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IMPLEMENTATION OF BUSINESS PROCESS REENGINEERING TO MINIMIZE CUSTOMER COMPLAINTS

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ABSTRACT

Service in an organization is highly correlated with the level of customer satisfaction with the quality of service provided. From this activity, improvements will be made to the Business Processing Reengineering method so that the business process can run properly and efficiently. To test whether it is true that the Business Process Reengineering (BPR) approach has been able to minimize customer complaints, in this case, PDAM Giri Tirta Gresik will carry out an identification and analysis stage first on any problems. Based on the existing problems, the focus of this research was emphasized on the service process to fulfill clean water in Gresik Regency, especially in the reengineering process for new installations. A comparison of new installation business processes before and after the Business Process Reengineering, namely the percentage of throughput efficiency tests of 94.44% from 73.99% of ongoing business processes and provides the final simulation results in the form of BPMN notation which takes maximum time. which is obtained in 24 days 2 hours 20 minutes from 26 days 16 hours 5 minutes in the new installation process.

Keywords: Business Process Reengineering; Customer Complaints; Service; Organization

INTRODUCTION

Service in a community or organization is highly correlated with the level of customer satisfaction with the quality of service provided. However, in this case, there are still many complaints from the community such as drinking water (Rahmawati, 2014) needs that still cannot be served optimally such as high water loss rates, low water volume sold, and drinking water supply system management programs have not been integrated for the long term, there are no tariffs for adjusting water price tariffs, there is no regulation of water networks and meters and monitoring customer water usage and lack of support functions day-to-day operational services such as the lack of a quick response in the complaint service. Complaints generally arise due to dissatisfaction with products or services (Hsiao et al., 2016). Because of problems in the public service process, customer complaints become crucial, so it is considered to be able to make public service providers help face various problems and then satisfaction and trust from customers can return (Tjiptono, 2022).

At the Business Process Reengineering stage, it is expected to be able to find out the expectations of consumers or customers from each existing service process, whether it has reached the level of satisfaction provided, and to measure the achievement of the efficiency level of an organization(Fajriah & Nazar, 2020). Information technology services and business processes in an organization will always change periodically from time to time. This shows that an organization must require more effective and efficient business processes to improve services to the community (Helmi et al., 2018) Identifying business processes is the first step to finding out what obstacles cause business process performance to run less than optimal so far. This must be based on the application of information technology and a good business strategy. The use of the Internet and technology has become an important aspect that must be present in organizational operations and business processes.

According to Hammer & Champy, (1993) in the study (2010: 2) Business Process Reengineering is a rethink on the basis of a radical redesign of business processes in order to

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achieve dramatic improvements that can be calculated, such as cost, quality, service, and speed (Gaol, 2016). Kai. A. Simon (2004) said that many companies are trying very hard to be able to provide good value for their consumers through various ways, such as re-engineered businesses, customized business processes, and information technology that is used as a trigger to gain competitive advantage.

This is considering that competition in the business world is increasingly fierce which causes an organization to need a method to increase targets in accordance with organizational goals in order to meet the level of satisfaction with consumers and customers (Paul et al., 2015) A high level of efficiency will create productivity in carrying out the operational activities of the organization, where the level of efficiency itself is strongly influenced by the performance of services provided by an organization as input and capital as well as the results of consumer or customer satisfaction with the services provided as output in the organization. Efficiency is a variety of input components used, such as time, energy, and costs that can be calculated for use and do not have an impact on meaningless expenditure or waste (Aznedra & Safitri, 2018). An activity that has been carried out is considered efficient if the activity carried out is in accordance with the target (output) but the sacrifice (input) is minimal so that efficiency can be interpreted as no waste Nicholson, (2002) in (Moon & Min, 2017).

In line with technology that is growing rapidly, the faster technology is in changing business processes to be more effective and efficient. The influence of technology has brought a large and significant impact on organizations or public service agencies in achieving a goal to be achieved. This is then used by organizations to compete in providing maximum service quality. Service quality is an assessment given by users/consumers of the service they receive (perceived service) and whether it is as expected (expected service) (Fitzsimmons and Fitzsimmons, 2001) in (Setyawan, 2021). The quality of service felt by consumers or customers will greatly determine the loyalty and satisfaction of consumers and customers to the organization. Service quality has become a mandatory aspect that must be implemented or carried out by an organization in order to survive and gain the trust of consumers and customers. Service in this case can be observed in the form of services delivered by the organization which can be in the form of speed, convenience, ability, and even hospitality that can be shown through attitudes and behaviors to provide services in meeting consumer or customer satisfaction.

Business processes are an important aspect carried out in organizations in providing added value (Harahap, 2017) The business process itself is a set of activities carried out by one or more parties who carry out the process (Putri, 2018). Rainer (2011, p7), said that business processes are a series of activities that produce goods and services that have benefits for agencies, partners, and processes consumers. Technological developments will have an impact on achieving the vision of an organization if business process activities are not well integrated. While Magal & Word (2012), said that a business process is a set of tasks or activities that produce something. In this case, it is also necessary to analyze and evaluate a problem in business processes related to activities that take a lot of time and cost but do not produce added value for the organization (Purabaya, 2021). From this activity, improvements will be made to the Business Processing Reengineering method so that the business process operates correctly and efficiently. The application of Business Process Reengineering (BPR) is expected to be able to answer every problem that arises in an organization (Wahyudi et al., 2018) Business processes can run optimally and create increased efficiency in the organization.

In carrying out business process activities, an organization will not be separated from the problem of efficiency levels. This is considering that competition in the business world is increasingly fierce which causes an organization to need a method to increase targets in accordance with organizational goals in order to meet the level of satisfaction with consumers and customers. The PDAM Giri Tirta Gresik business process used as a BPMN modeling object is only a new installation business process that is in direct contact with customers. Business Process Reengineering (BPR) carried out focuses on minimizing the level of customer complaints.

A high level of efficiency will create productivity in carrying out the operational activities of the organization, where the level of efficiency itself is strongly influenced by the performance of services provided by an organization as input and capital as well as the results of consumer or customer satisfaction with the services provided as output in the organization. In an effort to increase organizational efficiency, everything included in the inefficiency process must be reduced or even eliminated. This inefficient activity is usually caused by non-value-added activities or waste in the ongoing processes in an organization. In an effort to increase efficiency, this waste will cause losses to the organization.

To test whether it is true that the Business Process Reengineering (BPR) carried out has been able to minimize customer complaints, in this case, identification and analysis will be carried out in advance on any problems that arise that correlate with ongoing business processes and evaluate in the form of improvements that will later produce input and the results of customer satisfaction with the services provided as output in the organization in an effort to increase satisfaction and minimize customer complaints against the organization.

