Research Article

Application of the Waiting Line Method for Evaluation of the IAIN Batusangkar Information Technology Helpdesk Information System

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Abstract : Information Technology and Database (TIPD) IAIN Batusangkar is a unit engaged in the field of IT services, namely software and network maintenance software application services so that students / lecturers / units have to go to the TIPD office and fill out a complaint form after which repairs are made by officers or staff TIPD, because the procedures and services provided took a long time so that the TIPD IT services at IAIN Batusangkar had not been able to provide maximum service. This study aims to produce a system that can facilitate TIPD IT services by using a helpdesk information system with the waiting line method. This type of research is the collection of library research data through field research (Field Research), library research, laboratory research, system analysis, application design and application testing. Data collection techniques in this study were using interviews and collecting documents. The results showed the helpdesk application that was built to provide convenience to TIPD IT services and can improve the performance of TIPD officers. Each service with the waiting line method, the technician service facility level has a busy 37% level from the previous 61%, the expected time for each customer arrival to wait on the Waiting Line is 0.21 minutes from the previous one, 1.8 minutes, and time Expected by each customer arrival while in the system or waiting in service is 3.6 minutes from the previous 7.2 minutes, with this it can be said that the helpdesk information system application can provide maximum service.

Keywords: Systems, Information, Helpdesk, Waiting Line.

1. INTRODUCTION

The development of technology and information systems cannot be separated, because they both need and support each other. With technology, it can design or design an information system, which makes work easier and provides many benefits for those who use it, namely being able to handle the work process quickly and precisely, so as to minimize time in data processing, storage and provision in providing information for those who need it. [1]. With the rapid development of this information system, users will always want to get an information system that will facilitate their work, one example is a service information system or helpdesk in a company or agency.

Helpdesk has a very important role in ensuring the availability and quality of information technology (IT) services in an organization. The Helpdesk is the IT department that the user is first contacted when they have questions or problems related to IT. Helpdesk is the center point of an organization that helps handle customer or user needs related to questions, services, technical support, or complaints against certain products and services by utilizing information systems to facilitate tracking of resolution actions coordinated by a team. A good helpdesk also functions to record and classify problems that occur and provide solutions to problems, so that they can be used and become knowledge assets for companies / agencies. Helpdesk should be assisted by certain software to facilitate data recap, activity monitoring, and reporting. The software must be able to categorize problems, store knowledge of the solutions obtained, and prioritize workmanship [2].

Helpdesk information systems currently have a lot of research using helpdesk information systems such as, "Designing a Helpdesk Information System Using the ITIL V3 Framework", "IT-Helpdesk Information Systems at Web-Based Yogyakarta Amikom University", in the above research there are still obstacles such as the user processes a complaint after which the user waits for news from the officer, here the user cannot see the progress of the repair process, besides that the shortcomings of the above research are there is no queue system, so technicians are difficult to make decisions when making repairs, technicians do not know which complaints which must be done earlier, for that in the heldesk information system it is necessary to use a queuing method or a waiting line [1] [2], In addition, the helpdesk information system using the waiting line method will measure the level of service facilities in order to obtain maximum service [1].

According to Jaz Heizer and Barry Render (2006) the waiting line method is one of the methods used in solving problems in decision making such as staff selection, queuing programs from computer systems, making staff schedules, and others. Waiting line method is very useful for analyzing queue length form, average service time, average waiting time [3] [4]. With the help of calculating the waiting line method, it will produce information about the level of service intensity in the queue which can be taken into consideration for the development and quality planning and service of a service company and it also occurs in Information Technology and IAIN Batusangkar Database [5].

Information Technology and Database (TIPD) IAIN Batusangkar is a unit engaged in IT services which functions as an information technology center and IAIN Batusangkar database, develops information technology

systems and IAIN Batusangkar database, maintains and manages information technology and databases as well as presenting information quickly and accurately and managing and developing management information systems, network and application maintenance, database management, development of other technologies and cooperation with information technology parties. In providing services to the needs of information technology and databases at IAIN Batusangkar still have problems related to IT services which so far are about ecampus services, networks, computer and email maintenance, services from complaints from e-campus problems that accommodate IAIN Batusangkar's IT service activities [6].

