The Development of Business Process Monitoring and Tracking Parcel Model Using BPMN 2.0 for the Institute of Community Colleges, Thailand

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Abstract - This research aimed to develop a newer model of digital business transformation using Business Process Modelling and Notations (BPMN v.2.0) to solve the quality of online resource management services for the Institute of community colleges (ICC) 's head office with its 20 agencies in Thailand. In this paper, we implemented a business process monitoring and tracking services as a proof of concepts. We evaluated the model by comparing between as-is and to-be work processes based on key performance indicators from ICC that was conducted by the experts. Our findings were that the model accurately monitors and tracking parcel processes in accordance with the rules and policies of the government regulations, as well as the model optimized the workload of staff redundancy effectively. As a result, the evaluation achieved at a high level with an average score of 4.46 and SD equal to 0.097. The benefits of this research could modernize ICC and branch agencies to increase the quality of the online services, and conform to the governmental and non-governmental agencies' strategic development plan of digital business transformation in Thailand 4.0.

Keywords - ICC, BPMN, Parcel, Tracking Thailand

I. INTRODUCTION

At present, the government has the policy to promote the country to Thailand 4.0 by focusing on government agencies to bring information technology to help their work. To develop the service of the agency, it has increased the quality as well as complied with international standards. Currently, the existing equipment management system is one of the government policies that must develop in the process driven oriented to maximize efficiency instead of the as-is operating system in order to reduce budget and consumable costs such as ink or accessories.

Traditionally, the institutions, community colleges require internal audits generate annual surveys that normally are conducted with handwriting or typing information into hardcopies. Therefore, the equipment management system is important in order to make it easier for the officers to check, track and maintain damaged equipment [1].

Nowadays, Institute of Community Colleges (ICC) [2] wants to develop to-be system to manage the equipment, as well as to reduce the problem of checking the equipment in timely basis. Because it collects documents and records them in Microsoft Excel, it is difficult to find and monitor them. In the case of

inventory items are numerous. It takes a lot of time to collect data and it takes time to check the equipment to print the annual report, which is a waste of resources to monitor the equipment.

From the problem above, the existing inventory management system currently became obsolete, as well as the digital process transformation strategies of Thailand 4.0 for the governmental and non-governmental agencies' development plan [3]. Recently, ICC has been developing process-oriented services under business process modeling and notation technology with BPMN 2.0 standard [4-6]. Focus on the management of work processes for the quick and easy check. And can report the use of the equipment effectively. To reduce the workload of staff redundant structures and integrated database management model. It is easy and quick to monitor the results of the operation and helps operations of community colleges match the policy of the government. The focus is to bring technology to use as a tool to drive the country to Thailand 4.0 [7-8].

Our paper is organized by followings: Section 1, Introduction, Section 2, discusses literature reviews of related works. Section 3, discusses the problem overview. Our proposed model and the experimental results are provided in Section 4 and 5 respectively. Finally, a conclusion is given in section 6 with future works for the next generations.

II. LITERATURE REVIEW

In theorem, the business process is defined as a model represent a collection of mutually agreed actions of operations directed at achieving a defined goal, the control-flow patterns, including elementary of process components. Business processes describe the production of goods or services as a set of local tasks and inter-organization exchanges [9-11].

The definition of the business process is "a collection of activities that takes one or more kinds of input and creates an output that is valuable to the customer" [12]. Generally, a business process has defined with a set of tasks and activities, relations between activities, clear inputs and outputs, and specific customer(s). A collaborative business process is a group of relevant business processes among different participants that pursue a particular goal as shown in Figure 1.
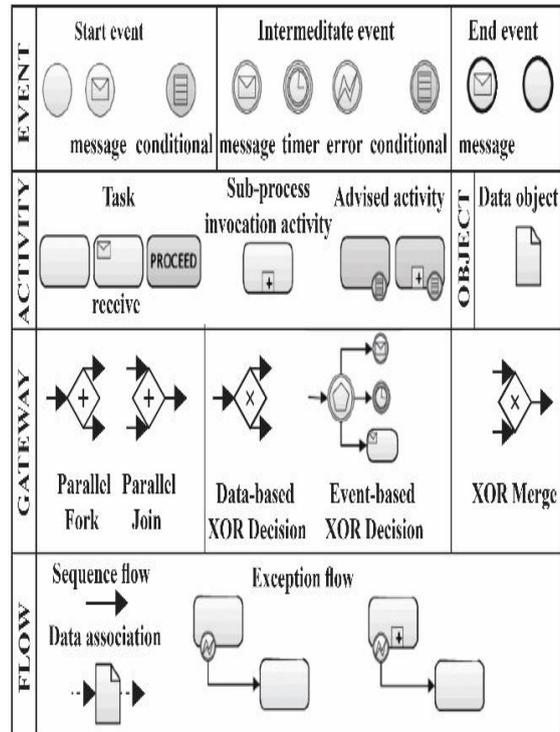

Figure 1. Elements of BPMN

A business process practically is formed as a flowchart. Recently, the most popular standards that provide graphical representations of business processes is Business Process Modeling and Notation (BPMN) [13-14].

