Business process improvement design of complaints on
technical information system problems using the business
process improvement method

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Abstract. Various attempts were made to optimize the quality of ICT services. UPT. TIK
Undiksha is one of the ICT organizational units that have been supporting business processes
for Undiksha’s main business processes to produce quality graduates. This study aims to
provide recommendations for the improvement of one of the business processes at UPT. TIK
Undiksha. The researcher proposes a business process design to be used as complaints
regarding on technical information systems problems (To-Be) based on the results of the As-Is
business process modelling and evaluation of the problems. Business Process Improvement
(BPI) method was used for the analysis, evaluation, and recommendations for business process
improvement. Further, the streamlining tools proposed to optimize the As-Is the business
processes are standardization and upgrading. The simulation results show that the use of
resources and time for the design business process was decreased compared to the current
business process.

1. Introduction
Universitas Pendidikan Ganesha (Undiksha) is one of Lembaga Pendidikan Tenaga Kependidikan
(LPTK) which aims to create quality graduates, both as educators and non-educators. To support this
goal, Undiksha has Unit Pelaksana Teknis (UPT), namely UPT. Teknologi Informasi dan Komunikasi
(TIK). UPT. TIK Undiksha is one of the UPTs with business processes that support Undiksha’s core
business processes. Undiksha continues to make various efforts to repair and improve facilities and
services, especially ICT. This is because in today’s era and in the future ICT-based services is a
support system that must be managed properly to be able to compete in the information age.

According [1], “ICT plays a great role in the education industry. However, the educational system
could not be improved using technology alone. Technology always exists within a social context. In
this sense, in order to select the appropriate ICT technology from the technical perspective, it is
necessary to clearly understand the business processes and detect inefficiencies in current
activities”. UPT. TIK Undiksha has the main task of being an ICT-based service provider for the
academic community, namely leaders, lecturers, staff, students, and communities outside Undiksha.
Current business processes at UPT. TIK (As-is) has not been fully optimal. Various activities in
ongoing business processes can still be improved or enhanced to optimize the quality of ICT services.
Regarding to this, a process improvement is known as a mechanism to achieve a performance
increase[2]. Thus, improvement is done by reviewing the possibility of improvement and conducting error prevention.

According to[3], business process is a collection of activities carried out in coordination within the organizational environment and technical environment. These activities come together to achieve business goals. Each business process is defined by an organization (part), however business process can interact with other organization's business processes (parts). Paul Harmon (2003) in[4] defines “a business process is a series of activities carried out by a business which includes the initiation of inputs, the transformation of information, and produces output. The output can be the values to business customers or markets, it can also be the values to other processes (within the organization). A business process can be broken down into several sub-processes, each of which has its own attributes that contribute in achieving the goals of the parent process. Sub-processes can be further broken down into activities, such as the smallest sub-processes which can consist of one or more steps (steps) that must be included in the business process”.

In this study, the authors analyzed, evaluated and provided recommendations for business process improvements using the Business Process Improvement (BPI) method. Business processes running at UPT. TIK is modeled using BPMN. The modeling aims to help describe business processes in a graphical manner so that it is easier to understand, neat and detailed. BPMN was chosen because BPMN is a graphic modeling language used to model business processes that occur in an organization. The advantage of BPMN is that it can describe business processes in detail with the flow of information in the form of messages that are conveyed between related parties[5]. In addition, BPMN also provides standardized business process modeling notation so that business process diagrams can be easily read and understood quickly by all parties involved in the business[4].

According to Harrington (1991) in[6] BPI is a systematic framework developed to assist organizations in increasing effectiveness and efficiency in implementing their business processes. BPI provides an introduction that will assist in simplifying business processes with the target of helping internal and external parties in the organization to get better output than before. BPI has five phases, namely organizing for improvement, understanding the process, streamlining, measurement and controls as well as continuous improvement. Harrington (1991) in[7], states that the continuous improvement of a business process has the following objectives:

1. Making the business process effective, namely the production that is achieved in accordance with the target.
2. Making business processes efficient, namely minimizing the resources used.
3. Making business processes adaptable, namely processes that are able to adapt to changing customer and business needs.

2. Method

The research method consisted of 5 stages as shown in Figure 1.

Figure 1. Research Methods.

