Automation of Student's Final Project Business Process using ProcessMaker: Case Study - Institut Teknologi Kalimantan

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Keywords: Business process, Business process automation, final project, ProcessMaker

Abstract: Business Process Automation can be applied in the higher education business process, including the student's final project business process. The undergraduate program in the Kalimantan Institute of Technology (ITK) ends with the writing of the final project, in which students have to follow the research methods and grammar rules of scientific writing (ITK, 2018). There are several processes that need to be followed in order to finish the final project, namely registration, proposal presentation, research & supervisory, and final project defense. There are also 18 forms that need to be filled throughout the final project process. Problems occurred due to no information systems to support this business process, leading to missing forms, missing information in each form, ineffective supervisory activities, and past deadline final project completion. To solve these problems, it is necessary to do business process automation for the entire process of the final project. In this study, the method used was part of the life cycle of Business Process Management (BPM), namely, business process implementation. The steps that were taken in this method confirmed the process model, identify automation boundaries, task manual review, complete the process model, bring the process model to an adequate granularity, and specify the execution process. The results obtained from this study were the Final Project Information System had been implemented using ProcessMaker, and there were 13 proposed process improvements in the Final Project Guidelines.

1 INTRODUCTION

A business process is a collection of business activities that involve one or more types of input and produce outputs that add business value. Business processes are evolving at different speeds compared to information systems, which leads to asynchronous business processes and information systems. However, this issue can be overcome by technological developments that currently support rapidly developing business processes, namely Business Process Automation. Business Process Automation is part of Business Process Management (BPM), which is an approach to be able to realize effective and efficient business processes. BPM can help speed up the process of an organization, reduce labor requirements, increase the level of efficiency, productivity, and competitiveness of the company (Singh, 2012). BPM has a life cycle consisting of 6 stages, namely process identification, process discovery, process analysis, process redesign, process implementation, and process monitoring and controlling. To make business processes effective and efficient, actions are needed to run business processes. The action is the process implementation stage contained in the BPM life cycle. To implement the business process can be done with Business Process Automation (BPA) (Dumas, Rosa, Mendling, & Reijers, 2013).

BPA can also be applied in the higher education business process, including the student's final project business process. The undergraduate program in the Kalimantan Institute of Technology (ITK) ends with the writing of the final project, in which students have to follow the research methods and grammar rules of scientific writing (ITK, 2018). There are several processes that need to be followed in order to finish the final project, namely registration, proposal presentation, research & supervisory, and final project defense. There are also 18 forms that need to be filled throughout the final project process. Problems occurred due to no information systems to support this business process, leading to missing forms, missing information in each form, ineffective supervisory activities, and past deadline final project completion. To solve these problems, it is necessary

Fadhilah, M. and Atrinawati, L.
Automation of Student's Final Project Business Process using ProcessMaker: Case Study - Institut Teknologi Kalimantan.
DOI: 10.5220/0009444902040212
In *Proceedings of the 1st International Conference on Industrial Technology (ICONIT 2019)*, pages 204-212
ISBN: 978-989-758-434-3

to do business process automation for the entire process of the final project. Therefore, this research implements the final project business process at ITK by using one of Business Process Management Software (BPMS), namely ProcessMaker. By using BPMS, process owners can save processing time, save costs, and ensure quality and consistency. This is expected to help facilitate the entire process of the final project at ITK. The system that has been implemented using BPA provides several benefits, including workload education, flexible system integration, execution transparency, and rule enforcement (Dumas, Rosa, Mendling, & Reijers, 2013).

