OBSTACLE IN CURRENT BUSINESS PROCESS

Process	Obstacle	Implications
Registration	Patient registration data recorded manually on paper	 Take significant amount of time in searching patient data. Patient forced to wait for non-medical process Potential data duplication.
Medical Examination	Patient medical record data, recorded manually on paper	 Medical record data is hard to find. Has risk in giving inaccurate treatment/ medicament.
Medical Prescription	 Medical prescription written manually on paper. Medicament stock does not synchronize with given medical prescription. 	 Has risk in giving inaccurate medicament. Unavailable medicament might be prescribed.
Payment	• Payment and bookkeeping process documented manually on paper.	 Has risk in data writing and interpreting written data. Inability to do fast and accurate financial analysis.

Healthcare clinics are the main reference for healthcare service in Indonesia. Specifically in West Java, around a third of the citizen prefer clinics for their healthcare problems [4]. The increasing healthcare price in Indonesia provides opportunity for small size healthcare institutions like healthcare clinics to gain significant

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market size. Object of case study in this paper is one of the most prominent healthcare clinics in rural area of Bandung. They main activities are in general medical practice, dentist, and midwifery services. Currently, all activities in the clinics all done manually without any information systems support. This condition cause resources of the clinics wasted in inefficient processes, especially related to administration and data management process, such that the clinics can not focused on the improvement of medical related activities. Interview with numbers of clinic's employees conducted in April 2017, identified several obstacles faced by the employees in doing their job in current business process as shown in Table 1.

II. LITERATURE REVIEW

A. Lean Business Process and Environmental Performance

The lean business process defined in this study is a business process that has less of non-value added activities known as waste. A study carried by Yang (2011), suggest that lean business process within an organization will help the organization to adopt environmental management practices that will impact to a better environmental performance. The adoption of environmental management practices driven by the lean business process may help the organization to meet their performance objectives better. Adopted from Yang (2011), schematic diagram of the hypothesis is shown in Figure 1.



Figure 1. Schematic diagram of the hypothesis on lean business process and environmental performance

B. Big Picture Mapping (BPM)

Big picture mapping method is a picture or mapping the initial conditions that occur in the company. BPM is an early stage as an identification of the flow of activity that provides information on whether there are activities that are not needed or less useful or not for the company. in its application, this method is widely used with the principle of lean thinking [5]. Big picture mapping is the stage in describing the initial conditions that occur in a system. With the big picture mapping method of each activity will be measured clearly [6]

C. Enterprise Resource Planning (ERP) System

Enterprise Resource Planning (ERP) is an information system package that integrates information within a functional area and across functional areas within the company

ERP is the backbone of enterprise information systems. The core of this software is a centralized database that gets and delivers data to various modular applications that are operated in the same computer system. ERP includes a variety of functions in business, such as manufacturing, supply chain management, finance, projects, human resources, and customer relationship management. The modules in this ERP package can be tailored to the specific needs of the organization. Using ERP, redundant data can be avoided because the data need only be entered once into the database. This system provides consistency and transparency throughout the enterprise to provide reliable and integrated information access.

III. DATA COLLECTION

Data collection used in this research is direct observation to the object of case study. The data collection conducting to the main activities of the clinic as described in the following:

A. Administration

The administrative process is the first process done when the patient arrives. In the administrative process is done checking the data whether the patient is old or new. All processes are done manually without any data input process to the computer.

B. Inspection

The inspection process is a health service activity performed by a doctor.

C. Pharmacy

The process that occurs in this process is the patient prescribed the medication that has been obtained from the results of the examination by the nurse. The nurse looks for prescribed medications and confirms the availability of the drug stock manually. In this process, the study lasted long enough, so the patient waited for a long time. After confirmation of existing drugs and stock, then the nurse gives the medicine to the patient and immediately makes the payment process.

D. Payment

This process is the last activity performed by the patient. In the process, the patient makes a payment with a certain amount of payment in accordance with the examination and type of drug given.

IV. DISCUSSION

To examine waste of the current business process, big picture mapping (BPM) methodology is performed based on data collection performed previously. The assessment result of BPM is shown in Figure 2. From the assessment, it is found that the total lead time is 580 seconds and the value-added time is 1975 seconds. Since the value-added time is greater that the total lead time, it is can be concluded that there are much time wasted the current business process. Observation in the object of case study shows that the time is wasted in inefficient process in the administration and drug inventory verification activities.

The inefficient process mentioned above cause significant amount of time wasted by the patient in non-

medical activities. Based on observation, the major risk of the current business process is in the medical record administration activities. The current paper-based process is not reliable since the data is not digitally stored. In some cases, it caused inaccurate prescription. Improvement to this process is needed since it is important process both for the patient as well as the clinic.



Figure 2. Big picture mapping of current business process

Adoption of the ERP system is expected to reduce the wasted time of the initial business process. With the adoption of ERP system, the administration process will be easier and more valid compare to the current manual process. Further, it will facilitate the operator in performing their activities. As shown in Figure 3, the ERP system is expected to give significant improvement in the main activities of the clinics, including registration, medical examination, pharmay, and payment process.



Figure 3. Big picture mapping with ERP system adoption

V. CONCLUSION

This paper studies business process improvement in healthcare clinics using big picture mapping methodology. The means of this study, not only to have the more efficient business process but also to increase environmental performance. To have better business process performance, this paper proposes to adopt open source ERP system as supporting information system. With ERP system adoption in mind, new business process suggests in this paper is expected to have significant potential improvement in delay and transport time, thanks to paperless business process supported by the ERP. To quantitatively measure the impact of the improved business process to the environmental performance, this paper suggests further study to measure the carbon footprint before and after the ERP system adoption. In a larger scale, positive environmental impacts are expected to gain if more and more healthcare clinics adopted integrated enterprise system like ERP to enhance their business process.

VI. REFERENCES

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