ANALYSIS OF QUEUE IN TELLER AT PT BANK RAKYAT INDONESIA KALIMALANG BRANCH OFFICE, DUREN SAWIT, EAST JAKARTA

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Abstract - *This study aims to determine how the queues used by PT Bank Rakyat Indonesia, Tbk, especially the Kalimalang Branch Office. The number of samples used in this study were customers of Bank Rakyat Indonesia who made transactions, especially at tellers on Monday-Friday starting at 08.00-15.00 WIB in quiet or crowded conditions.*

From the observation for five consecutive days, BRI KC Kalimalang Bank has 4 tellers (M) with a standard service of 2 minutes per customer so that the average service level (μ) is 30 customers in 60 minute intervals (per hour) with a value average customer arrival (λ) is 11.6 (12) people. The average level of service use (ρ) was 0.096666 or 9.67%. This means that at the time of observation, there was no long queue at Bank BRI KC Kalimalang.

To optimize the use of tellers, the researchers suggest reducing the 4 open tellers to 3 to be transferred to other jobs / divisions that are currently busy. From the results of this reduction, it was obtained teller utility (ρ) increased from 9.67% to 12.89% and the average waiting time spent by customers in the system (Ws) was still achieved, namely 2.006644 minutes in accordance with the service standards set by Bank BRI KC Kalimalang

Keywords**:** *Queue, Teller, Bank*

I. Background

In a modern economy, the Bank is an institution that plays an important role in bridging parties with excess funds with those who need funds. According to Kasmir in Utari et al (2019: 337) Banks are financial institutions whose main activity is to collect funds from the public and channel them back to the public and provide services such as saving money in the form of savings, deposits, transferring money from one account to another. , savings and loans and so on. The banking industry today, especially commercial banks, is at the core of the financial system of every country. The bank has a function in the form of collecting funds from the public who have excess

funds and then channeling the funds back to people who are short of funds or entrepreneurs who need capital to develop their business within a certain period of time and with certain agreements as well. The function of seeking and subsequently collecting funds in the form of deposits greatly determines the growth of a Bank, because if the volume of funds raised or saved will certainly determine the volume of funds that can be developed by the Bank in the form of earning investment.

Every customer who performs transactions or activities related to cash and non-cash will be served by a bank called a teller. A common phenomenon that often occurs here is that customers have to queue by taking the queue number provided by the bank and wait before getting service from the teller. In an effort to obtain service from tellers, customers often assess the quality of a bank's operating system based on the length of time waiting or the teller's speed in providing services to its customers, especially transactions. Service effectiveness is a condition that concerns the extent to which activities or activities offered by one party to another by using existing tools and resources optimally through certain systems, procedures and methods in order to fulfill the interests of others in accordance with their rights so that the objectives properly selected achieve the expected results and benefits.

The authors chose Bank BRI KC Kalimalang as the object of research in order to evaluate the effectiveness of the queues applied by Bank BRI KC Kalimalang and aim to improve service quality, especially the speed of tellers in processing transactions that have an effect on customer queues and public perceptions of services at Bank BRI KC Kalimalang**.**

II. Literature Review

2.1 Research Review

The first research was conducted by Rusmin Nuryadin and Emylia Pebriani (2020), Faculty of Economics and Business, Muhammadiyah University of Parepare in the Journal of Economics and Business with the title "*Analysis of the M / M / S Model Queuing System Utility Level in the Transaction Process at PT Bank Rakyat Indonesia (Persero) Tbk. , Pangkajene Unit Sidrap Branch Office* ". The average probability of 0 customers in the system (P0) is 0.1240 or 12.40%. The teller's utility rate (ρ) is 0.625 or 62.5%. The average number of customers in the system (Ls) is 4,762 or 5 people, while the average number of customers waiting in the queue (Lq) is 3,512 or 4 people. The average time spent by customers in the system (Ws) is 0.190 hours or 11.4 minutes, while the average time spent in queues (Wq) is 0.14948 hours or 8.42 minutes. And finally, the utilization cost / unemployment cost is IDR 108,000 / day.