RESEARCH METHOD

This research applies a mixed method between qualitative methods and quantitative methods. This mixed method, it is carried out using descriptive qualitative, namely by collecting some specific data from a number of participants, asking questions, and analyzing the data inductively based on the topic of the problem and theme to be studied by interpreting the meaning of the data. The research flow used in this study is described through a flowchart (Haryono, 2020). The use of flowcharts was chosen because it is considered to make it easier to provide an explanation of each stage used in research. The object of research at PDAM Giri Tirta Gresik is related to the readiness and alignment of business processes in accordance with customer complaints against the services provided by an organization. Here is the flow used in this study:

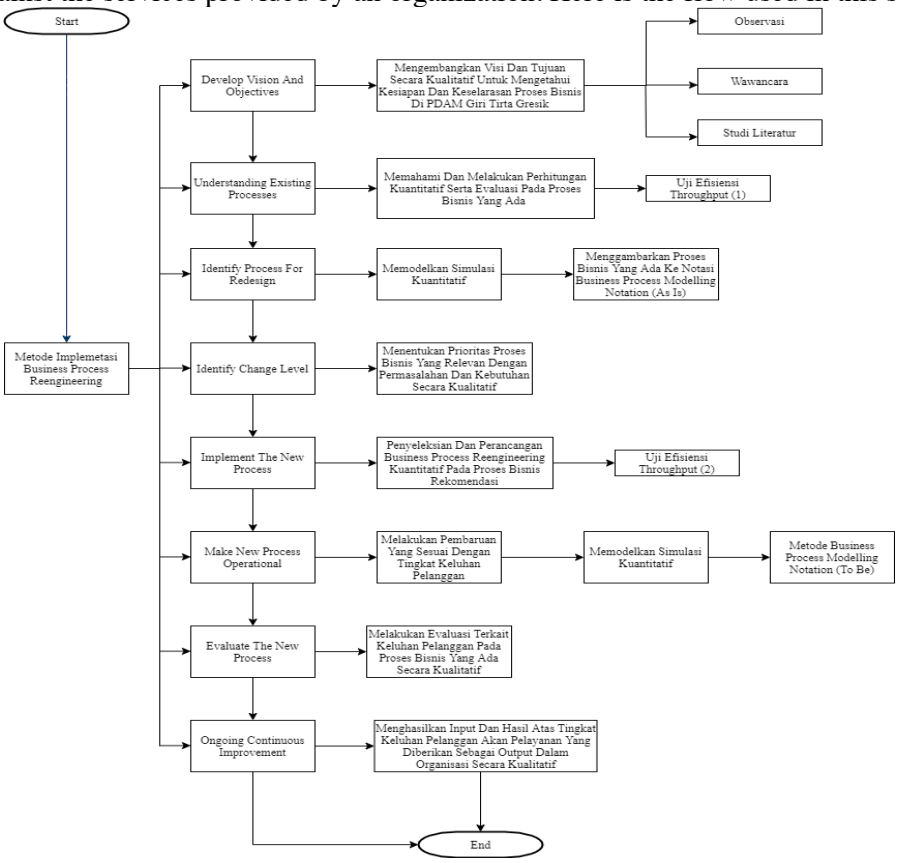

Figure 1
Research Flow

From the research flow above, it can be explained that this research process goes through several stages, starting from the initial stage of data collection to the final stage of implementing Business Process Reengineering in the running business process.

RESULTS AND DISCUSSION

Result of the Development of the Vision and Goals of the Organization

The initial stage of this research was carried out by developing a vision and objectives to determine the readiness and alignment of business processes in PDAM Giri Tirta Gresik. The process of developing this vision and goals is very decisive and makes it easier to obtain and produce initial data. At this stage, data collection will be carried out such as what data exists and occurs in the field and data that is related to the research being conducted.

As per Government Regulation Number 16 of 2005 which regulates the Development of Drinking Water Supply Systems. Explain that the Drinking Water Supply System (SPAM) can be done through a piped network system and/or not a piped network. In this case, it is also explained that the Drinking Water Supply System (SPAM) of Gresik Regency is carried out with a piped system. Of the 18 sub-districts in Gresik Regency, PDAM Giri Tirta Gresik is only able to serve 9 sub-districts in meeting clean water needs, while the other 9 sub-districts are still not well served by PDAM Giri Tirta Gresik. In this case, PDAM Giri Tirta Gresik is as follows:

Table 1
PDAM Giri Tirta Gresik Service Area Zone

No.	Region	Subdistrict	Served Villages
1.	Gresik Kota	Gresik	Sidokumpul, Tlogobendung, Gapurosukolilo, Pulopancikan, Pekauman, Bedilan, Kebungson, Pekelingan, Kemuteran, Kroman, Karangpoh, Lumpur, Sukodono, Trate, Karangturi, Tlogopojok, Sukorame, Ngipik, Tlogopatut, Kramat Inggil, Sidorukun
		Kebomas	Kebomas, Sidomoro, Singosari, Karangkering, Gending, Segoromadu, Ngargosari, Gulomantung, Randuagung, Sukorejo, Kedanyang, Prambangan, Sidomukti, Giri, Klangonan, Sekarkurung, Kembangan, Dahanrejo, Tenggulunan, Indro, Kawisanyar
		Manyar	Roomo, Pongangan, Yosowilangun, Sukomulyo, Suci, Manyarejo, Manyarsidomukti, and Tebalo
		Duduk Sampeyan	Ambeng watang, Tirem, Samir Plapan, Tebaloan, Duduk Sampeyan
2.	Gresik Tengah	Menganti	Menganti, Kepatihan, Boboh, Hendrosari, Palemwatu, Putat Lor, Beton, Bringkang, Mojotengah, Sidojangkung, Boteng
		Cerme	Dadapkuning, Ngembung, Sukoanyar, Morowudi, Guranganyar, Ngabetan, Betiting, Iker-iker, Cerme Kidul, Tambakberas, Cerme Lor, Semampir, Padeg, Banjarsari
		Kedamean	Kedamean, Slempit, and Banyuurip
3.	Gresik Selatan	Wringinanom	Desa Wringinanom
		Driyorejo	Krikilan, Driyorejo, Cangkir, Bambe, Mulung, Tenaru, Petiken, Sumput, Tanjungan, Banjaran, Karangandong, Mojosari Rejo, Wedoroanum, Gadung

Test Installation Process Throughput New

This testing process is carried out to determine and measure the performance of service time in terms of overall time in the ongoing process (Rozaqi et al., 2020) From the results of mapping and measuring this throughput efficiency test, it can be seen the level of comparison in the business processes that is running by determining recommendations for business process

improvements both in terms of models and results obtained in an effort to minimize the level of customer complaints on business processes and in terms of services provided to the organization.

Table 2
ASME Standard Process Mapping New (Existing) Installation

No.	Business Process Flows	Runtime (minutes)	Eksekutor
1.	Prospective customers come to the head office of PDAM Giri Tirta Gresik	40	Customer
2.	Prospective customers enter the counter to pick up the form	10	Customer
3.	Prospective customers fill out the form and include the latest KTP, KSK, UN, sale, and purchase certificate, 6000 stamps, cellphone number, and RT / RW information regarding the address/parcel for installing a new connection	15	Customer
4.	The counter records the data of the prospective customer form	5	Counter
5.	Prospective customers go home to ensure the connection of PDAM customers around the installation location	60	Customer
6.	The counter officer provides data on the results of prospective customers' recaps to the Service department	15	Counter
7.	The Services Department deposits data to the Planning Department	15	Service Section
8.	The Planning Department conducts a survey of the installation site	10080	Planning Section
9.	The Services Department awaits survey results	15	Service Section
10.	The Planning Department makes a report on the results of the site survey	35	Planning Section
11.	The Planning Department provides a report on the survey results to the Services department	15	Service Section
12.	The Services Department prints the list number of potential customers	10	Service Section
13.	The Services Department contacts prospective customers for payment confirmation	15	Service Section
14.	Prospective customers come to the head office of PDAM Giri Tirta Gresik and make payment to the counter	60	Customer
15.	The counter records customer payment data	25	Counter
16.	The counter prints and delivers payment receipts to customers	5	Counter
17.	The counter deposits the customer's payment data to the Service department	10	Service Section
18.	The Service Department deposits payment data to the Warehouse section	10	Bagian Pelayanan
19.	The Warehouse Department confirms and checks the stock of goods in the warehouse for the installation process	2880	Warehouse Parts
20.	If stock is not available, the Warehouse Department will receive additional inventory	720	Warehouse Parts
21.	If stock is available, the Planning Department performs a new installation process to the customer's location	60	Planning Section
22.	After the new installation process is complete, the Planning Department generates a new customer installation report	30	Planning Section
23.	The Planning Department deposits reports to the Services department	10	Service Section
24.	The Services department stores customer report data	5	Service Section
25.	The Service Department inputs new customer data	5	Service Section
	Number of Stages	7 13 0 4 1 0	
	Total Time	115 10335 0 3675 5 0	14130