There are obstacles that occur in the TIPD IT service from but in the service of IT problems that occur at this time are students or lecturers or other units going to the TIPD unit or via telephone, after reporting, they are asked to fill out a complaint form for problems that will be reported, after That has just been done by TIPD officers / staff, with the current flow of the system being considered inefficient and ineffective because those who are far from the TIPD unit have to come to TIPD to report any IT problems that are not effective in terms of cost and energy or even passing through. via telephone there is no clarity in the repair process, and to make a report from the complaint data the officer collects all the complaint data form data and then it is created in Microsoft Excel software and this often occurs because the data is lost due to the accumulation of a lot of forms then there is often a request which who previously reported it did not exist p it was explained that students / lecturers / other units had reported an IT problem but the officers worked on other improvements only afterwards they put in place the IT problems of students / lecturers / other units earlier, as a result students / lecturers / other units who reported earlier were not satisfied with IT services at TIPD, therefore we need a service information system that will facilitate services in TIPD to overcome the problems mentioned above [7].

Based on problems regarding IT services in TIPD for lecturers, staff and students who are still waiting for sufficient time and there is no information about IT services such as software and network maintenance software applications carried out by the TIPD team, this research is how to design IT service helpdesk at TIPD IAIN. Batusangkar with a waiting line method which can help facilitate and control IT services at TIPD IAIN Batusangkar [8].

As for the research objective is to design an IT service helpdesk application so that it can see the level of service intensity and service processes using the waiting line method so that the application can see how many services are available from several types of services, the number of waiting, the average waiting so that the IT service application is able to facilitate services for lecturers, students and employees of IAIN Batusangkar [9].

2. METHODS

The research method used in the writing of this thesis is as follows:

a. Field Research is data obtained in research in this field to see the actual reality of the problem being studied in the following ways: (a). Observation; The technique of collecting data is by conducting research and direct observation to the TIPD office. (B) Interview, namely the technique of collecting data by holding direct questions and answers with TIPD staff;
b. Library Research is the collection of data by studying various literatures, books, research results of the same type and other media related to research issues and themes;
c. Laboratory Research (Research Labor) This research was conducted to practice direct analysis and making programs that are useful for developing new systems, which is meant by using a computer as a tool in the preparation of this research.

The design of the Information Technology and Database Helpdesk application (TIPD with the waiting line method used on the web. The application used is a codeigniter framework using the MySQL database, the purpose of this application is to simplify the service process at TIPD, such as maintenance services for computers, networks, etc. And by using the waiting line method, this application can see how much the intensity of the service is by using the helpdesk application.

In application testing, in testing the helpdesk application using POM for Windows software, this application can see the level of service intensity, the number of customer arrivals, the average number of customer arrivals, the number waiting in the waiting line, and the average number of customers waiting in the waiting line.

3. RESULT AND DISCUSSION

3.1. Current System Analysis

Analysis of the system currently running on the TIPD IT service information system, aims to find out more clearly and in detail how the system works and the problems contained in the system so that it can be used as a new system to be computerized.

3.2. Current System Flow

Analysis of the ongoing system is a guideline for designing a new system, because by analyzing the current system it can be seen the weaknesses of the old system and the advantages of the new system. the old system will be used as a comparison against the new system that will be implemented. System analysis aims to find solutions to problems faced in the system so that the same problem does not occur again in the future.

The old information system flow:

1. Students or lecturers or units go to TIPD to report any IT problems and then fill out the complaint form
2. Students or lecturers or units provide a complaint form to the TIPD staff
3. TIPD officers check IT problems reported by students or lecturers or units
4. Students or lecturers or units waiting for the improvement of the reported IT problem
5. After the repair is complete, the TIPD officer provides information or informs the student or lecturer or unit that the repair has been completed
6. Data from the complaint form is recapitulated and then made a monthly report and given to the TIPD leader