The second research was conducted by Nelly Naomi Sihombing and Faridawaty Marpaung (2018) Mathematics Department, FMIPA, State University of Medan with the title "*Optimization of Teller Service Queuing System in BRI Unit Sumbul, Dairi Regency*" in the Indonesian Science Journal. This analysis aims to determine whether the teller service at BRI Unit Sumbul, which is the only bank in the area, is optimal or not. From this calculation, it is found that the services provided by BRI Unit Sumbul are less than optimal so that it must be re-analyzed by using the addition of 1 teller to see differences in characteristics. With the addition of 1 teller, the probability of unemployed tellers increased by 0.0851. With the addition of 1 teller, the probability of busy tellers is reduced by 0.04542, for the average number of customers in the system (Ls) decreases by 4.1396 (4 customers), for the average waiting time spent by customers in queues (Lq) is reduced by 4,134 minutes and the average time spent by customers in the system (Ws) was reduced by 10.02 minutes.

The third research was conducted by Hilda, Saharuddin Kaseng and Husein HI Moh. Saleh (2018) in the Management Science Journal of Tadulako University, with the title "*Analysis of Customer Service Queues at PT Bank Syariah Mandiri Bungku Branch*". The level of utility or the teller's busyness (ρ) using the M / M / 1 model is 0.94 or 94%. The average number of customers in the longest queue (Lq) occurred on Monday as many as 15 people, while the average number of

customers in the system (Ls) was the shortest on Thursday, namely 2 people. The longest average time spent in the system (Ws) is 0.5 hours or 30 minutes 28 seconds occurs on Monday, then the average time spent by customers in the longest queue (Wq) is 0.4714 hours or 28 minutes 16 seconds.

The fourth research was conducted by Dimas Dwi Prayogo, Jessie J Pondaag and Ferdinand Tumewu (2017) in the EMBA Journal of Sam Ratulangi University Manado with the title "*Analysis of Queuing Systems and Optimization of Teller Services at PT. Bank SulutGO* ". From the research above, the teller utility level (ρ) was obtained at 11.00-12.00 the teller's busyness was 0.75% while it was low at 08.00-09.00. The average number of customers in the queue (Lq) was greater at 12.00-13.00 than 08.00-09.00, which was only 0.00046 people or 0. The longest average number of customers waiting in the system (Ls) occurred at 12.00-13.00 hours as many as 5,1353 or 5 people. The average time a customer spends waiting in the shortest queue (Wq) is at 08.00-.09.00 which is 0.0028 minutes. The longest average time spent by a customer in the system (Ws) occurs at the same hour, namely 12.00-13.00 for 6.847 minutes.

The fifth research was conducted by Ilham, Husein HI Moh. Saleh and Asngadi (2020) in the Management Science Journal of Tadulako University with the title "*Analysis of Antian Service Systems at Bank BNI Syariah, Palu City Branch*". This study aims to compare the performance of tellers 1 and 2 in serving customers for cash deposit and withdrawal transactions. Based on the comparison between teller 1 and 2 implemented by Bank BNI Syariah, Palu City Branch, the performance of the busiest teller service is at teller 2 based on a higher level of activity, namely 0.3687 or 36.87%, while for teller 1, it is 0.393 or 33.93%. However, for the calculation of the average probability of 0 customers in the system (P0), the average customer waiting in the queue and the system (Lq and Ls), the average time spent by the customer in the queue and the system (Wq and Ws) has a value the same and that means, the performance of the two tellers is the same in their service

The sixth research was conducted by Eshetie Berhan (2015) in the IOSR Journal of Business and Management (IOSR-JBM) June 2015 with the title "*Bank Service Performance Improvements using Multi-Sever Queue System*". This study aims to model performance services as suitable servers in the queue system. From the research results, the optimum configuration is realized when the number of servers reaches five. The average time that each server or teller is busy (service utilization) was found to be 0.584 or 58.4%. The average number of customers in the queue and system (Lq and Ls) is 0.305 or 0 customers and 2.23 or 2 customers. The average waiting time spent by customers in queues and systems (Wq and Ws) is 0.042 hours or 2.52 minutes and 0.428 hours or 25.68 minutes.