2 METHODOLOGY

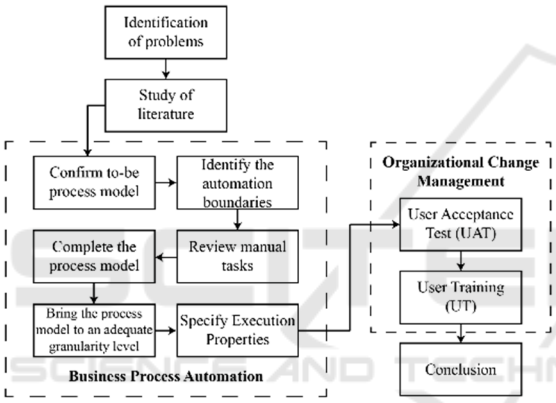


Figure 1: Methodology flowchart

BPA has several stages, namely, confirm to-be process model, identify the automation boundaries, review manual tasks, complete the process model, bring the process model to an adequate granularity level, specify execution properties, user acceptance test, and user training. In the first stage, interviews with the business process owners are conducted so that the business process models are confirmed. The result obtained from this stage is a clear and fixed business process model of the final project process at ITK. Next, the automation boundaries are identified by separating which activities can and cannot be automated using the Business Process Management Software (BPMS). The activities are grouped into several categories, specifically automated tasks, user tasks, and manual tasks. All of the manual tasks need to be reviewed and converted into automated or user tasks in order to be automated using BPMS. The manual tasks that cannot be automated by the system are separated. After setting the boundaries of the existing process automation in the final project business process and reviewing the manual task, we need to check that the process model has been completed. If there is a process that has not been completed, the process must be completed first so that the system can run effectively. Furthermore, it is necessary to ensure that the tasks in the business process are of the right size, so that the work carried out can run without a hitch. If there is a process in the procedure of implementing the final project that can be divided into smaller so that it can run more optimally. In the last stage, the business process model changed from to-be executed models to executable models. Specifications need to be made on how each element in the final project business process model can be implemented effectively with BPMS. Things that need to be specified include variables, messages, and errors of existing processes, task and event variables, and their maps with process variables, service details, and others.

Finally, the User Acceptance Test (UAT) stage is conducted in order to evaluate that that all final business process automation activities can run smoothly. The UAT needs to be approved by the process owners. If the UAT stage has been approved by the process owners, the next step is to conduct user training to all of the users to ensure a smooth transition to using the BPMS.

3 RESULT AND DISCUSSION

3.1 Confirm to-be Process Model

The entire final project business process in the Information Systems Study Program refers to the Standard Operating Procedure (SOP) of the Information Systems Final Project Guide. Then after doing previous research by Wiratama Putra Pratikta, it produced a to-be process model of a final project that has been carried out until now. So, it is necessary to do the confirm to-be process model stage, which is an interview process to the process owner regarding the suitability of the final project business processes that have been running with the current conditions that occur in the Information Systems Study Program. Then the business processes are detailed, and their business process models are described. One business process that has been confirmed by the process owner is the final project registration business process, which can be seen in Figure 2. There are three roles involved in this business process, namely students, administration staff, and prospective supervisors. The process starts with the student doing the required

documents to the administration staff. Then the administration staff review the eligibility of the requirements file, if the requirements file does not meet the requirements, the student must give back the revised requirements file to the administration staff, and if the requirements file meets the requirements, the student requests for supervisor, then the supervisor will review the topic of the final project, if the supervisor does not agree, the student must request the supervisor again, but if the supervisor has agreed, students can do the final project proposal consultation process.

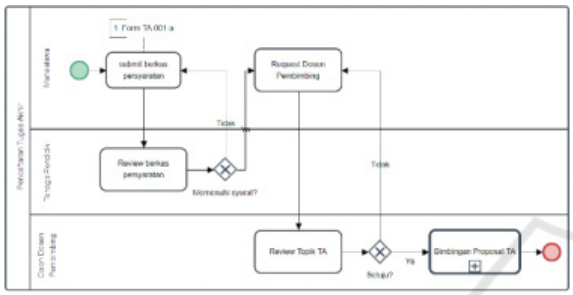


Figure 2: Final project registration business process

Based on interviews with the process owner, there are 9 Final Project business processes at ITK. All the final project business process list is shown in table 1.