A BPMN process is made up of diverse types of elements: objects, sequence flows and message flows. An object itself can be an activity, an event, or a gateway. Figure 1 shows the most common elements of the BPMN standard [15].

Currently, BPMN version 2.0.2 is the latest version which complied with ISO-19510 standard and UML version 2.5.1 [16-18] supporting by OMG. It composed of activity and Event-driven Process components for business process perspectives. BPMN 2.0 provides numerous tools such as Bonita

Bizagi, or the Eclipse BPMN Designer [19] for the design or execution of a process model, and then to make it evolve by refactoring parts of it (to optimize it or better suit partner organizations) or by adding new features in it [15-18].

In 2018, the development and evaluation of the workflow model for monitoring is implemented based on business process management by the Land Operation Plan [24]. The researcher uses the BIZAGI software as a research tool. The research findings were that the system was systematically managed data in secure, ease to use, and serve the requirements of users efficiently. Therefore, the outcomes of BPMN model can improve the efficiency of the Department of land procedures to be accurate and more modern. It can also be used to expand academic results in the future [24-27].

III. PROPOSED MODEL

In this section, we design and develop the process driven model by using Bizagi as a tool to build BPMN 2.0 model which is complied to the standard and regulations of the Comptroller General's Department by following 5 major processes below.

Begin Process:

Process 1001: The community colleges with the branches, prepare the annual procurement plan. This process involves with the creation of a purchasing plan for each fiscal year of each department or college according to the regulations of the Comptroller General's Department [28]. Our model is designed as shown in Figure 2-3.

Process 1002: is a process for collecting procurement plans from the college for the fiscal year in order to verify accuracy according to the reasons and necessities.

Process 1003: The approved annual budget procurement plan has entered into the parcel operation process.

Process 1004: is the process of controlling materials and supplies.

Process 1005: is the operational procedures of the officers, according to the regulations of the Comptroller General's Department [28]
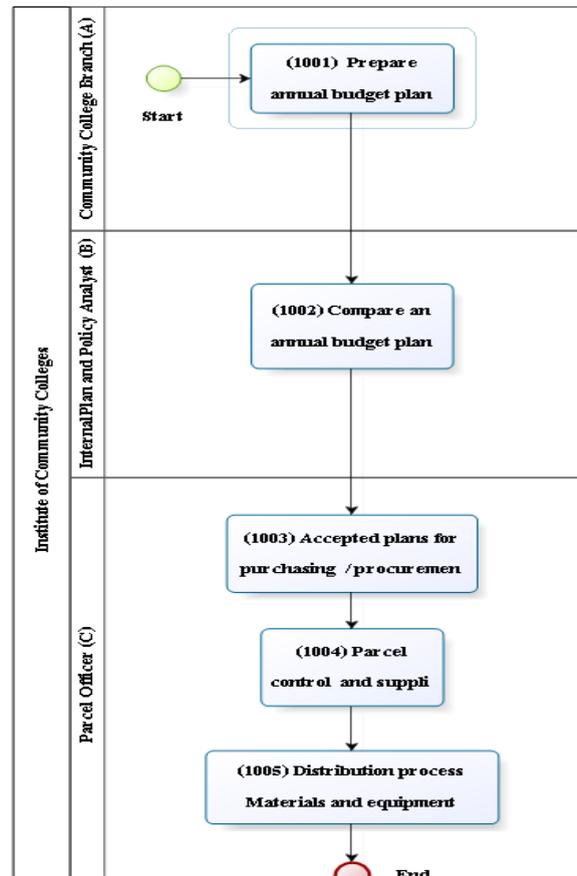
End Process.