The seventh research was conducted by Eze, Everestus Obinwanne, Odunukwe and Adaora Darlingtina (2015) in the American Research Journal of Bio Sciences with the title "*On Application of Queuing Models to Customers Management in Banking System*". This study aims to investigate the expected waiting time from customers and the actual waiting time at the Bank. From the research results, the system capacity studied was 238 customers and the arrival rate was 0.1207 while the service level was 0.156. This indicates that the system service level is greater than the arrival rate, this does not mean that there is no queue, but the queue may not be long. The expected number on the waiting line is 0.1361. The expected number in the system is 0.9098. The expected waiting time in the queue is 1,276 and the total expected waiting time in one day is 3.2664 hours.

The eighth research was conducted by Tanzila Azad, Amitsaha, Hasnain Shaikh Sithil and Rafiul Rafi (2020) in the Research Journal of Management Sciences with the title "*Performance improvements using multi server queuing model by reducing customer wait time of a Bank*". This study aims to increase the efficiency of the model in terms of utilization and long waits. The software used is TORA software. From the research results, the summation performance table of the multi-server queuing model at the bank is obtained, namely the arrival rate (λ) 4 minutes, the service level (μ) which is 2 minutes, the utilization of the average server or utility (ρ) 66.7%, the

number of subscribers in the queue (Lq) is 0.889 customers, the average number of customers in the system (Ls) is 2.889. Furthermore, the average time waiting in the queue (Wq) is 0.222 minutes, the average time spent by customers in the system (Ws) is 0.722 minutes and the probability that there are no customers in the system (P0) is 0.111 or 11.11%.

2.2 Theoretical Basis

2.2.1 Definition of Operations Management

Operations management, namely activities related to the creation of goods and services through the transformation process from input (input) to output (results) according to Heizer and Render (2016: 3). Inputs in operations management are inputs such as human resources, raw materials, machines and parts. Meanwhile, the output in operations management is the result of the processed input. Organizing to produce goods and services includes the following:

1. Marketing, which is an activity or process that generates demand and at least receives orders for a product / goods and services.
2. Production / operation is an activity which involves company resources to create products or services.
3. Financial / accounting is an activity that tracks how well the organization is performing. Its activities include bill payment, money collection and others related to company financial reports.

2.2.1.2 New Challenges in Operations Management

The operations manager works in a fun, dynamic and challenging environment. This environment is the result of challenges such as the transfer of ideas, products and money at breakneck speed. According to Heizer and Render (2016: 15), some of these challenges are:

1. Global Focus.

Operations managers quickly seek out creative and innovative designs, producing efficient and high quality goods through international collaboration.

2. Supply Chain Partners

Operations managers outsource and build long-term partner relationships so that raw materials and supply chain processes are in line with the needs of end users.

3. Continuity

The operations manager strives to continually increase the productivity associated with designing ecologically sustainable products and processes.

2.2.3 Definition of Bank

According to the Law of the Republic of Indonesia Number 7 of 1992 concerning Banking in Mahendra & Firmansyah (2019: 307) a Bank is an institution that collects funds from people who have excess funds in the form of deposits, checks or others and channel them back to people who are short of funds in the form of credit or other forms in order to improve the standard of living of the Indonesian people.

2.2.4 Queuing Theory

A queuing line is a common situation - for example, it takes the form of a queue of cars waiting to be repaired at a repair shop. According to Heizer & Render in Eni & Intan (2019: 419) queuing theory is the science of queuing forms. Queue itself means people or goods in a line waiting to be served or to receive a process.

2.2.4.1 Variations Of Queuing Models

A very varied queuing model can be implemented in operational activities. The following is an illustration of the four most widely used models in several sectors such as the banking sector and the beverage or food sector according to Heizer and Render (2016: 852-872):

1) Model A (M / M / 1): Single Server Queue Model with Poisson arrival and Exponential service time. According to Heizer and Render (2016: 852-872) The Poisson distribution is the number of arrivals per unit of time which can be estimated by the probability distribution. For some arrival times (for example, two consumers per hour or four trucks per minute), different Poisson distributions can be determined using the formula:

Table 2.2 Single Line Queuing System Formula (M/M1)