Table 1: List of Final Project Business Processes

No	Index	Business Process Name
1	PB-01	Attendance of Final Project Proposal Presentation
2	PB-02	Final Project Registration
3	PB-03	Final Project Proposal Consultation
4	PB-04	Final Project Proposal Presentation Registration
5	PB-05	Final Project Consultation
6	PB-06	Final Project Proposal Presentation
7	PB-07	Final project defense Registration
8	PB-08	Final project defense
9	PB-09	Submission of Final Project Completions

3.2 Identify the Automation Boundaries

The identify the automation boundaries stage is the process of identifying the type of each task or process carried out in order to know the limits of automation. Each task or process has three different types, namely automated tasks, manual tasks, and user tasks. Therefore, this stage is the process of giving appropriate icons to each task. One example of a business process that has been given the icon is the final project defense business process, which can be seen in figure 3.

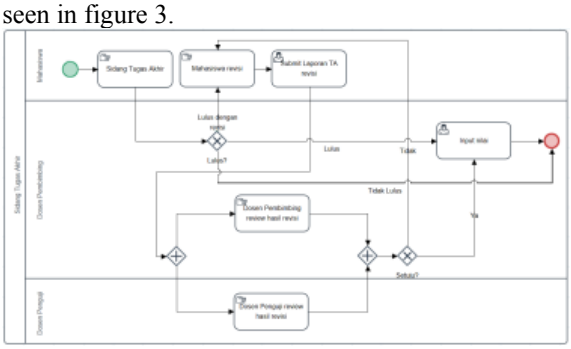


Figure 3: Final project defense business process

In the student lane, there are three tasks with each type of task. In the final project, the session task is categorized as manual tasks because students are required to present their final project directly in the classroom. Student revision task is also categorized as a manual task because students revise reports directly and submit for final project report revision task is categorized as a user task because students can submit revised final project reports via email or that kind of thing. Then in the supervisor lane, there are two tasks, namely the supervisor revision review task is categorized as a manual task because the supervisor reviews directly on the final project report and score input task is categorized as user tasks because Supervisor can input score in Academic Information Systems ITK (SIKANTAN). Then the examiner lane only has 1 task, namely the revision review task, which is categorized as manual tasks because they must do a review directly on the final project report.

3.3 Review Manual Tasks

After the process of identifying the automation boundaries, the manual task review stage can then be performed to maximize the value obtained by the system. Tasks that are still categorized as manual tasks are changed to user tasks or automated tasks. So, there are no more business processes that contain manual tasks. One example of a business process that has passed the manual task review stage is the final project Proposal Presentation, which can be seen in figure 4.

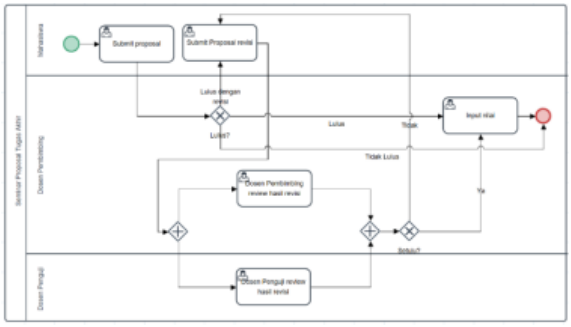


Figure 4: Final Project Proposal Presentation business process

Previously, the final project Proposal Presentation business process had passed through the identify the automation boundaries stage, which was explained in figure 3. In the student lane, the final project Proposal Presentation task has been replaced by the submit proposal task with the type of user tasks. And the removal of the revised student task was done. Then in the supervisor lane, the type of supervisor review task, which was previously a manual task, has been changed to a user task. Then in the examiner lane, the type of examiner review task has been changed to a user task.

3.4 Complete the Process Model

At the complete process model stage, all Final Project business processes are confirmed to be complete and clear. The final project consultation business process can be seen in figure 5. In the final project consultation business process, all tasks have a category. So that the business process can proceed to the next stage.