Based on Table 2 of the ASME Standard Process Mapping for New Installation (Existing), it is found that there are 25 stages in the ongoing new installation process. The next step is to

calculate the overall service time performance from the results of the mapping of the new ASME standard installation process as follows:

$$\text{Throughput Efficiency} = \frac{\text{Waktu proses bukan tunda}}{\text{Total waktu dalam sistem}} \text{x} 100\%$$

$$= \frac{14130-3675}{14130} \text{x} 100\%$$

$$= \frac{10455}{14130} \times 100\%$$

$$= 73{,}99\%$$

The results of the throughput efficiency test obtained the results of mapping ASME standards in the new installation process, which was 73.99%. From the calculation formula, it is obtained from the non-delay process time divided by the total overall time in the system multiplied by 100%. The value 14130 represents the overall runtime running in the system in the new gan install process. While the value of 3675 is the amount of time in the delay process in the new installation process. So that a value of 10455 is obtained, which is the number of processes that do not experience delay time, which includes values in the operation process, transportation process, inspection process, storage process, and combined activity process or the result of a reduction of the total amount of time running in the system minus the amount of delay process time. As for the value of 14130, which is the overall processing time that runs and also includes the delay time. Based on the results of the calculation above, a throughput efficiency test was obtained in the new installation process at PDAM Giri Tirta Gresik of 73.99% of the running process and with 26.01% remaining time which was still not running well.

Business modeling results Process Modelling Notation (As Is)

At this stage, simulations and modeling will be carried out on business processes that run into BPMN notation to make it easier to determine a problem that arises and conduct analysis and evaluation of improvements in an effort to minimize the level of customer complaints in the new installation process running on PDAM Giri Tirta Gresik. The data used in supporting the preparation of this research process model was obtained from the results of interviews with respondents, the results of understanding technical documents in the organization, and the results of observations in the research conducted. Business process simulation is used in assisting understanding, analysis, and design of running business processes. As for Figure 2, the following is a simulation model into the Business Process Model and Notation (As Is) notation in the new installation process that is currently running. In addition, the following Figure 3 is the result of calculations and running simulations into the Business Process Model and Notation (As Is) notation in the new installation process.

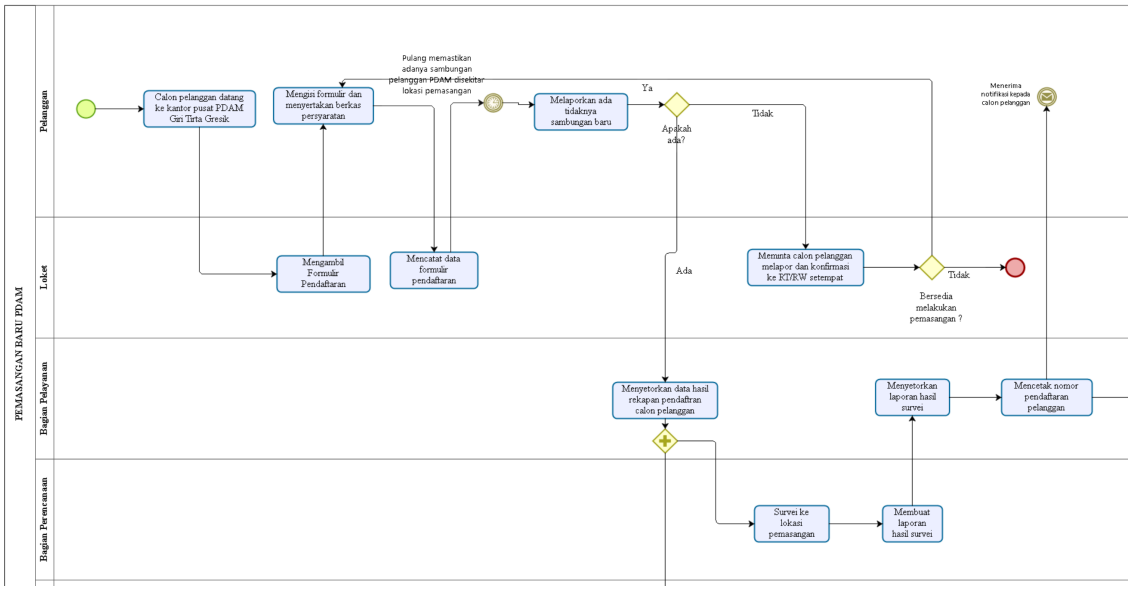

Figure 2
News installation BPMN model on running processe

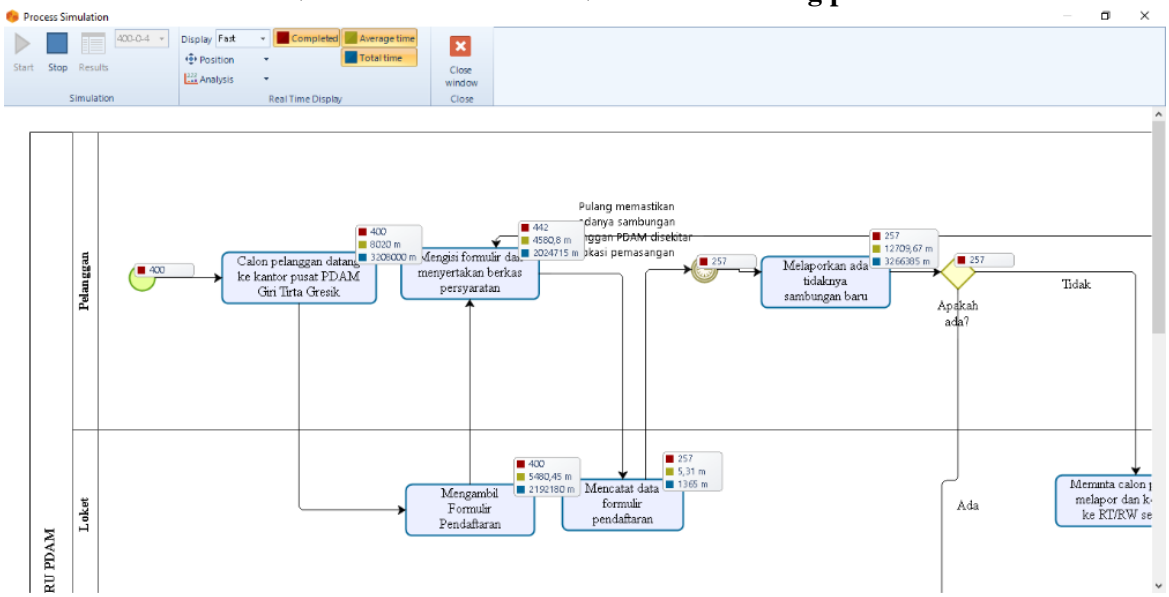

Figure 3
BPMN Running Simulation Model New Install on Running Process

In Figure 2, a simulation was carried out using the big modeler application. From the picture above, the time obtained from each activity is obtained from the results of interviews and observations. Then from Figure 3 above, it can be concluded that the estimated 400 processes can be completed, namely with the results of the simulation of the new installation business process that is currently running, carrying out the process takes at least 17 days 23 hours 50 minutes, a maximum of 26 days 16 hours 5 minutes, and an average of 22 days 16 hours 52 minutes 6 seconds for each person. In addition, the percentage of utilization of repair simulation results was also obtained with an estimated number of 400 customers at 75.07%, Counter with 4 people at 90.35%, Service Section with 1 person at 99.70%, Warehouse Section with 1 person at 72.49%, and Planning Section with 1 person of 70.87%.