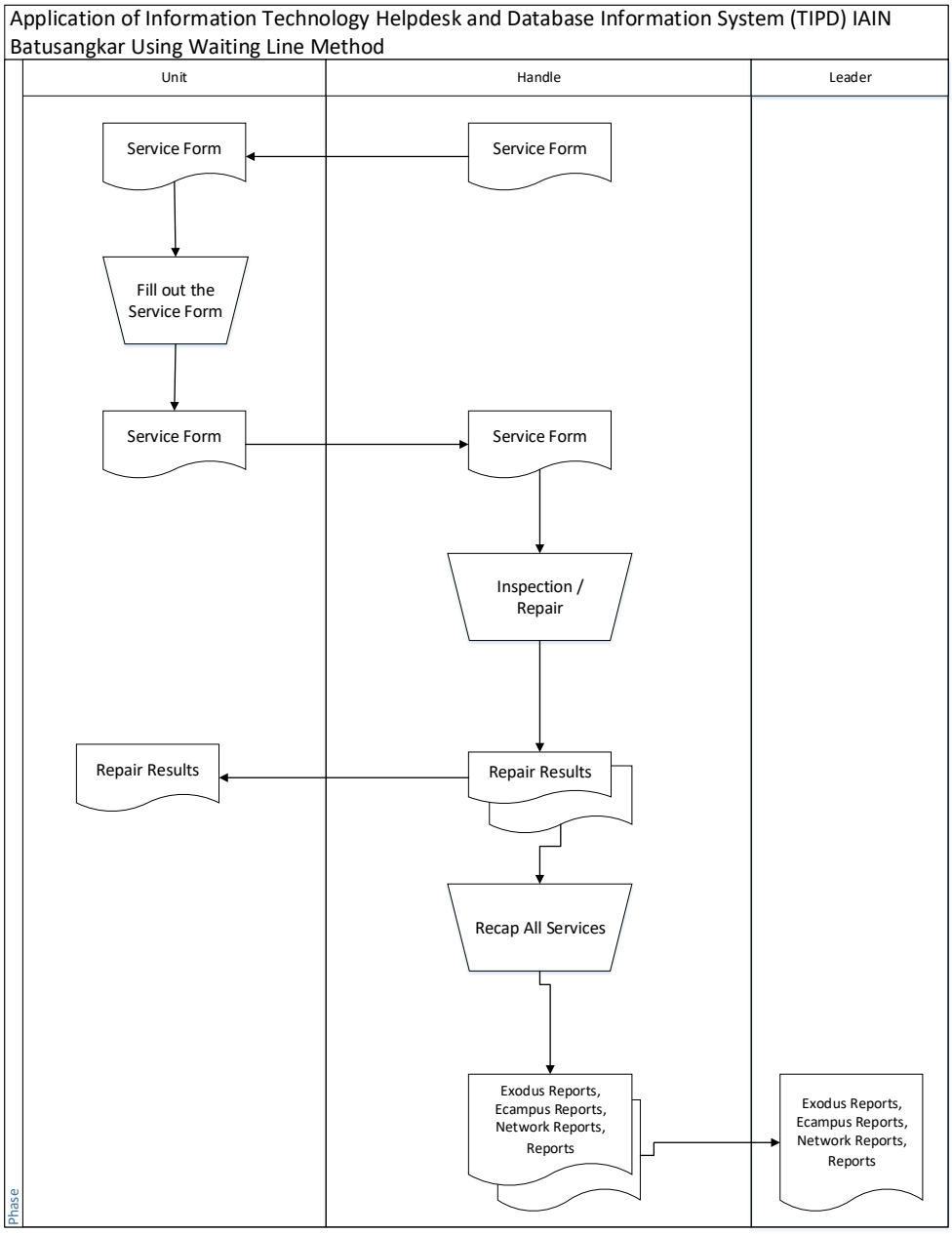

Figure 1. ASI currently running IT services at TIPD IAIN Batusangkar
Source: Information system flow of IT disruption services at TIPD IAIN Batusangkar

3.3. Evaluate the Running System

System evaluation is carried out to determine problems that occur in the old system as a basis for designing the new system. The existing system can be said to be running well, but there are still deficiencies in IT services at TIPD, including:

a. The service process is still manual by registering to the TIPD and providing information that there has been an IT problem and filling out a complaint form.
b. Storage is still in excel format and service archives, so the data obtained is not guaranteed its security.

3.4. System Design

System design is a system development plan in the form of a design to make it easier for users to see the designs that have been made. steps to design by making usecase diagrams, activity diagrams, and class diagrams. The information system flow image above is a document flow on business investment. The flow of Information Systems above is a regulation that has been established by the Information Technology and IAIN Batusangkar Database, which every student or lecturer or unit below must follow the document flow system. In the Information System Flow above, students or lecturers who want to report IT problems must go to TIPD and data processing of all complaints is still done by making it in Microsoft Excel. The author will try to design a flow of information systems that process data and service complaints using certain programs. As shown in Figure 2 below:

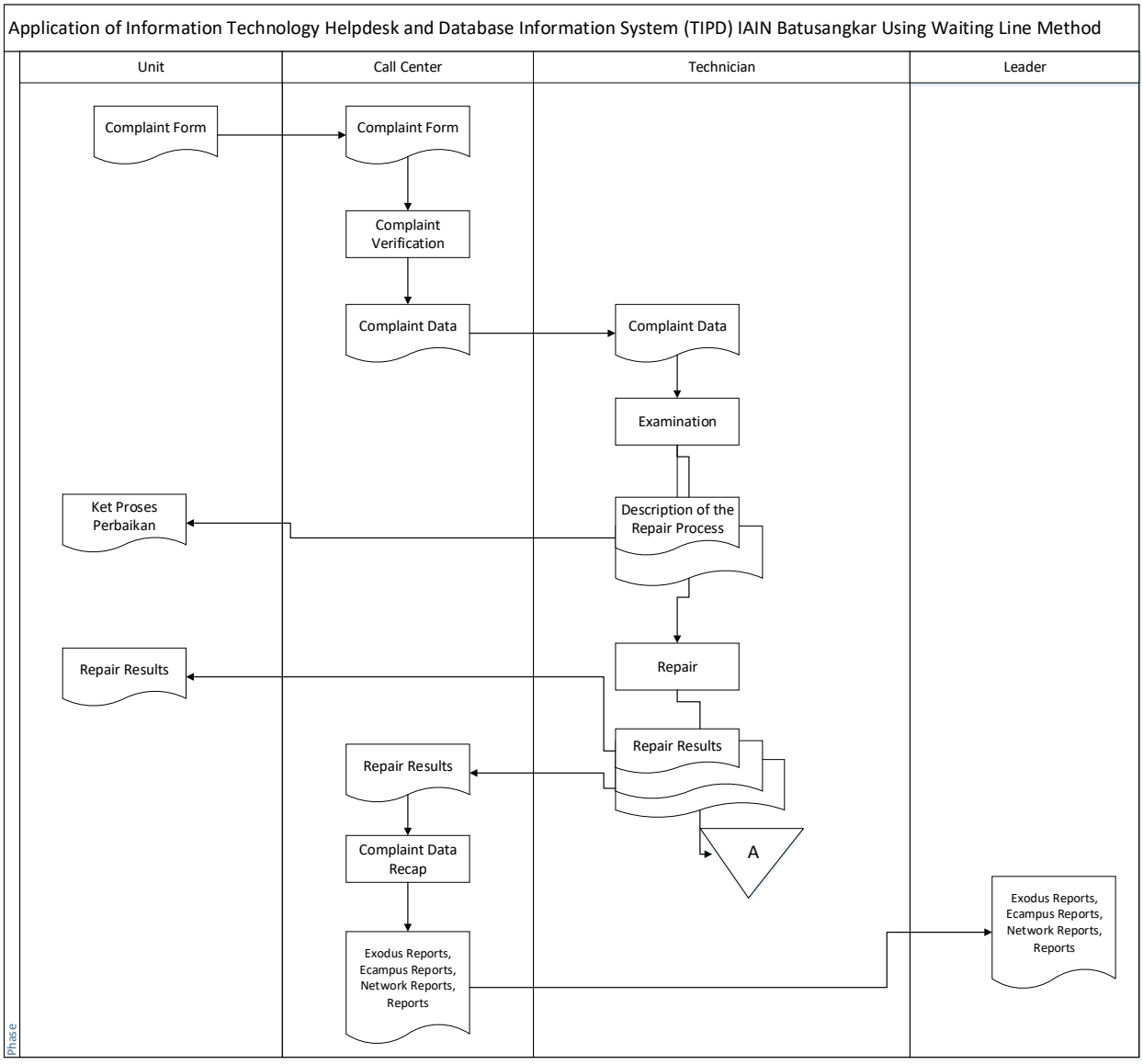

Figure 2. The flow of the new TIPD IT service information system

Context diagram is a design tool globally that shows the system in general and the parts of the sub-systems involved in the system as a whole, where in the linkages and interactions between sub-systems. In the context diagram of the incoming mail processing information system consists of four entities, namely: Users, Staff, Leaders. The following context diagram is a flow of data from entity to entity. Incoming mail report diagram context can be seen in the following figure:

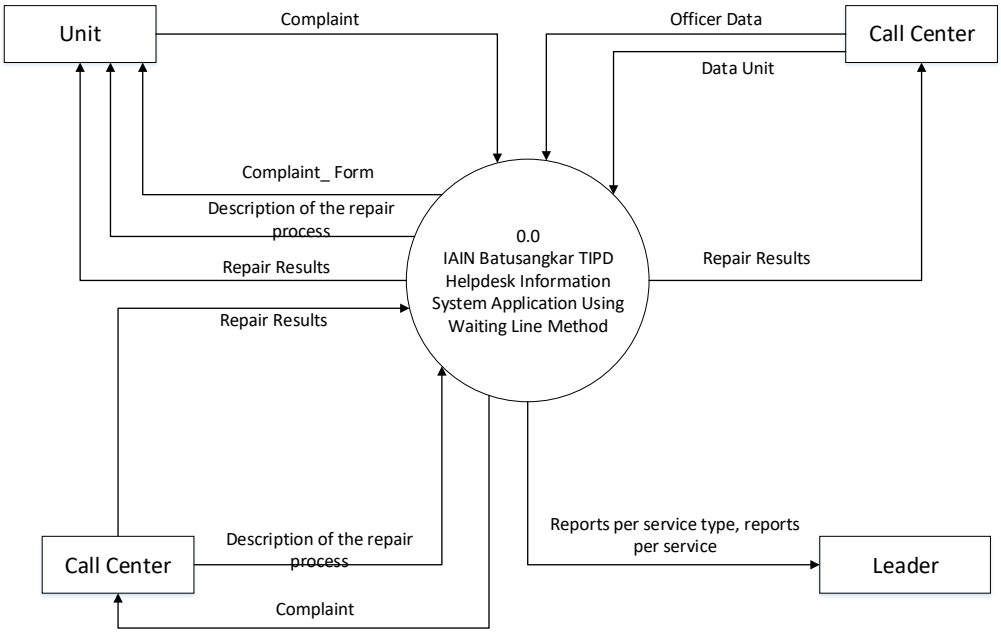

Figure 3. context diagram

Data Flow Diagrams (DFD) are a graphical documentation tool that uses small numbers of symbols to describe how data flows, ending relationships in the process. The Data Flow Helpdesk Diagram above can be seen in the following Figure:

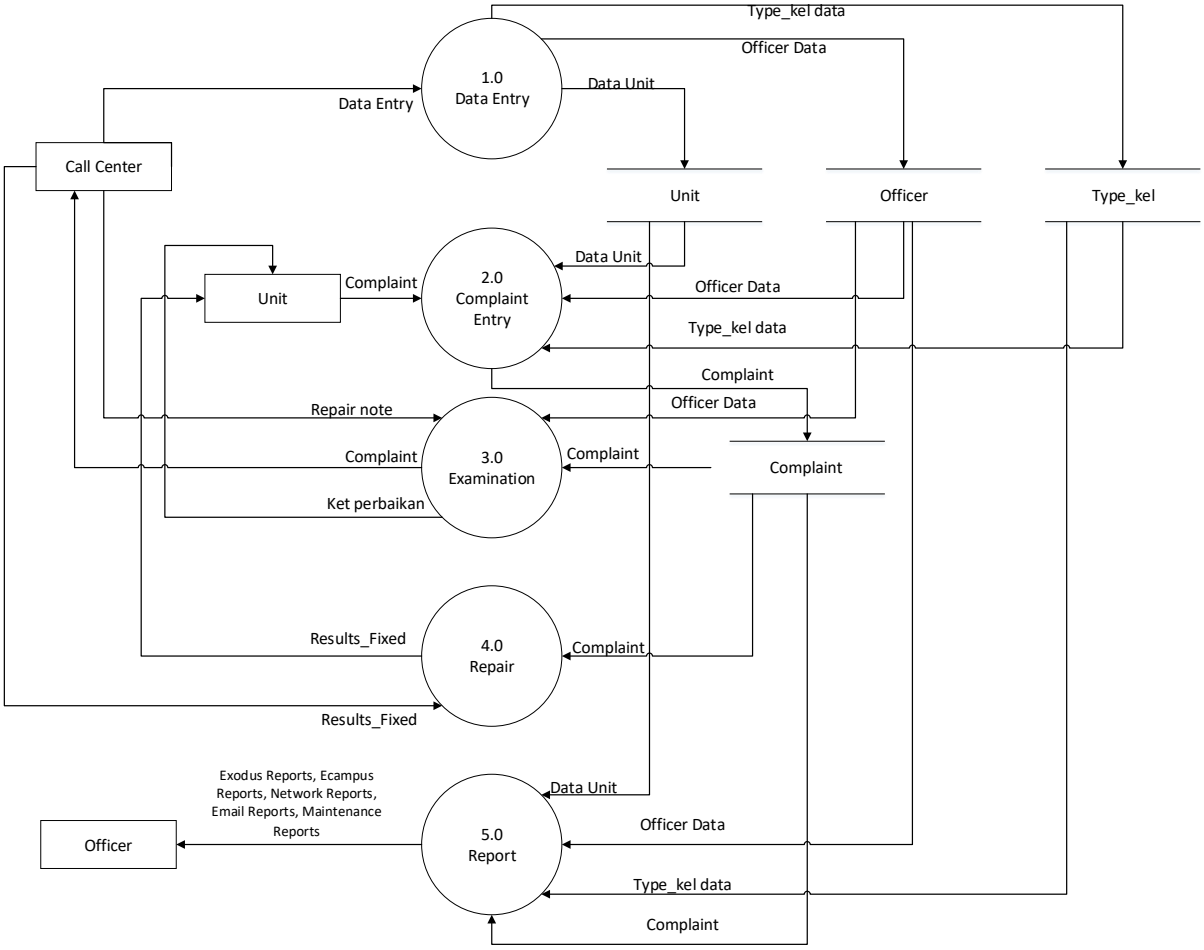

Figure 4. Data Flow Diagram

Entity relationship diagram (ERD) is a translation relationship that contains the components of the entity set and the set of relations equipped with attributes that connect the entities to use. Key Field (Primary Key Attribute) of each entity. The form of the Entity Relationship Diagram is as follows:

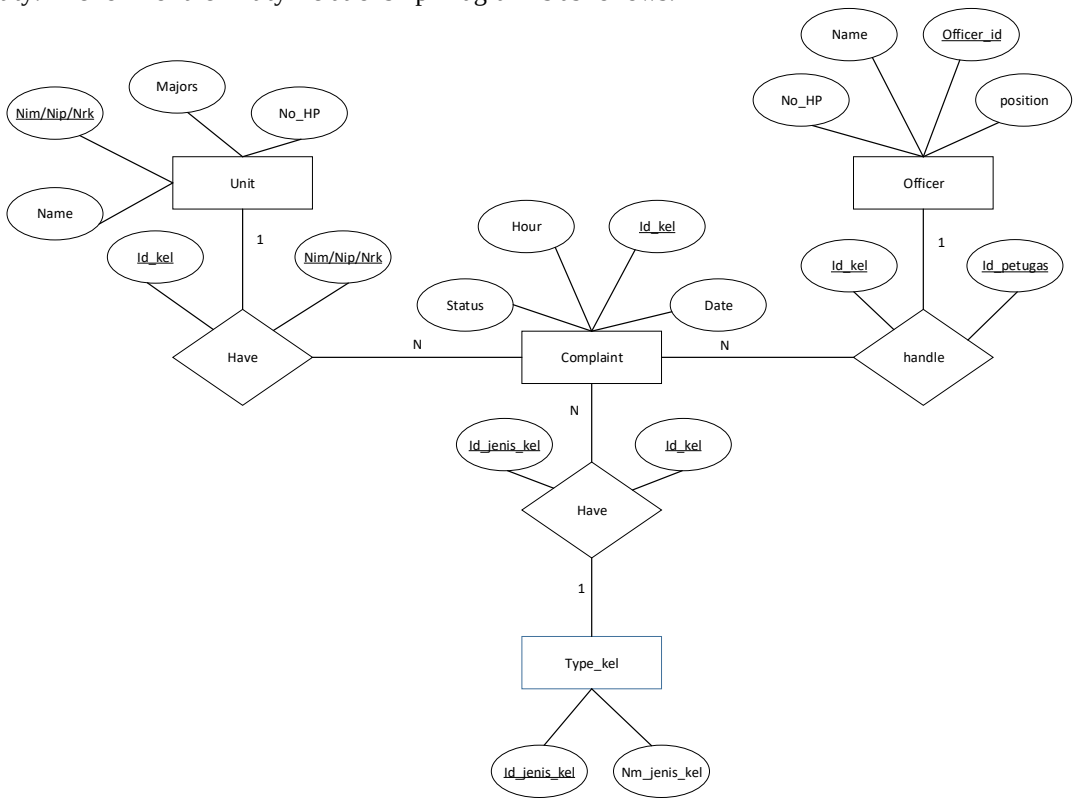

Figure 5. Entity Relationship Diagram

3.5. Application of the Waiting Line Method

TIPD IAIN Batusangkar currently has 1 (one) call center and 3 technicians who function in providing services for IT problems at IAIN Batusangkar. Where the arrival rate reports an average of 20 customers per month. Each technician on average can serve 11 reporters per month. The average service time for each technician is 8 hours. Where from these assumptions it is known that the average number of customer arrivals (λ) is λ = 20. The average number of complainants can be served (μ) is μ = 11. The number of service facilities or servers (s) is s = 3. The queuing system model used is (M / M / s) with the following description:

a. Service facility intensity level (P)
b. The number of arriving customers who are expected to wait on the Waiting Line (Lq)
c. The average number of expected customer arrivals in the system (L)
d. Time expected by each customer arrival to wait on the Waiting Line (Wq)
e. Time expected by each customer arrival while in the system or waiting in service (W)

To test the accuracy, the researchers entered the results of the analysis into the POM software for Windows version 2.0 using the Waiting Line method and the Multiple Channel Model (M / M / s) queuing system model, as follows:

Waiting Lines Results

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Parameter	Value	Parameter	Value	Minutes	Seconds
M/M/s		Average server utilization	,61		
Arrival rate(lambda)	20	Average number in the queue(Lq)	,56		
Service rate(mu)	11	Average number in the system(Ls)	2,38		
Number of servers	3	Average time in the queue(Wq)	,03	1,67	100,4
		Average time in the system(Ws)	,12	7,13	427,67

Figure 6. Waiting Line Method

From these results, it can be described as follows:

a. Based on the intensity level of the cashier service facility (P) is 0.61, which means that the technician has a busy level of serving the reporter for 61% of the time. This figure shows that Technicians will be busy serving reporters for 61% of the time. Meanwhile, 39% of the idle time will be used by technicians to rest, and so on.
b. The number of customer arrivals who are expected to wait on the Waiting Line (Lq) is 0.56 customers or 1 reporter rounding up.
c. The average number of expected customer arrivals in the system (L) is 2.38 reporters or the rounding of 2 reporters.
d. The time expected by each customer arrival to wait on the Waiting Line (Wq) for 0.03 hours or equal to 1.8 minutes.
e. The time expected by each customer arrival while in the system or waiting in service (W) for 0.12 hours or equal to 7.2 minutes

The level of probabilities (the possibility of customers served in the system) is as follows:

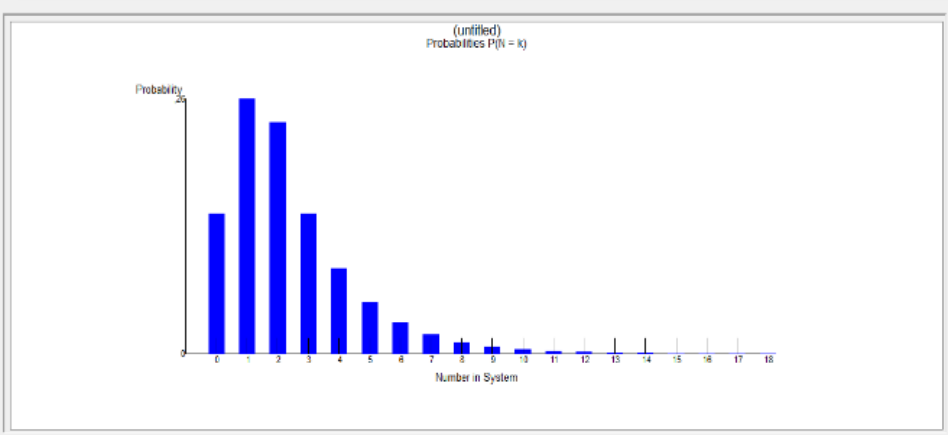

Figure 7. Probabilities Graph

Based on the graph above, it can be seen that the value of probabilities or the possibility that the system can serve the reporter is 1 per unit time reporter. Researchers see that technicians are very busy serving reporters, only about 39% of the time technicians can rest and reporters wait long enough in the queue for almost half an hour. So that the queuing problems that occur in the TIPD IAIN Batusangkar IT service system need to be evaluated. Some of the problems that occur in this regard, the researcher identifies these problems, as follows:

a. The system that runs for whistleblowers to report any IT problems at IAIN Batusangkar by going directly to the TIPD room or via telephone, after that it is executed by officers, and this is considered ineffective because for the reporter it will take money and time and the repair process for technicians is not know which ones should be prioritized for the process.
b. Most of the reporters were not satisfied, because conventional services were considered slow in responding to the wishes of the reporters
c. As a result of dissatisfied reporters, it can hamper the company's expected revenue target