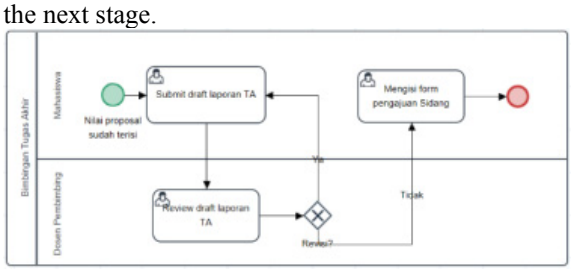


Figure 5: Final project consultation business process

3.5 Bring the Process Model to an Adequate Granularity

Bring the process model to an adequate granularity level is a process of combining interconnected tasks into one task. This stage can be seen in one of the final project defense business processes in the student lane section described in figure 6.

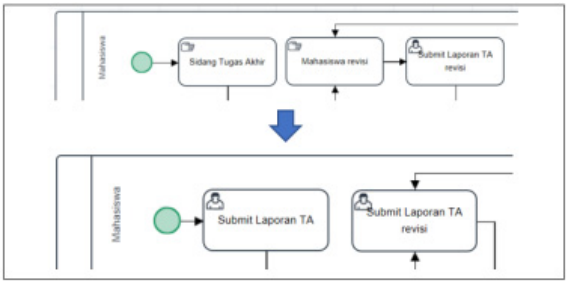


Figure 6: Final project defense business process

It can be seen in the student revision task has a connection with the submit report revision task so that both tasks can be combined into the submit final project report revision.

3.6 Specify Execution Properties

At the stage of specifying the execution process, all tasks in the final project business process need to be specified. This stage is carried out, aiming to automate business processes to run smoothly, thus making the system effective. The specifications carried out on the task, or the business process itself are as follows:

- Assignment Rules
- Dynaforms
- Input Documents
- Output Documents
- Triggers
- Permissions
- Sub-process Properties

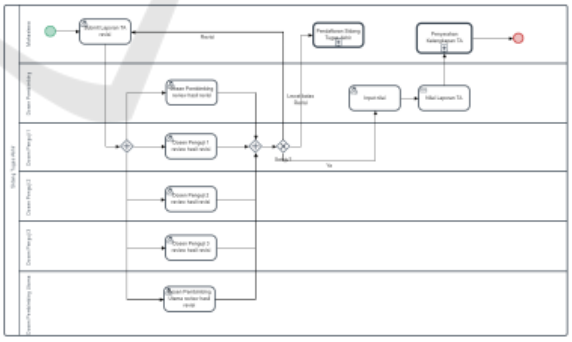


Figure 7: Final project defense business process

Examples of business processes that have passed the specify execution properties stage are the final project defense business processes described in figure 7. All of the tasks have been carried out in the specification process for the assignment rules section. It aims to determine the tasks given in accordance with their respective roles.

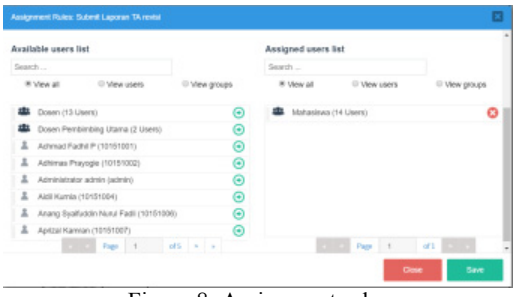


Figure 8: Assignment rules

Can be seen in figure 8, the specifications are done on the submit final project report revision task in the student roles section. So, assignment rules need to be done to student users.

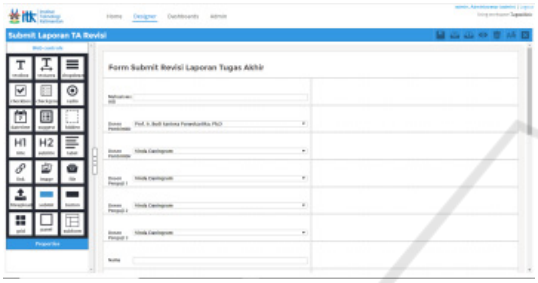


Figure 9: Dynaform

Furthermore, so that students can collect revised final project reports, a form is needed as a container for collecting student report files. So, it can be seen in figure 9, an example of a dynaforms that has been designed is called submit final revision report contained in the submit final revision report task.