1. Organizational identification

This stage is the implementation of the first phase in the BPI. At this stage the authors collected data by means of interviews and observations. The goal was to obtain information and identify the object of research better which was used to support the modeling process and business process improvement.
2. Selection of business processes

The purpose of this stage was to determine which business processes will be improved using the approach provided by BPI. In order to determine the business processes to be improved, business process prioritization was carried out using the BPI approach, namely the weighting selection approach. This weighting selection approach determines the priority of business process improvement by providing value in terms of impact on customers, ease of change, performance or opportunities for business processes to be improved, and impact on the business.

3. Business process modeling

At this stage the selected business process was described using the provisions of Business Process Modeling and Notation (BPMN) and using the Bizagi Modeler tools. Business process modeling aims to graphically depict the flow of business processes and activities currently running.

4. Evaluation of business processes

At this stage, the recommendation business process model was described after analyzing and designing business process improvements. Business process evaluation was carried out by identifying problems and analyzing activities to identify deficiencies in the As-is business process.

5. Simulation of business processes

The next stage was to simulate and compare the current business process (As-is) with the recommendation business process (To-be). Simulations were carried out to the level of resources analysis carried out in the business process prior to improvement (As-is) and the business process after improvement (To-be) to be able to see the comparison of the time and the use of the required resources. The concept of simulation is the process of imitating the reality[8]. Simulations were carried out with the help of the Bizagi application such as the process of validation and time analysis. Process validation was done to find out which activity is running valid or not, and to find out the number of tasks running from the beginning to the end of the process. Meanwhile, time analysis was done to determine the incensement of time in the business process recommendation (to be) compared to the current model (as is).

3. Results and Discussion

3.1. Organizational Identification

In accordance with Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi Republik Indonesia Number 14 of 2016 concerning Organisasidan Tata KerjaUniversitas Pendidikan Ganesha, "UPT. TIK has the task of carrying out the development, management and services of information and communication technology as well as management of information systems and networks. In order to achieve success in the implementation of these tasks the current UPT. TIKUndiksha has 5 divisions. Those divisions are the information systems division, the data and information center division, the infrastructure, network and security division, the content management division, and the service and documentation division. Each division has main duties and functions (in Bahasa: tupoksi) in order to support UPT. TIK Undiksha tasks. Further, based on the results of interviews and observations made by researchers, it can be stated that currently UPT. TIK Undiksha's has 14 business processes.

3.2. Selection of business processes

This stage was to determine the business processes that will be proposed for improvement. The weighting selection approach was carried out by determining the priority of business process improvement by providing value in the aspects of impact on customers (Customer Impact), ease of change (Changeability), performance or business process opportunities that can be improved (Opportunity), and impact on business (Business Impact). Based on weighted selection of business processes, complaints of information system technical problems and complaints of network technical
problems were the most prioritized business processes for improvements to be proposed. In this paper, the scope of discussion only around the business process of complaints about technical information systems problems. This is because the intensity of events for these business processes is very high compared to other business processes. In addition, the chances of success in improving other business processes will be higher if the two business processes are successfully upgraded or improved.

3.3. Business process modelling

Business process modeling corresponds to the second phase of BPI, namely understanding the process. Activities in this phase include defining the boundaries of the process, defining the actors of the process, making graphical notations of the business process flow. The graphical notation used in business process modeling is BPMN notation. Business process modeling was carried out to select business processes based on priorities for improvement, namely complaints of information system technical problems. The description of the business process for complaints of technical information systems problems is shown in Table 1.

Table 1. Description of the Business Process for Complaints on Technical Information System Problems.

| Business Process Name | Complaints on Technical Information System Problems |
|-----------------------|-----------------------------------------------------|
| Actors                | Users (Students, Staff, Lecturers), Service and documentation staff, Information systems division staff. |
| Description           | This business process includes the process of complaints, handling up to confirmation of handling technical problems in the information system developed by UPT. TIK Undiksha. |
| Purpose               | Collecting and documenting reports and handling complaints regarding technical information systems issues. |
| Input                 | Report on complaints of information system technical problems |
| Output                | Confirmation of complaint status on information system technical problems |

Based description above, Table 2 shows the roles, activities and features used in each business process activity for complaints regarding technical information systems that are currently running.