Formula	Information	Unit
$\mathbf{Lq} = \frac{\lambda^2}{\mu(\mu-\lambda)}$	Average number of customers waiting in queue	Customers
$\mathbf{Ls} = \frac{\lambda}{\mu-\lambda}$	The average number of customers waiting in the system	Customers
$\mathbf{Wq} = \frac{\lambda}{\mu(\mu-\lambda)}$	Average time spent on queues	Minute
$\mathbf{Ws} = \frac{1}{\mu-\lambda}$	Average time spent on queues	Minute
$\boldsymbol{\rho} = \frac{\lambda}{\mu.M}$	Probability of busy service facilities (utilization factor)	
$\mathbf{Po} = \mathbf{1}\text{-}\frac{\lambda}{\mu}$	Probability 0 in the system (idle service units)	

Source : Heizer dan Render (2016)

Information λ = average number of arrivals per time period
μ = average number of people served per unit time
M = number of servers or paths opened

2) Model B (M / M / S): Multiple Server Queue Model
That is, two or more servers are available to handle incoming customers. Multiple server systems assume that arrivals follow a Poisson probability distribution and that service times are exponentially distributed. First come service, first served service and all servers are assumed to be working at the same level. This form of queue allows new arrivals to enter the service or the shortest queue. Queue formula for model B:

Table 2.3 Formulas of the Dual Line Queuing System Model B (M/M/S)

Formula	Information	Unit
$\mathbf{P_0} = \frac{1}{\left[\sum_{n=0}^{m-1}\frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^{n}\right]+\frac{1}{M!}\left(\frac{\lambda}{\mu}\right)^{M}\leftarrow\frac{M\mu}{M\mu-\lambda}}$	Probability that there are no customers in the system (server is idle)	
$\mathbf{Ls} = \frac{\lambda\mu(\frac{\lambda}{\mu})M}{(M-1)!(M\mu-\lambda)^{M}\leftarrow}Po + \frac{\lambda}{\mu}$	Average number of customers in the system	Customers
$\mathbf{W_s} = \frac{Ls}{\lambda}$	Average time spent on the system (queues and	Minute

	services)	
$L_q = L_s - \frac{\lambda}{\mu}$	Average number of customers waiting in queue	Customers
$W_q = W_s - \frac{1}{\mu}$	Average time spent waiting in line	Minute

Source : Heizer dan Render (2016)

3) Model C (M /D/1) The constant service time model
When consumers or equipment are processed according to a fixed cycle, constant service time is appropriate. For example in the case of an automatic car wash.

Table 2.4 Single Line Queuing System Formulas with Arrival Poisson Distribution and constant service time

Formula	Information	Unit
$L_q = \frac{\lambda^2}{2\mu(\mu-\lambda)}$	Average number of customers in queue	Customers
$W_q = \frac{\lambda}{2\mu(\mu-\lambda)}$	Average time spent by customers in the system (queues and services)	Minute
$L_s = L_q + \frac{\lambda}{\mu}$	Average number of customers waiting in the system	Customers
$W_s = W_q + \frac{1}{\mu}$	Average time a customer spends in the system	Minute

Source : Heizer dan Render (2016)

4) Model D, Namely a single line queue with a limited population. According to Heizer and Render (2016: 852-872) Limited population (finite), namely queues where there is only a limited number of potential users of the service. The limited population model allows some number of people who repair (servers) to be considered. This model is different from the three previous queuing models because there is an interdependent relationship between queue length and arrival date.

Table 2.5 Formulas for Single Line Queuing System with Limited Population

Formula	Information	Unit
$X = \frac{T}{T+U}$	Service Factor	
L = N(1-F)	Average number of queues	Customers
$W = \frac{L(T-U)}{N-L} - \frac{T(1-F)}{XF}$	Wait time is average	Minute
***J* = *NF* (1-*X*)**	Average number of services	Customers
H = *FNX*	Amount in service is average	Customers
N = *J* + *L* + *H*	Total population	Customers

Source : Heizer dan Render (2016)

2.2.4.2 Characteristics of Queuing Discipline:

The waiting line itself is the second component of the queuing system. The second waiting line characteristic relates to queuing discipline. It refers to the rules by which consumers queue to receive services. These kinds of queues are tailored to the needs of the company. According to Heizer and Render (2016: 852-872), the following are the types of queues that are commonly applied or used by several companies, be it services or trade:

1. First isn First Serve (FIFS) is a queuing discipline where the first customer in the queue will receive the first service. Then for a company that produces a product, this queuing discipline will be used in releasing inventory items in the warehouse with the name First In First Out, where the goods that come first will be issued or used first as well.
2. Last in First Serve (LIFS) is a queuing discipline where the last customer who comes in the queue will receive the first service. Then for a company that produces a product, the queuing discipline will be used for releasing inventory items in the warehouse with the name Last In First Out, where the last item that comes last will be issued or used first. Compared with FIFO.
3. Priority Service (PS) is a priority for a service. According to Trisna, Safitri & Pratiwi (2019: 8), priority service is a process that prioritizes priority services or in an emergency. For example handling in a hospital.

2.2.4 Definition of the System

"The system is a collection of networks of mutually influencing procedures, gathered as a whole which has the function of carrying out an activity or to complete a specific goal or goal" according to (Kenneth C. Laudon & Jane P. Laudon in Sukma & Henny, 2019: 31).There are several ways that the banking industry has taken to reduce queue density at certain hours in addition to optimizing services related to current technology. Like the presence of m-Banking which has the function of transferring money without having to go to the bank and other functions. recently, the use of an Automation Machine adopted by several banks has advantages such as cash deposits in the form of cash. One of the goals of the development and use of technology by the banking sector is to reduce queues, especially those related to internal transactions (Samuel & Manongga, 2017).

2.3 Relationship Between Research Variables

In this study, there is only an independent variable, namely the queue at the teller. Independent variable has one variable, which means a variable that stands alone without any connection with other variables according to Sugiyono (2015: 53). Descriptive research is research that deals with questions about the value of independent variables (independent variables are independent variables).

2.4 Hypothesis Development

Based on the description of the Relationship Between Research Variables, the variables used in this study are independent variables and thus it can be concluded that there is no relationship between one variable and another, so there is no hypothesis development in this study.

2.5 Research Conceptual Framework

According to (Yasin, Riyadi & Ingga, 2017: 500) the research concept framework will assist researchers in connecting findings with theory. Thus, a conceptual framework is needed as a basis for thinking in carrying out a study developed from a theoretical review so that it is easy to understand.

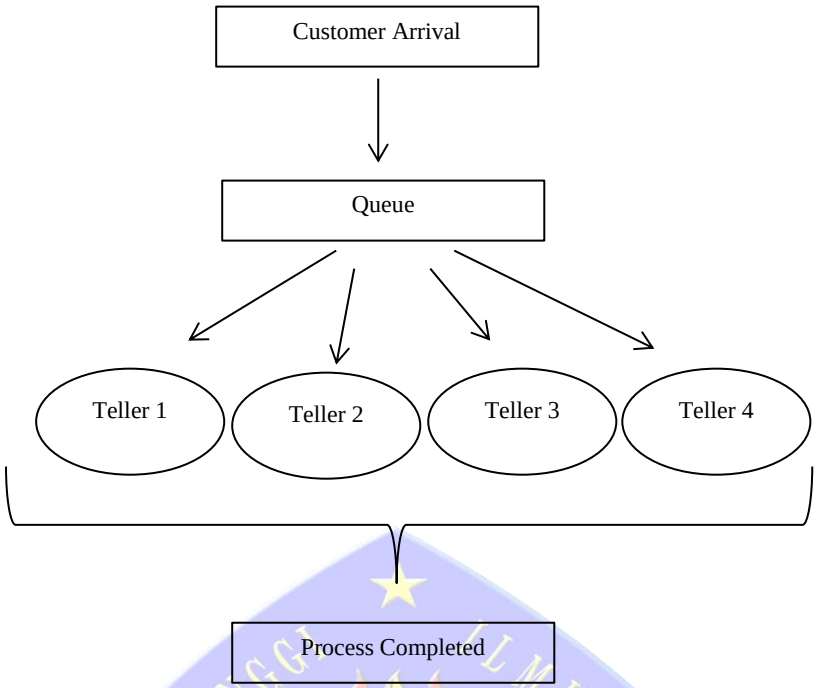


Figure 2.5 Research Conceptual Framework

III. RESEARCH METHODS

The strategy used in this research method is descriptive research strategy. Descriptive research is research that aims to describe and interpret the object, in this case the customer, with the actual conditions and uses numbers starting from data collection, interpretation of processed data and the final result. This strategy was chosen because it is to determine the analysis of the teller queuing system model.