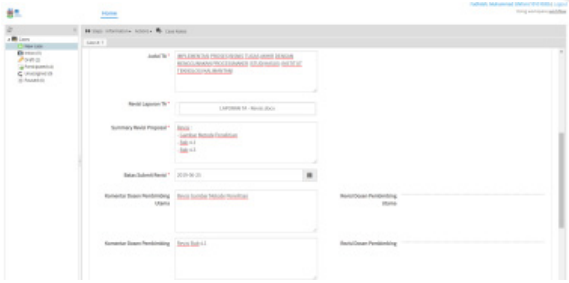


Figure 10: Submit revised final project report form

From the results of the design, the form display on the system can be seen in figure 10. In that view, students fill in the data related to the final project report. Management of files sent by each user can be set in the input documents specification, which includes the document size, document name, document type, document placement, illustrated in figure 11.

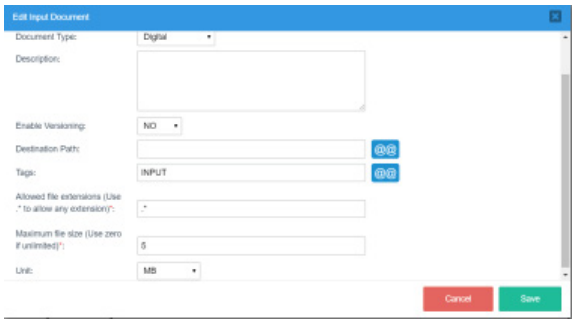


Figure 11: Input documents

This input document can be used on different dynaforms. So, the user can upload files according to the input settings of the document that has been adjusted. Then the display of the results of the input documents shown in Figure 12, there are titles of input documents, ID documents, and document management.

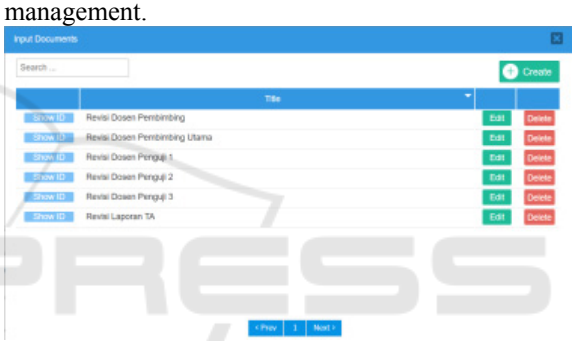


Figure 12: Document input results

Similar to input documents, the function of the output documents specification is to manage the files received by each user, which include the file name, file type, and file contents. Output documents can produce files such as final report value, create invitation letters, official records, and so on, as in figure 13. So, the user can download the file as specified.

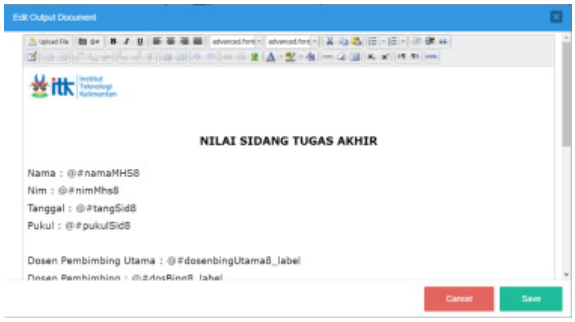
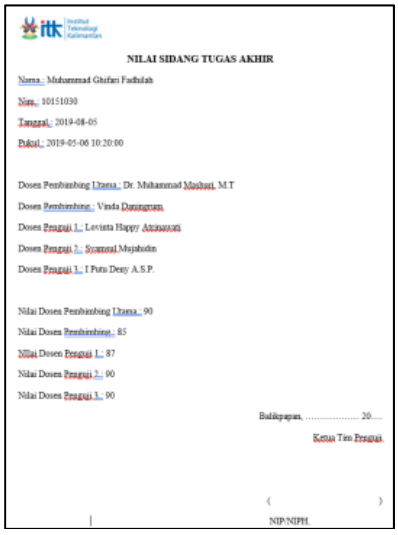


Figure 13: Output documents



NILAI SIDANG TUGAS AKHIR

Nama : Muhammad Ghifari Fadhilah

Nim : 10151030

Tanggal : 2019-08-05

Pukul : 2019-05-06 10:20:00

Dosen Pembimbing Utama : Dr. Muhammad Mashuri, M.T

Dosen Pembimbing : Vinda Daningrum

Dosen Penguji 1 : Lovinta Happy Atrinawati

Dosen Penguji 2 : Syamsul Mujahidin

Dosen Penguji 3 : I Putu Deny A.S.P.