Table 2. Business Process for Complaints on Technical Information System Problems

| No | Roles                          | Activities                                                                                                   | Tools               |
|----|-------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------|
| 1  | Users                         | Send complaints via chat                                                                                     | Group Telegram     |
| 2  | Service and documentation staff | If it is appropriate with UPT TIK main task and function, Service and Documentation Staff will provide immediate solutions if it is an FAQ and knowledge base, if not, Service and Documentation Staff will pass on to the Information system division staff. | Group WA, GIT UPT. TIK |
|    |                               | If not the main function of UPT. TIK, Service and Documentation Staff direct users to authorized parties.     | Group Telegram     |
| 3  | Information systems division staff | If there are quite a lot of requests for complaints, priority should be made, if not immediately make corrections. |                     |
| 4  | Information systems division staff | Send confirmation of repair results to Service and Documentation Staff.                               | Git UPT. TIK, Group WA |
Furthermore, based on Table 2, business process modelling was carried out with BPMN.

3.4. Evaluation

Evaluation was carried out by identifying problems and analyzing activities that have occurred in current business processes (As-Is). Table 3 shows the results of the identification of business process problems in the technical information system complaints that have been modeled.

Table 3. Results of the Identification of Business Process Problems Complaints on Technical Information Systems Problems.

| Sub Proses                        | Issues                                                                 | Risk                                                                 |
|----------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------|
| Submit a complaint               | Complaints are often sent via chat to WA or personal Telegram of Service and Documentation Staff | Service and documentation staff performance cannot be monitored, complaints are not well documented. |
| If it is appropriate with UPT TIK main task and function, Service and Documentation Staff will provide immediate solutions if it is an FAQ and knowledge base, if not, Service and Documentation Staff will pass on to the Information system division staff. | • Users of settings send complaints that is not comply with the UPT. TIK main duties and functions. | • Blurring the main tasks and functions of UPT. TIK. |
|                                  | • Complaints are only documented on the Telegram Group                 | • Other users will ask for a similar problem.                       |
|                                  | • Telegram groups have limitations in documenting the FAQ and Knowledge base |                                                                      |
| If not the main function of UPT TIK, Service and Documentation Staff direct users to authorized parties. If there are a lot of complaints requests, the information system division staff will be prioritized, otherwise the information systems division staff will immediately make improvements. | Prioritization is carried out independently, without standards | There is a discrepancy in the prioritization of complaints |
| Send confirmation of repair results to Service and Documentation Staff | Incomplete documentation because not all confirmation of problem resolution is delivered through Git UPT. TIK, often directly through the WA Group chat only. | The performance of the information system division staff cannot be monitored, confirmation of complaint resolution is not well documented. |
Send confirmation of the status of the complaint to the user. The confirmation of the status of the complaint sank due to the messages sent in the telegram group. Other users will ask for a similar problem that has already been answered.

Based on the evaluation that has been done, the authors developed a business process improvement proposal using BPI's streamlining tools. The types of streamlining that were proposed to optimize as-is business processes are standardization and upgrading. Table 4 shows the design of improvements to the business process for complaints about technical information systems.

**Table 4. Business Process Improvement Design for Complaints on Technical Information System Problems.**

| Initial Business Process Problems | Streamlining type | Business Process Recommendations |
|-----------------------------------|------------------|----------------------------------|
| Complaints are sent to WA or Staff's personal Telegram | **Standardization** | Before submitting a complaint, users are provided with an FAQ and a knowledge base. If it doesn't match / doesn't exist yet, the User can send a complaint through the information system with the chat function. |
| • Complaints that do not fit the main duties and functions are often made by users. • Complaints are only documented on the Telegram Group • Limitations in documenting the FAQ and Knowledge base | **Upgrading** | FAQ and Knowledge base based on problems/complaints by users can be managed by service staff and documentation through the functions provided by the information system. |
| Prioritization was done independently | **Standardization** | Prioritization is automatically based on standardized service level agreement (SLA) available in the information system function. |
| Incomplete documentation because not all confirmation of problem resolution was delivered through Git UPT. ICT, often directly through the WA Group chat only. | **Upgrading** | Confirmation of complaint resolution through the information system chat function as well as monitoring staff performance. |
| The confirmation of the status of the complaint sank due to the many messages in the telegram group. | **Upgrading** | Confirm the settlement of complaints through the chat function which is also for monitoring the performance of service staff and documentation. Documentation is done through an information system equipped with a complaint documentation function based on categories. |

The proposed streamlining types were standardization and upgrading. According to Harrington (1991) in [9], standardization means determining an activity of a process that is used so that it can be carried out uniformly, while upgrading or maximizing the use of existing facilities to improve business process performance. Furthermore, based on the business process improvement design presented in
Table 4, the authors modelled how the business process to be. Further, Table 5 shows a comparison of the current business process by design.