Therefore, the best solution is needed to overcome this so that customer queues can be minimized. hence the need for a helpdesk information system for TIPD IAIN Batusangkar. Where the arrival rate of customers who come to order an average of 20 customers per day. Each technician on average can serve 18 reporters per day, whereas previously it was only able to serve 11 reporters. The average service time for each cashier is 8 hours. Where from these assumptions it is known that the average number of customer arrivals (λ) is λ = 20. The average number of customers that can be served (μ) is μ = 18. The number of service facilities or servers (s) is s = 3. The queuing system model used is (M / M / s) with the following description:

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Parameter	Value	Parameter	Value	Minutes	Seconds
M/M/s		Average server utilization	,37		
Arrival rate(lambda)	20	Average number in the queue(Lq)	,07		
Service rate(mu)	18	Average number in the system(Ls)	1,18		
Number of servers	3	Average time in the queue(Wq)	0	,21	12,44
		Average time in the system(Ws)	,06	3,54	212,44

Figure 8. Result Probabilities

From these results, it can be described as follows:

a. Based on the intensity level of the cashier service facility (P) is 0.37, which means that the technician has a busy level of serving the reporter for 37% of the time. This figure shows that Technicians will be busy serving reporters for 37% of the time. Meanwhile, 67% of the idle time will be used by technicians to rest, and others.
b. The number of customer arrivals who are expected to wait on the Waiting Line (Lq) is 0.07 customers or 1 reporter rounding up.
c. The average number of expected customer arrivals in the system (L) is 1.18 reporters or a rounding of 2 reporters.
d. The time expected by each customer arrival to wait on the Waiting Line (Wq) for 0 hours or equal to 0.21 minutes.
e. The time expected by each customer arrival while in the system or waiting in service (W) for 0.06 hours or equal to 3.6 minutes

The level of probabilities (the possibility of customers served in the system) is as follows:

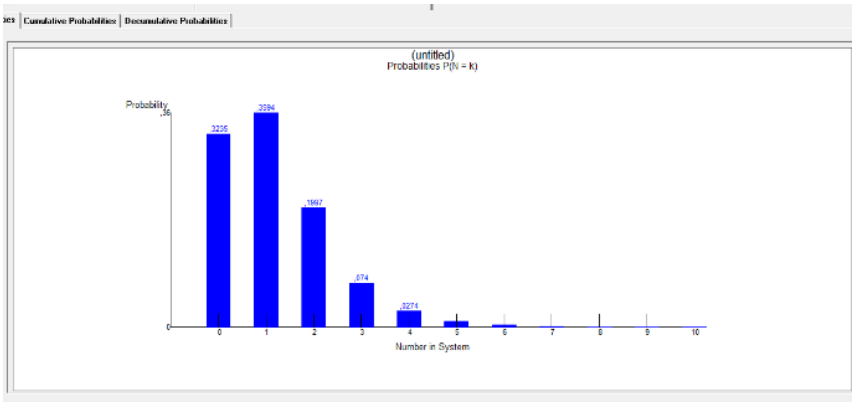

Figure 9. Level of Probabilities

Based on the graph above, it can be seen that the value of probabilities or the possibility of the system being able to serve customers an increase is as much as 2 reporters per time. Researchers see that technicians are not very busy serving customers, currently about 67% of the time can be used by technicians to rest from previously only 39%. The reporter did not wait too long in the queue, which was only 0.25 minutes from the previous 1.8 minutes in the queue. Then by using the helpdesk information system, the time when customers wait to be served is only about 3.6 minutes from the previous time having to wait around 7.2 minutes.

4. Conclusion

Based on the discussion of the research, it is concluded that the helpdesk application with the waiting line method is able to provide convenience for TIPD IT services and can improve the performance of the officers. The test results of the help desk application using the waiting line can determine the intensity level of the technician's service facility, which has a busy 37% level from the previous 61%. minutes, and the time expected by each customer arrival while in the system or waiting in service is 3.6 minutes from the previous 7.2 minutes, with this it can be said that the helpdesk information system application can provide maximum service.

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