Nilai Dosen Pembimbing Utama : 90

Nilai Dosen Pembimbing : 85

Nilai Dosen Penguji 1 : 87

Nilai Dosen Penguji 2 : 90

Nilai Dosen Penguji 3 : 90

Balikpapan, ... 20....

Ketua Tim Penguji,

( )

NIP/NIPH.

Figure 14: Output documents results

From the results of the draft output documents, the data filled out by the user will be displayed as an example of the output documents in figure 14. The triggers specification is needed to regulate the running of a task process. So that each task goes automatically according to the user-specified. So that the task process runs precisely and efficiently. An example of triggers can be seen in figure 15.

Figure 15: Triggers

Triggers are used to call the main supervisor, supervisor, and examiner. So, the results displayed on the triggers settings can be seen in Figure 16 below.

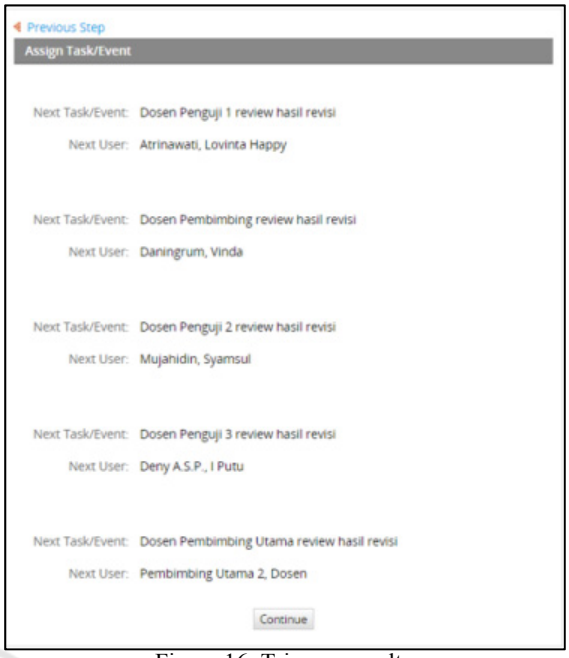


Figure 16: Triggers results

In order for all users can access input documents, it is necessary to do specifications on permissions, and an example can be seen in figure 17. Permissions are intended for lecturer roles, so lecturers can download files sent by students, or from others.

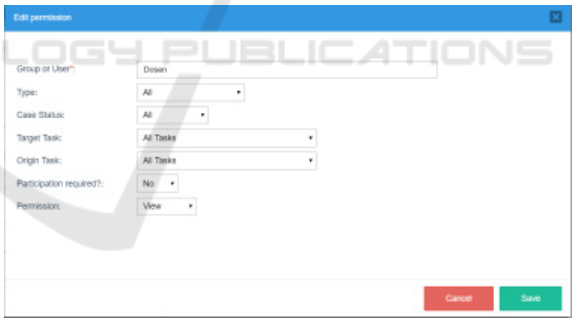


Figure 17: Permissions

Then the results of the specifications on the permissions, the Lecturer has been able to download the revised final report file that has been sent by the student listed in Figure 18.

Figure 18: Permissions results

One of the most important specifications, so that the entire process can run, it requires sub-process properties. This specification can manage every variable that has been sent by each user so that it is passed on to other processes. Examples of sub-process properties specifications that have been used are in the sub-process submission of the completion of the final project. This can be seen in figure 19.