Results of prioritization of relevant business processes

At this stage, analysis and identification of the priorities of ongoing business processes are carried out in the new installation process at PDAM Giri Tirta Gresik. Business processes that have been identified produce several problems that will be improved. In this case, it will select and re-sort a process or stage that is considered and considered to have weaknesses so that an alternative will be arranged to redesign a different process by making improvements to the business process, either by reducing the processing time, standardizing or automating the process, adding or reducing errors in a process and can also simplify the design a process at this stage, it will also be proposed to register a new installation process, namely with the appearance of the website application and develop it in an effort so that the business processes running on PDAM Giri Tirta Gresik can run optimally and achieve the goals of Business Process Reengineering. The following is an example of a website-based application that can be developed by PDAM Giri Tirta Gresik in assisting with the registration process for the new installation process:

Figure 4
New Installation Application Proposal

The following Table 3. regarding the prioritization of business processes, especially in the new installation business process at PDAM Giri Tirta Gresik. An alternative to this redesign is expected to be known and identified several customer complaints that arise in the running business process. Business processes that have been identified produce several problems that will be improved so that they are expected to minimize the level of customer complaints as can be seen in Table 3. Problems in business processes that run as follows:

Table 3
Alternative Priority Business Process New Installation

No.	Process Stages	Enhancement Alternatives	Information
1.	Prospective customers come to the head office of PDAM Giri Tirta Gresik	Automation	Customers enter the website to register for a new installation online
2.	Potential customers enter the counter to pick up the form	Automation	Customers do not need to go to the counter, because the

			registration process is carried out online
3.	Prospective customers fill out the form and include the latest KTP, KSK, UN, sale, and purchase certificate, 6000 stamps, cellphone number, and RT / RW information regarding the address/parcel for installing a new connection	Automation	No data collection form and physical requirements are required because the data collection process can be done online
4.	The counter records the data of the prospective customer form	Automation	Data logging can be done online
5.	Prospective customers go home to ensure the connection of PDAM customers around the installation location	Elimination	Processes that tend to consume too much time
6.	The counter officer provides data on the results of prospective customers' recaps to the Service department		
7.	The Services Department deposits data to the Planning Department		
8.	The Planning Department conducts a survey of the installation site		
9.	The Services Department awaits survey results	Elimination	Spending too long
10.	The Planning Department makes a report on the results of the site survey	Elimination	Too much process and takes a lot of time
11.	The Planning Department provides a report on the survey results to the Services department		
12.	The Services Department prints the list number of potential customers	Automation	Customers can print the registration number through the website
13.	The Services Department contacts prospective customers for payment confirmation		
14.	Prospective customers come to the head office of PDAM Giri Tirta Gresik and make payment to the counter	Automation	Payment for the new installation process can be made online without having to come to the registration location
15.	The counter records customer payment data	Automation	Payment recording and data collection can be done online
16.	The counter prints and delivers payment receipts to customers	Automation	Processes that take too much time and cost
17.	The customer went home and waited for the installation officer to come to the site	Elimination	A process that is too convoluted and takes quite a long time

18.	The counter deposits the customer's payment data to the Service department		
19.	The Services department deposits payment data to the Planning department		
20.	The Warehouse Department confirms and checks the stock of goods in the warehouse for the installation process		
21.	If the data is valid, the Planning Department performs a new installation process at the customer's location		
22.	After the new installation process is complete, the Planning Department generates a new customer installation report	Automation	Data collection and recap of customer new installation data is carried out online
23.	The Planning Department deposits reports to the Services department		
24.	The Services department stores customer report data		
25.	The Service Department inputs new customer data		

Table 4
Problems with Running Business Processes

Business Process of New Installation of PDAM Giri Tirta Gresik		
No.	Problems	Risk
1.	Prospective customers come to the head office of PDAM Giri Tirta Gresik	1. In the ongoing process, customers are required to come directly to PDAM Giri Tirta Gresik to perform and apply for a new installation. 2. In the ongoing process, it must be required to come a second time to PDAM Giri Tirta Gresik to process the payment. 3. Too many processes are inefficient and a lot of time-consuming. 4. Potential customers are often confused. 5. There are frequent queues of potential customers. 6. The process of submitting a new installation application is still running manually.
2.	Potential customers enter the counter to pick up the form	
3.	Prospective customers fill out the form and include the latest KTP, KSK, UN, sale, and purchase certificate, 6000 stamps, cellphone number, and RT / RW information regarding the address/parcel for installing a new connection	
4.	The counter records the data of the prospective customer form	
5.	Prospective customers go home to ensure the connection of PDAM customers around the installation location	
9.	The Services Department awaits survey results	
10.	The Planning Department makes a report on the results of the site survey	
12.	The Services Department prints the list number of potential customers	

14.	Prospective customers come to the head office of PDAM Giri Tirta Gresik and make payment to the counter
15.	The counter records customer payment data
16.	The counter prints and delivers payment receipts to customers
17.	The customer went home and waited for the installation officer to come to the site
22.	After the new installation process is complete, the Planning Department generates a new customer installation report

Business Process Modelling Notation (To Be) Modeling Results

After the design process related to the running business process, at this stage, the proposed business process will be remodeled by identifying several problems that arise. In this study, Bizagi Modeler was used as a tool to support simulations. There are several types of simulations in this study, including time analysis. Time analysis is obtained to calculate and obtain the average time duration in executing an instance on a running business process. In addition, at this stage, it is also possible to see the minimum and maximum time that is likely to occur in a process instance. At this simulation stage, it can be used from various configurations and in the long term, so as to reduce or minimize the possibility of failure in a process specification, eliminate obstacles that arise unexpectedly, prevent excessive use of company resources such as human resources, and optimize the work of the running system. As for Figure 5, the following is a simulation model into the Business Process Model and Notation (To Be) notation in the proposed new installation process. As for Figure 6, the following is the result of calculations and running simulations into the Business Process Model and Notation (To Be) notatio in the installation process of the new improved version.