Figure 2. The Purposed Model with BPMN 2.0 Standard

Note: By implementing the strategic plan of the Institute of Community College, the service level agreement (SLA) of process 1003, the purchasing process is not more than 15 days, Process 1004 duration of the operation is not more than 7 days, and the process 1005 is not exceed 7 days.
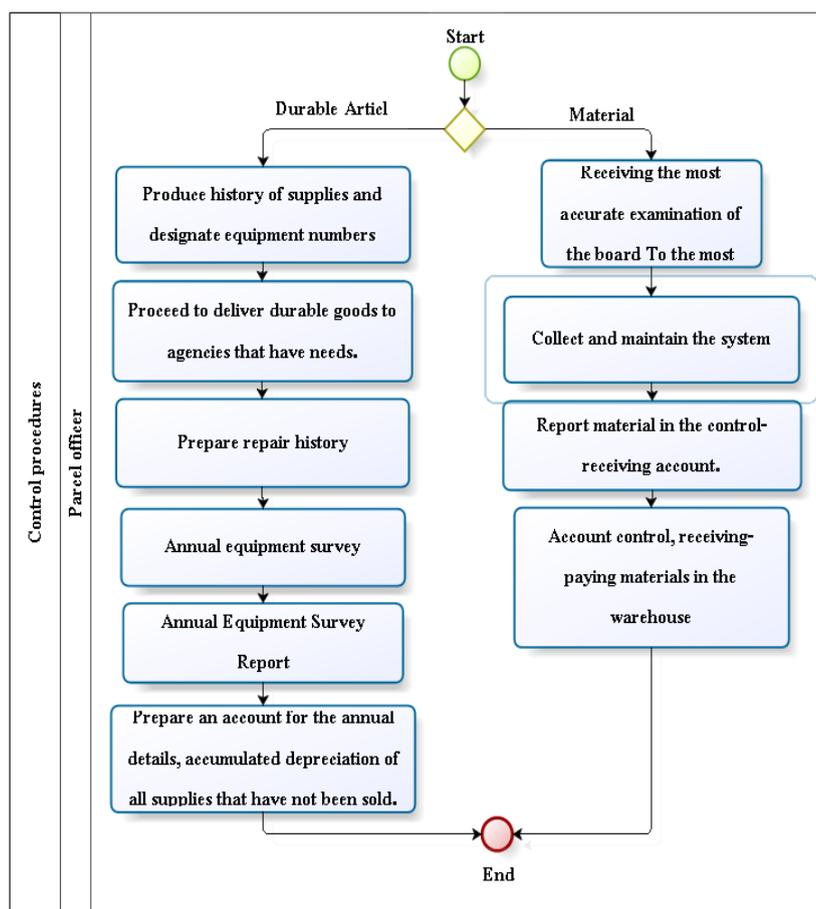
Figure 3. The Examples of the Control Materials and Equipment Procedures

IV. THE EVALUATION

In this research, we use the criteria of the Institute of Community Colleges evaluation. During the test, there are 5 experts from internal and external auditors are conducted to examine the work process of our model by using Likert's scale [29-30] followings:

4.50 - 5.00 is the highest level of the satisfaction

3.50 - 4.4.9 is high level of the satisfaction

2.50 - 3.49 is the medium level of the satisfaction

1.50 - 2.49 is low level of the satisfaction

0.00 - 1.49 is the lowest level of the satisfaction

TABLE I
THE RESULTS OF PERFORMANCE EVALUATION

No.	The evaluation criteria	$\bar{x}$	S.D.	Result
1	Arrange the procurement according to the plan completely	4.75	0.134	The Highest
2	Deliver the parcels to the authorities As scheduled and complete	4.73	0.039	The Highest
3	Summary of complete supplies for disbursement	4.14	0.136	High
4	Inspection / repair of materials and equipment Always ready to work	4.61	0.111	The Highest
5	Report on supplies for the Director of the Institute Schedule	4.09	0.066	High
Total		**4.46**	**0.097**	**High**

In Table I, it shows the overall results of the performance evaluation of the BPMN model of the parcel and supplies that evaluated by the experts is at high level (an average score is at 4.46 and the standard deviation (S.D.) is at 0.097). The details are below.

1) The accuracy of the complete procurement plan is at the highest level by an average score of 4.76 and S.D equal to 0.139 with the opinion of most experts that the procurement is correct.

2) The accuracy of the delivery of the parcel to the officer According to the deadline and completed at the highest level with an average score of 4.73 and S.D equal to 0.039 with the opinion of most experts that the delivery of the parcel is correct.

3) The accuracy of the summary of complete consumables for disbursement is at the highest level with an average score of 4.14 and S.D equal to 0.136 and the opinions of most experts that the conclusion of the consumables is correct.

4) The accuracy of the inspection or repair of materials and equipment is at the highest level with an average score of 4.61 and S.D equal to 0.111 and the opinions of most experts that the inspection or repair of materials and equipment is correct.

5) The accuracy of reporting on parcels for the institute director is at the highest level with an average score of 4.09 and S.D equal to 0.066 and the opinions of most experts that the reporting on the parcel is correct.

V. CONCLUSION

In this section, our BPMN 2.0 model is archived the objectives. It efficiently monitor and track parcel processes in accordance by the rules and policies of the government regulations. Additionally, the model can optimize the workload of staff redundancy for 20 agencies in Thailand to solve the traffic problems of online resource management systems. The benefits of this research can modernize and enhance the quality of the online services, conforming to the digital process transformation strategies of Thailand 4.0 for the governmental and non-governmental agencies' development plan.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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