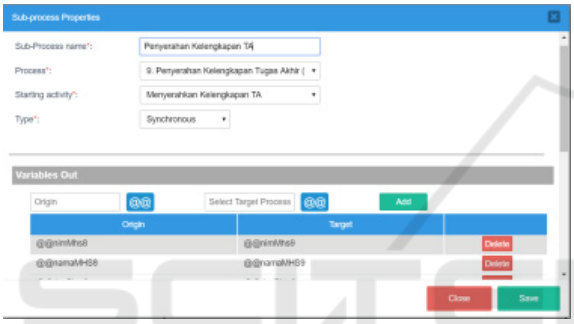


Figure 19: Sub-process properties

After the specification of the sub-process properties is carried out, the process that was previously in the final project defense can proceed to the sub-process of submitting the completeness of the final project shown in Figure 20 below.

Figure 20: Sub-process properties results

3.7 User Acceptance Test (UAT) & User Training

This stage aims to ensure that all final project business process automation activities can run smoothly and are approved by the process owner. Therefore, the testing and training stage of the system only covers the Information System Study Program. Because it is constrained by the free time, each process owner is different, so it is very difficult to bring the entire process owner in UAT & UT activities. Then the testing and training activities are carried out simultaneously. All UAT participants conduct testing and training in accordance with predetermined scenarios.

The UAT scenarios are carried out in all business processes, which can be seen in table 2.

Table 2: Testing and training scenarios

No	Scenario	Index	Business Process Name
1	UAT-01	PB-01	Attendance of Final Project Proposal Presentation
2	UAT-02	PB-02	Final Project Registration
3	UAT-03	PB-03	Final Project Proposal Consultation
4	UAT-04	PB-04	Final Project Proposal Presentation Registration
5	UAT-05	PB-05	Final Project Proposal Presentation
6	UAT-06	PB-06	Final Project Consultation
7	UAT-07	PB-07	Final project defense Registration
8	UAT-08	PB-08	Final project defense
9	UAT-09	PB-09	Submission of Final Project Completions

The test results of the final project information system in this second UAT & UT are all UAT scenarios accepted by UAT participants, and the system is considered to have run properly. All UAT scenarios that have been successfully tested can be seen in table 3.

Table 3: UAT scenario test results

No	Scenario	Index	Business Process Name	Test Results
1	UAT-01	PB-01	Attendance of Final Project Proposal Presentation	Pass
2	UAT-02	PB-02	Final Project Registration	Pass
3	UAT-03	PB-03	Final Project Proposal Consultation	Pass
4	UAT-04	PB-04	Final Project Proposal Presentation Registration	Pass
5	UAT-05	PB-05	Final Project Proposal Presentation	Pass
6	UAT-06	PB-06	Final Project Consultation	Pass
7	UAT-07	PB-07	Final project defense Registration	Pass
8	UAT-08	PB-08	Final project defense	Pass

9	UAT-09	PB-09	Submission of Final Project Completions	Pass

3.8 Proposed Improvement of the Guide to the Final Project Information Systems Study Program

The final project guide aims to maintain the quality of the final project produced by ITK students, especially in the scope of Information Systems Students. In addition, each study program has its own criteria, so that in the final project guide, there is a special reference to accommodate the study program criteria in the ITK environment. From the results of the Business Process Automation stages that have been carried out, in accordance with aspects of the implementation of business processes, it is necessary to do the organizational change management stage, which is to align the process of the final project guide with the final project business processes that have been implemented. From the results of these stages, there are 13 proposed improvements to the process of the final project guide, which are listed in table 4.