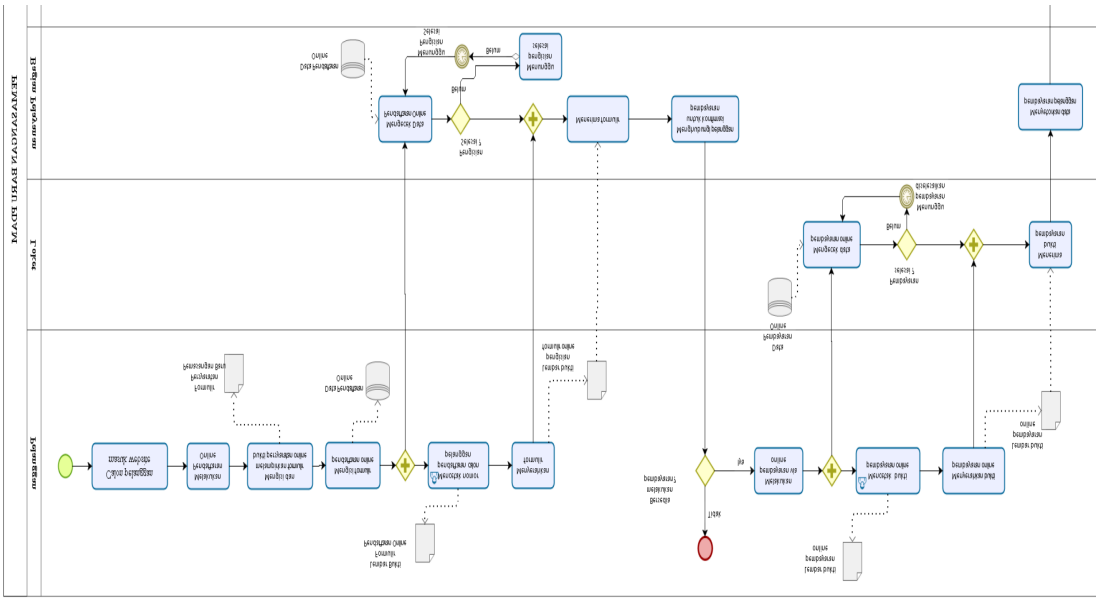

Figure 5
New Installation BPMN Model Repair Version

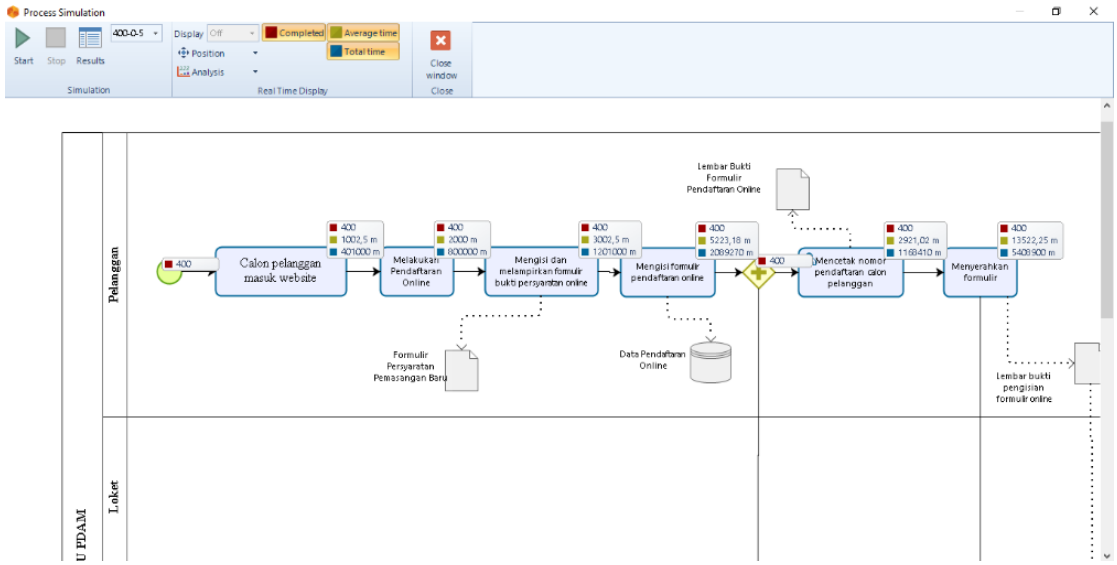

Figure 6
New Installation BPMN Running Simulation Model Improved Version

In Figure 5, an improved version simulation was carried out using the big modeler application. Based on the picture above, an estimate of the time of each activity is obtained from interviews and observations. Then from Figure 6 above, it can be concluded that an estimated 400 processes can be completed, namely with the results of simulating the new installation business process that is currently running, carrying out the process takes at least 3 days 14 hours 55 minutes, a maximum of 21 days 5 hours 15 minutes, and an average of 6 days 6 hours 8 minutes 12 seconds for each person. In addition, the percentage of utilization of repair simulation results was also obtained with an estimated number of 400 customers at 96.99%, Counter with 5 people at 83.50%, Service Section with 2 people at 90.72%, Warehouse Section with 1 person at 75.64%, and Planning Section with 1 person of 75.84%.

Test the Throughput efficiency of the new installation process (To Be)

At this stage, adjustments and improvements are made based on the results of the analysis of alternative business process priorities in the new installation process. After knowing the problems that arise in the new installation business process above, an experiment was carried out by redesigning the ongoing business process by making improvements and adjustments based on the current conditions which can be seen in Figure 7 below:

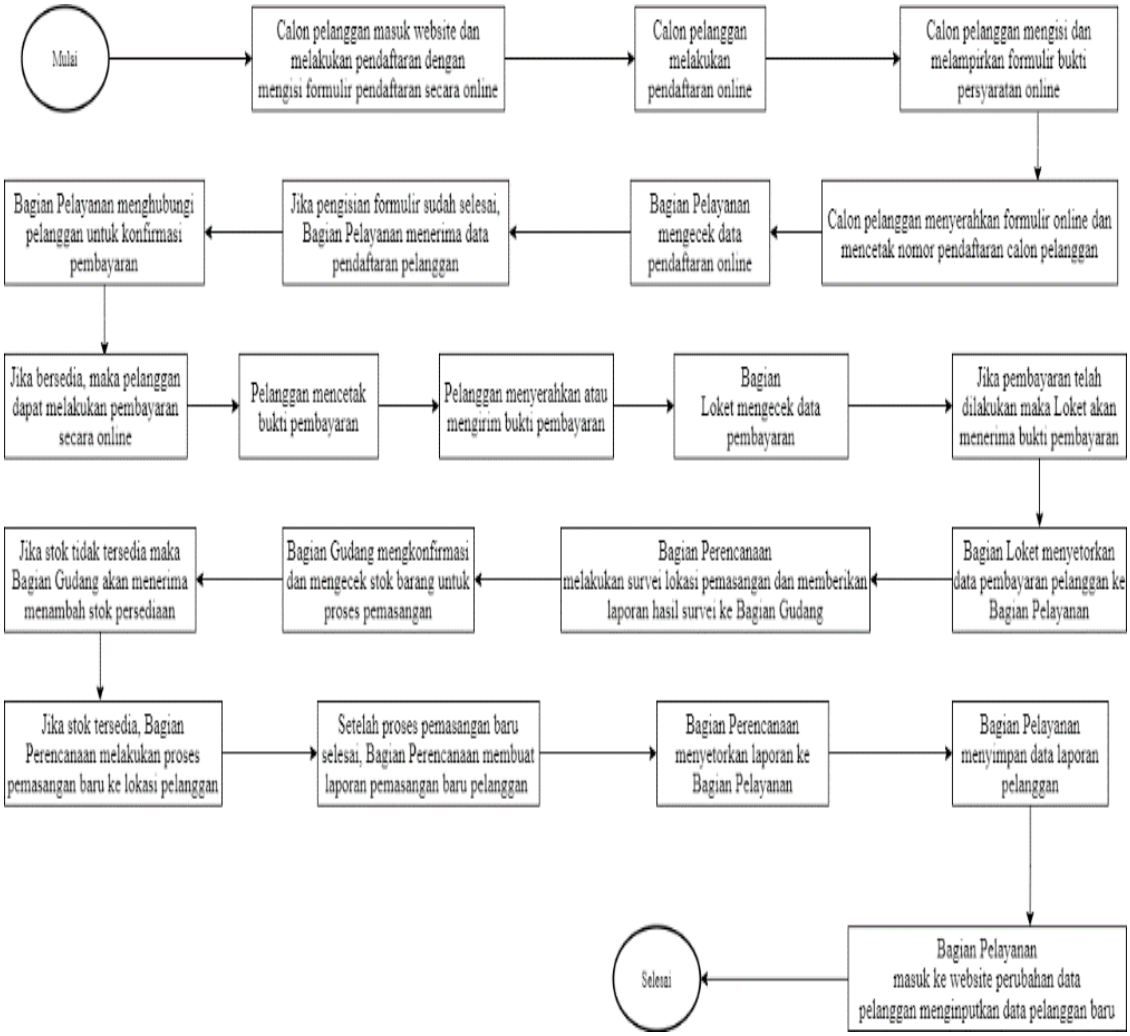

Figure 7
New Install Process Improvement Recommendation Flow

Based on Figure 7 of the New Installation Process Improvement Recommendation Flow, it is explained that the new installation recommendation process at PDAM Giri Tirta Gresik is carried out by automating a process that is still manual and takes a lot of time, namely prospective customers can register without having to come to the head office to do a new installation but can apply and register online. And in this process, improvements are also made to business processes that run by means of elimination, namely by eliminating a process that does not provide added value to the organization. In addition, in the improvement of the new installation business process, a throughput efficiency test will also be carried out again related to recommendations for improving the overall business process. In this case, a throughput efficiency test will be carried out again against the results of improvement recommendations based on the overall service time