**Table 5. Comparison of Current Business Processes with Recommendations.**

| Business Process Recommendations | Activities Related to the Initial Business Process | Activities added/changed /removed in the recommendation business process |
|----------------------------------|-----------------------------------------------------|-------------------------------------------------------------------|
| Complaints are sent through the information system | Users send complaints via telegram chat or WA | (Added) Before submitting a complaint, users are directed to check the FAQ and Knowledge base. If the problems experienced are not available in the FAQ and Knowledge base, users are welcome to send complaints. Complaints are sent through a mobile-based information system equipped with a chat feature. |
| FAQ and Knowledge base based on problems / complaints by users can be managed by service staff and documentation through the functions provided by the information system | Service and Documentation Staff will provide immediate solutions if it is an FAQ and Knowledge base (based on personal notes and experience) | (Changed) FAQ and Knowledge base are checked through the documentation on the information system. |
| Prioritization is automatically based on standardized service level approval available in the information system function. | If there are many requests for complaints, prioritization is carried out, if not immediately make corrections (based on personal records and experience). | (Changed) Prioritization is carried out through a functional on the information system based on standards (SLA) |
| Confirm the settlement of complaints to the service and documentation division through a functional chat which is also for monitoring staff performance. | Send confirmation of repair results to Service and Documentation Staff (via Git UPT. TIK) | (Changed) Confirmation of repairs is carried out through an information system with the chat function. |
| Confirm the resolution of complaints to users through the chat function which is also for monitoring the performance of service staff and documentation. Documentation is done through an information system | Send confirmation of complaint status to users (via Telegram Group) | (Changed) Confirmation of complaint resolution through the information system with the chat function. |
Business Process Recommendations | Activities Related to the Initial Business Process | Activities added/changed /removed in the recommendation business process
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System equipped with a complaint documentation function based on categories.

3.5. Simulation

Simulations are carried out to compare the current business processes with the proposed design business processes. Simulations are carried out at the resource analysis level, namely resources. The simulation was done by comparing the resources used in the current business process (As-Is) with the recommendation business process (To-Be). In the simulation, the researcher applies several assumptions, namely:

1. All stakeholders involved in the process are present
2. The simulation is carried out for a duration of 5 working days. During that time there were 50 complaints.

The comparison of the simulation results of resource utilization in the process of complaints about technical problems in information systems is presented in Table 6. In the simulation, the authors used 3 staff of service and documentation divisions and 5 staff of information systems in accordance with the UPT. TIK organizational structure. The simulation results show that there is a decrease in the use of resources from the current business process by design. The decrease was 13.94% for users, 49.59% for the service and documentation division staff, and 0.37% for the information systems division staff.

**Table 6.** Comparison of Resource Utilization Simulation Results in the Complaints Process of Information Systems Technical Issues.

| Resource | Utilization | As-Is | To-Be |
|----------|-------------|-------|-------|
| Users    | 85.10%      | 71.16%|
| Service and documentation division staff | 94.65% | 45.06% |
| Information systems division staff | 99.45% | 98.82% |

The comparison of the simulation results of time utilization in the process of complaints about technical information systems problems is shown in Table 7. The table shows that there is a decrease in the minimum time of 11 minutes 20 seconds to resolve complaints in the design business process. In addition, there was also a decrease in the average time for complaint resolution. The reduction in time suggests that the proposed business process improvement design has the potential to help the process run faster.

**Table 7.** Comparison of Time Utilization Simulation Results in the Complaints Process for Technical Information Systems Problems.

|                      | As-Is     | To-Be     |
|----------------------|-----------|-----------|
| Instances started    | 1000      | 1000      |
| Instances completed  | 872       | 1000      |
| Min. time            | 17m 20s   | 8m        |
| Max. time            | 4d 17h 7m 50s | 5d 17h 4m 5s |
| Avg. time            | 2d 23h 55m 3s | 1d 20h 30m 11s |
4. Conclusion
Based on the results of the research that has been done, several conclusions were obtained:

1. UPT. TIK Undiksha has 14 business processes. The business process for complaints on technical issues of information systems was selected to be improved based on a weighting selection approach.

2. The researcher proposes a business process design for complaints about technical information systems problems (To-Be) based on the results of the As-Is business process modeling and evaluation of the problems. The streamlining tools proposed to optimize as-is business processes are standardization and upgrading.

3. The simulation results show that there is a decrease in the use of resources and a decrease in time for the design business process compared to the current business process.

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