No	Final Project Guide		Proposed Improvement
	Chapter	Statement	
1	Chapter I, Number 8, Section 2	Duties and obligations of supervisor	The addition of points in section 2 is prospective supervisors are entitled to accept and reject the request of supervisors from students
2			The addition of points in section 2 is Determining the examiner lecturer
3	Chapter I, Number 9, Section 2	Rights and obligations of the examiner	The examiner has the right to accept or reject requests to determine the date of the seminar and the final project defense of the student.
4	Chapter II, Number 1	Requirements that must be met by students in order to carry out the final project	Attend 5 Proposal Presentation times by collecting the Proposal Presentation attendance sheet file to the system.
5	Chapter II, Number 2, Section 1	Candidate final project participants fill out the final project topic proposal form (Form. TA-001a).	With the Final Assignment information system, the candidate final project participants can directly fill the supervisor request form on the system.
6	Chapter II, Number 2, Section 3	The final project coordinator will propose a list of final project participants, along with the assigned supervisor (Form ta-014) and then be approved by the study program coordinator.	With the final project information system, this process is no longer needed. So, the process can be removed.
7	Chapter II, Number 2, Section 4	Candidate participants in the final project fill out the advisory form proposal and research interest field (form. ta-001).	With the final project information system, candidate final project participants can directly fill out the Final Project registration requirements file form
8	Chapter II, Number 2, Section 5	Prospective participants of the final project compile a proposal file of supervisors and fields of interest to the academic administration of the study program with a deadline determined by each study program.	With the final assignment information system, the deadline for collecting files can be abolished, so that the final assignment registration can be done at any time during the lecture
9	Chapter II, Number 3	Proposal preparation procedure and Proposal Presentation implementation	The addition of points is the determination of the time and space of the final project Proposal Presentation determined by the student and with the approval of the main supervisor, supervisor, examiner, and administration staff.
10		The procedure for submitting a seminar proposal that must be done by students.	With the system, the 8-points submission procedure is changed according to the latest system.

11	Chapter II, Number 4, Section 4	Submit the final project approval form (form. ta-007) as a condition of the final project defense.	With the system, students can fill out the final project defense registration form
12	Chapter II, Number 5	The procedure for submitting a final project defense must be done by students.	With the system, the procedure points 1 – 10 is changed according to the latest system.
13	Chapter I, Number 7, Section 2	The final project coordinator is an ITK lecturer who is responsible for carrying out the final project in the study program concerned	Adds the responsibility of the Final Project Coordinator to add Student & Lecturer users

4 CONCLUSIONS

The implementation of BPMS for the final project business processes has finished. The process owners have agreed that all of the business processes implemented using ProcessMaker are suitable to support the final project activities. This integrated system (BPMS) is expected to provide benefits for the students, supervisors, and also ITK in order to implement an effective business process. There are some changes made, and the guidelines provided in the final project guide are not suitable anymore. Therefore, ITK needs to manage its organizational change management in order to align the process of the final project guide with the use of ProcessMaker. There are 13 changes proposed to improve the final project guidelines.

REFERENCES

Aalst, W. (2012). Business Process Management: A Comprehensive Survey. ISRN Software Engineering.

Atrinawati, L. H., & Pratikta, W. P. (2019). Permodelan Proses Bisnis Akademik (Studi Kasus: Institut Teknologi Kalimantan). Jurnal Teknologi dan Sistem Informasi (TEKNOSI) Universitas Andalas.

Dumas, M., Rosa, M. L., Mendling, J., & Reijers, H. A. (2013). Fundamentals of Business Process Management. Berlin: Springer.

Fadhilah, M. G. (2019, Mei). Sistem Informasi Tugas Akhir. Retrieved from Sistem Informasi Tugas Akhir: ta.is.itk.ac.id

Indonesia Productivity and Quality Institute. (2018, Agustus 20). IPQI. Retrieved from Mengenal Manajemen Bisnis Proses: https://ipqi.org/bisnis-proses-manajemen/

ITK. (2018). Panduan Tugas Akhir Institut Teknologi Kalimantan. Balikpapan: Pusat Jaminan Mutu.

Majekodunmi, D. (2018). Business Process Automation with ProcessMaker 3.1. Lagos: Apress.

Singh, P. (2012). Management of Business Processes Can Help an Organization Achieve Competitive Advantage. International Management Review, 8(2).

Sparx Systems. (2018). UML Tutorial: The Business Process Model. Retrieved from SPARX SYSTEMS Web site: http://www.sparxsystems.com

Weske, M. (2007). Business Process Management: Concept, Languages, Architectures. New York: Springer.