Table 5
New Install ASME Standard Process Mapping (Recommendation Results)

No.	Business Process Flows	Runtime (minutes)	Eksekutor
1.	Prospective customers enter the website and register by filling out the online registration form	5	Customer
2.	Potential customers register online	5	Customer
3.	Prospective customers fill out and attach the online proof of requirements form	20	Customer
4.	Prospective customer prints registration number Prospect submits an online form	15	Customer
5.	The Service Department checks online registration data	60	Service Section
6.	If the form filling is complete, the Service Department receives customer registration data	15	Service Section
7.	The Services Department contacts the customer for payment confirmation	10	Service Section
8.	If you are willing, then customers can make payments online	10	Customer
9.	The customer prints proof of payment	5	Customer
10.	The customer submits or sends proof of payment	5	Customer
11.	The counter checks payment data	420	Counter
12.	If payment has been made, the counter will receive proof of payment	5	Counter
13.	The Counter Department deposits customer payment data to the Service Department	15	Service Section
14.	The Planning Department conducts a survey of the installation site, provides a report on the survey results to the Warehouse Section;	10095	Planning Section
15.	The Warehouse Department confirms and checks the stock of goods for the installation process	1440	Warehouse Parts
16.	If stock is not available, the Warehouse Department will receive additional inventory	720	Warehouse Parts
17.	If stock is available, the Planning Department performs a new installation process at the customer's location	60	Planning Section
18.	After the new installation process is complete, the Planning Department generates a new customer installation report	30	Planning Section
19.	The Planning Department deposits reports to the Services Department	10	Planning Section
20.	The Services department stores customer report data	5	Service Section
21.	The Service Department enters the website to change customer data and inputs new customer data	5	Service Section
	Number of Stages	3 16 0 1 1 0	
	Time Total	45 12185 0 720 5 0	12955

$$\text{Throughput Efficiency} = \frac{\text{Waktu proses bukan tunda}}{\text{Total waktu dalam sistem}} \times 100\%$$

$$= \frac{12955-720}{12955} \times 100\%$$

$$= \frac{12235}{12955} \times 100\%$$

= 94,44%

Table 5 of the ASME Standard Process Mapping **for New Installation (Recommendation Results) explains and describes the results of the repeated throughput efficiency test in the recommendation process for new installations in PDAM Giri Gresik with a fairly high percentage result of 94.44% with the remaining service time that is not running in the system** of 5.56%. From the calculation formula, it is obtained from the non-delay process time divided by the total overall time in the system multiplied by 100%. The value 12955 represents the overall runtime running in the system during the new installation process. While the value of 720 is the amount of time in the delay process in the new installation process. So that a value of 12235 is obtained, which is the amount of process time that does not experience delay time which includes values in the operation **process, transportation process, inspection process, storage process**, and combined activity process or the result of a reduction in the total amount of time running in the system reduced by the amount of delay process time. As for the value of 12955, which is the overall processing time that runs and also includes the delay time.

In the results of previous throughput **efficiency tests in** the new installation recommendation process, it gives a small percentage result in this case because, in the previous process, there were too many inefficient processes that required and took a long time (Rozaqi et al., 2020) So in this case, an alternative analysis of redesign refinements is carried out on business processes that run from processes that were originally complicated and do not provide added value to the organization will be eliminated and also carried out by automating the process so that it can help the process run faster and more efficiently (Rozaqi et al., 2020).

Evaluation results on existing business processes

At this stage, an evaluation process is carried out in the form of an evaluation related to improvements which will later produce input and result in customer satisfaction with the services provided as output in the organization in an effort to increase satisfaction and initiate customer complaints against the organization. This aims to show the measurement results in terms of service time by testing the efficiency of throughput and business process flows in accordance with standards in Business Process Modelling Notation (BPMN) notation and analyzing Business Process Reengineering (BPR) improvements) at a later stage. At this stage, a comparison of overall service time in the initial business process and recommended business processes is carried out (Rozaqi et al., 2020) The following is Table 6 Comparison of New Install Business Process Throughput Efficiency which is the result of a comparison of throughput efficiency tests between the initial business process and recommended business processes on new installations:

Table 6
Comparison of New Install Business Process Throughput Efficiency

New Installation Process			
Initial Throughput efficiency	Throughput Efficiency Recommendations	Initial Process Speed	Process Speed Recommendations
73,99%	94,44%	14130 minutes	12955 minutes

Based on the explanation in Table 6 Comparison of Throughput Efficiency of the New Install Business Process is the result of a throughput efficiency test before and after improvements were made to the new installation process, namely with an initial throughput efficiency percentage of 73.99% and a significant increase in the percentage of throughput efficiency 94.44% recommendation. In addition, the total process speed time before and after improvements were made which experienced time acceleration. With the result of the initial process speed of 14,130 minutes and with the result of the recommendation process speed of 12,955 minutes. Table 7 Comparison of BPMN As Is Time Simulation And To Be The New Installation Process is the result of time process simulation into Business Process Modelling Notation (As Is) and (To Be) notation in the new installation process.

Table 7
Comparison of BPMN Time Simulation As Is And To Be New Installation Process

New Installation Process Simulation		
Time	Current Business Processes	Proposed Business Process
Minimum Time	17 days 23 hours 50 minutes	5 days 23 hours 35 minutes
Maximum Time	26 days 16 hours 5 minutes	24 days 2 hours 20 minutes
Average Time	22 days 16 hours 52 minutes 6 seconds	10 days 20 hours 3 minutes 37 seconds

Based on the results of Table 7 Comparison of BPMN As Is And To Be Time Simulation of the New Installation Process, the results of the simulation of the current process time that is currently running in the new installation process require a minimum estimated time of 17 days 23 hours 50 minutes, with an estimated maximum time of 26 days 16 hours 5 minutes, and with an estimated average time of 22 days 16 hours 52 minutes 6 seconds per person. In addition, the results of the simulation of the proposal process time for a new installation are needed with an estimated minimum time of 5 days 23 hours 35 minutes, with an estimated maximum time of 24 days 2 hours 20 minutes, and with an estimated average time of 10 days 20 hours 3 minutes 37 seconds per person.

Table 8
Comparison of BPMN Resource Simulation As Is And To Be New Installation Process

No	Resource	Initial Number of Resources	Number of Repair Resources	Initial Utilization Percentage	Percentage Utilization Improvements
1	Customer	400	400	75,07 %	96,99 %
2	Ticket window	4	5	90,35 %	83,50 %
3	Service Section	1	2	99,70 %	90,72 %
4	Warehouse Parts	1	1	72,49 %	75,64 %
5	Planning Section	1	1	70,87 %	75,84 %

Based on the results of the presentation in Table 8 Comparison of BPMN Resource Simulation As Is And To Be The New Installation Process, the comparison results of the simulation on resource utilization into Business Process Modelling Notation (As Is) and (To Be) notations are obtained.

From the simulation results, the percentage results for customers from the initial number of resources of 400 and repair resources of 400 obtained the initial utilization percentage of 75.07% with a percentage of repair utilization of 96.99%. In the Counter Section, from the number of initial resources of 4 and repair resources of 5, the initial utilization percentage of 90.35% was obtained with a percentage of repair utilization of 83.50%. In the Service Section, from the initial number of resources of 1 and repair resources of 2, the initial utilization percentage of 99.70% was obtained with a percentage of repair utilization of 90.72 %. In the Planning Section, from the initial number of resources of 1 and repair resources of 1, the initial utilization percentage of 70.87% was obtained with a percentage of repair utilization of 75.84%. Then in the Warehouse Section, from the initial number f resources of 1 and repair resources of 1, the initial utilization percentage of 72.49% was obtained with a percentage of repair utilization of 75.64%.

Output results and recommendations on existing business processes

The last stage, is a presentation of the results of the comparison of business processes before and after the Business Process Reengineering and provides results in the form of final

recommendations to the organization regarding the percentage of achievement in minimizing customer complaints against an organization. The following is Table 7 Results of Business Process Reengineering Business Process Installation will:

Table 9
Results of Business Process Reengineering New Installation Business Process

Results of Business Process Reengineering New Installation Business Process	
Throughput Efficiency Test Percentage	Total runtime
20,45%	1175 minutes

Based on the results of the presentation of Table 9 Results of Business Process Reengineering New Installation Business Process, a significant increase can be obtained from business process improvements, especially in the new installation business process, namely with an increase in the percentage of throughput efficiency of 20.45% of the overall efficiency of the running process and with a decrease in a total time of 1175 minutes from the total amount of time required previously. As for Figure 8, the following is the result of the BPMN As Is time process simulation in the new installation as follows:

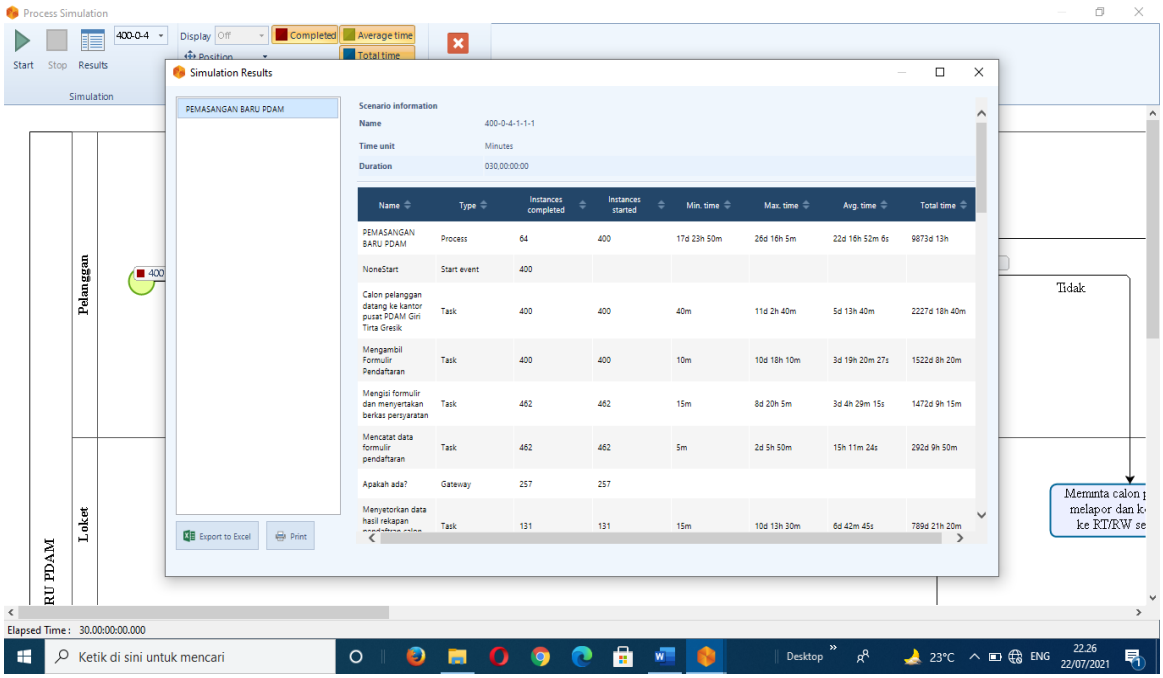

Figure 8
BPMN As Is Time Process Simulation Results

Based on Figure 8 BPMN As Is Time Process Simulation Results in the new ongoing installation process takes time with an estimate of 400 processes that can be completed in at least 17 days 23 hours 50 minutes, a maximum of 26 days 16 hours 5 minutes, and an average of 22 days 16 hours 52 minutes 6 seconds for each person. In addition, in Figure 9 the following are the results of the BPMN To Be time process simulation on the new installation as follows:

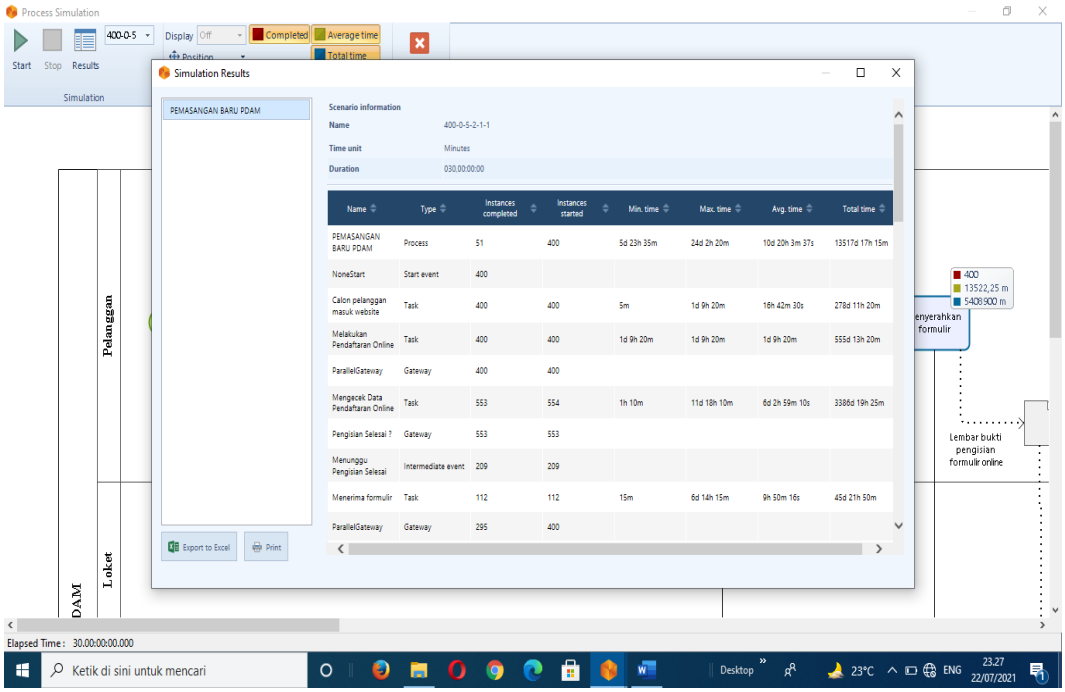

Figure 9
BPMN To Be Time Process Simulation Results

Based on Figure 8 of the BPMN To Be Time Process Simulation Results on the recommendation that the new installation process takes time with an estimate of 400 processes that can be completed at least 3 days 14 hours 55 minutes, a maximum of 21 days 5 hours 15 minutes, and an average of 6 days 6 hours 8 minutes 12 seconds for each person. So that Table 10 of the New Installation BPMN Time Simulation Results is the output of the BPMN Time Process simulation obtained in the new installation process:

Table 10
Results of BPMN Time Simulation for New Installation

Results of BPMN Time Simulation for New Installation		
Minimum Time	Maximum Time	Average Time
12 days 50 minutes	2 days 13 hours 45 minutes	11 days 20 hours 48 minutes 29 seconds

Based on the simulation results presented in Table 10 of the BPMN New Installation Time Simulation Results**, a** significant time interval was obtained in an effort to minimize customer complaints after **Business** Process Reengineering **was carried out in simulating between the current time and the recommended time needed in the new installation process, namely with a minimum interval difference of** 12 days 50 minutes, a maximum time of 2 days 13 hours 45 minutes, and with an average time difference obtained of 11 days 20 hours 48 minutes 29 seconds. With the simulation of improvements in the running time, it is expected to reduce the estimated time wasted and activities or processes that have no added value for the organization so that an organization can provide services effectively and efficiently, especially in minimizing customer

complaints related to services provided by an organization. As for Figure 9**, the** following is the result of the simulation of BPMN As Is resource utilization in the new installation follows:

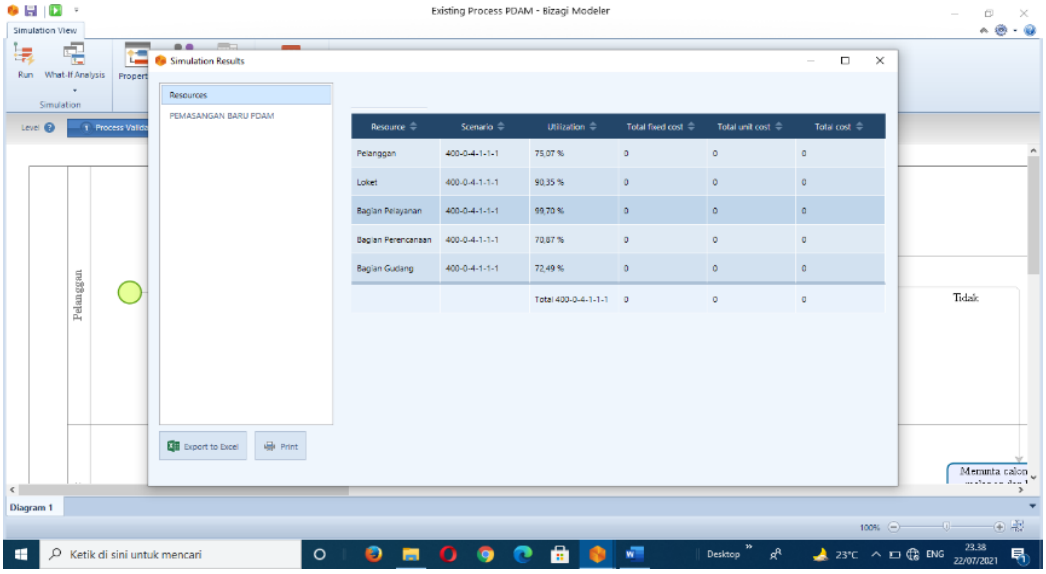

Figure 10
BPMN Resource Utilization Simulation Results As Is

Based on the presentation in Figure 9 of the BPMN As Is Utilization Resource Simulation Results, the results were obtained from the estimated number of 400 customers of 75.07%, Counter with 4 people of 90.35%, Service Section with 1 person of 99.70%, Warehouse Section with 1 person of 72.49%, and Planning Section with 1 person of 70.87%. In addition, in Figure 10 the following is also the result of simulating the utilization of BPMN To Be resources in the new installation as follows:

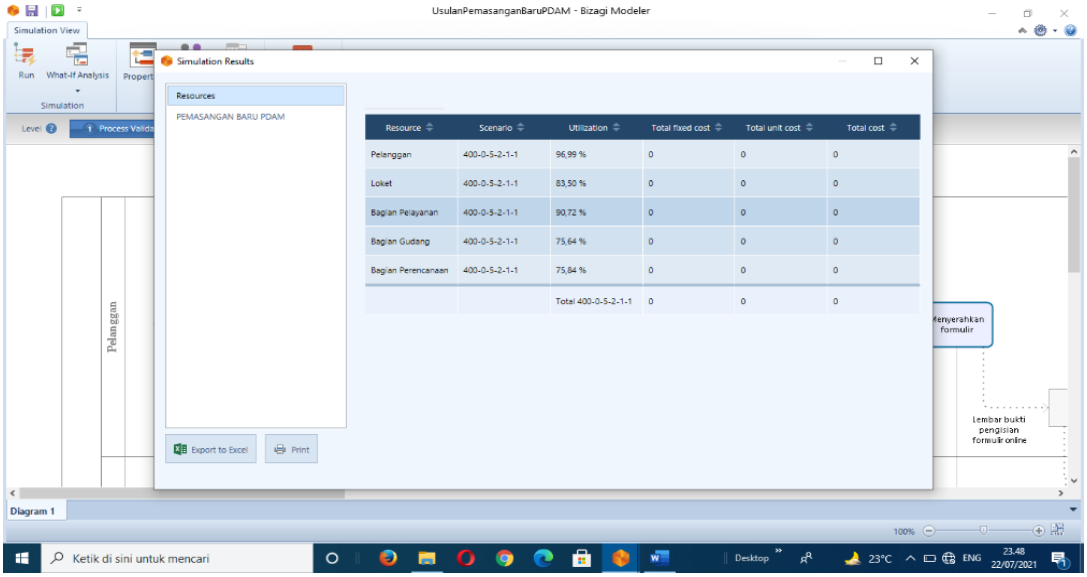

Figure 11
BPMN To Be Resource Utilization Simulation Results

Based on the presentation in Figure 10 of the BPMN To Be Resource Utilization Simulation Results, recommendations were obtained from the estimated number of 400 customers at 96.99%, Counters with 5 people at 83.50%, Service Section with 2 people at 90.72%, Warehouse Section with 1 person of 75.64%, and Planning Section with 1 person of 75.84%. So that the results of

resource utilization are obtained based on Table 11 BPMN New Install Resource Utilization Percentage Results are the output results of simulating Utilization Resources into Business Process Modeling Notation notation.

Table 11
Results of BPMN Resource Utilization Percentage for New Installs

Results of BPMN Resource Utilization Percentage for New Installs				
Customer	Ticket window	Service Section	Warehouse Parts	Planning Section
21,92%	6,85%	8,98%	3,15%	4,97%

Table 11 of the Results of the Percentage of BPMN Resource Utilization for New Installations, is the result of the percentage of utilization obtained, namely with the percentage of customers who increased by 21.92%, in this case, the estimated customers served without a pause in queuing time experienced a very significant increase. Meanwhile, the resources of the Counter Section and the Service Section in this case have decreased the percentage of time utilization with the addition of resources with the aim that resources needed do not work too hard.

CONCLUSION

Modeling and simulation of new installation business processes according to standards into BPMN notation in this study using time process and resource utilization that affect the level of customer complaints against the services provided by an organization. Based on the results of a comparison of the simulation of the current business process and the proposed business process, it shows that business process improvement runs well and can speed up the process time. The new installation business process with a minimum time decreased by 12 days 50 minutes, a maximum time of 2 days 13 hours 45 minutes, and an average time of 11 days 20 hours 48 minutes 29 seconds. In addition, the implementation of Business Process Reengineering in new installations with automation or elimination by changing a manual process and eliminating a process that has no added value for an organization is considered capable of changing old business processes to new business processes so that the organization can reduce an activity or business process that takes a lot of wasted time So that business processes can run optimally and efficiently, especially to minimize customer complaints in order to increase customer satisfaction.

Based on the results of data collection and research conducted previously and the points that have been described in the conclusions above, suggestions can be given for further research as follows: The influence of technology has brought a large and significant impact on organizations or public service agencies in achieving a goal to be achieved. This is then used by organizations to compete in providing maximum service. The quality of service felt by consumers or customers will greatly determine the loyalty and satisfaction of consumers and customers to the organization. Service quality has become a mandatory aspect that must be implemented or carried out by an organization in order to survive and gain the trust of consumers and customers. Thus, services or business processes can be answered by implementing Business Process Reengineering and alternative redesigns that can minimize customer complaints. Basically, there are still some shortcomings in this study, so further research is expected to improve existing business processes. In the conceptual aspect, this study focuses on new installations in terms of service performance percentage by conducting throughput efficiency tests and quantitative simulations on time process and resource utilization. So there is a need for similar research that focuses on other aspects such as water distribution, water bill payments, water treatment processes, and subscription termination processes in terms of cost, time process, resource utilization, and so on.

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