3.1 Population and Sample

3.1.1 Research population

Population is an object / subject that has a certain quantity and characteristics set by the researcher for study and then draws conclusions by the researcher. According to Hendryadi (2019: 162-163) There are two types of population, namely limited population and unlimited population. The population in this study were all customers who came to PT Bank Rakyat Indonesia Tbk KC Kalimalang who made all transactions either at Teller or Customer Service.

The sample used in this study was purposive sampling. Purposive sampling is a sampling technique with certain considerations according to Sugiyono (2018: 85). The sample used in this research is all Bank Rakyat Indonesia customers who make transactions at the teller with the assumption that the teller service time is the same. Samples taken are the number of customers in the teller queue for the next five days starting from Monday-Friday at 08.00-15.00 WIB.

3.2 Data Processing

In this study, the data obtained by researchers will be processed using the POM-QM for Windows version 5.3 software. QM stands for quantitative method which is software and accompanies text books on operations management.

IV. RESEARCH RESULTS AND DISCUSSION

Bank BRI KC Kalimalang operates 5 days a week. Within 1 day, the Bank provides operational hours for 8 hours, service time starts at 08.00 to 15.00 WIB for cash services (called tellers) and customer service (called Customer Service) starting at the same time and ending one hour greater than teller service.

The researcher collected data by means of observation for 5 consecutive days, from 15 June 2020 to 19 June 2020. The data obtained by the researcher was in the form of the number of customers per hour which was previously written manually. Researchers directly saw the level of customer arrival and the service level of the teller at Bank BRI KC Kalimalang in quiet or crowded conditions.

The following is the arrival data of BRI KC Kalimalang customers from observations for five days :

Table 4.1 Customer Arrival Data Per Day

Worktime 08.00-15.00

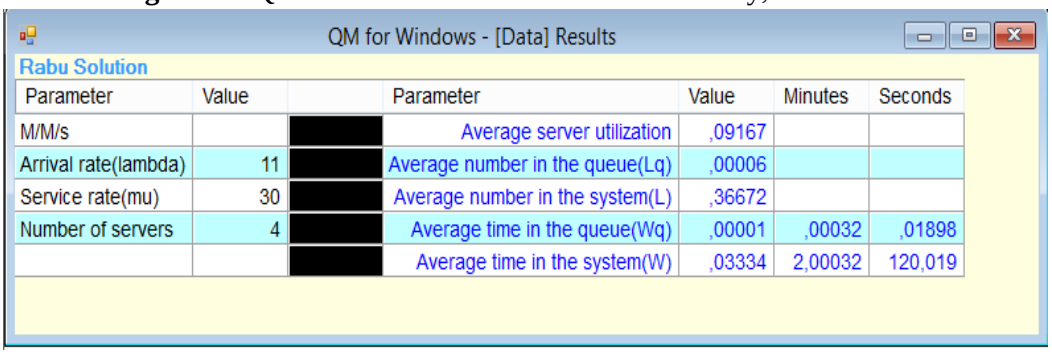
NO	Date	Working Days	08.00-09.00	09.01-10.00	10.01-11.00	11.01-12.00	12.01-13.00	13.01-14.00	14.01-15.00	Number of Customers
1	15-Jun	Monday	10	10	24	23	14	19	9	109
2	16-Jun	Tuesday	6	11	12	13	11	7	13	73
3	17-Jun	Wednesday	12	15	15	12	7	10	7	78
4	18-Jun	Thursday	4	10	15	12	9	3	6	59
5	19-Jun	Friday	10	18	14	11	7	19	13	92
Number of Customers/Hour			42	64	80	71	48	58	48	

Source : Processed Data (2020)

Bank BRI KC Kalimalang has a teller service standard to serve its customers, which is 2 minutes per customer with a time interval of 60 minutes, so the average number of servants (μ) is 30 customers obtained from:

$$\frac{1\ people}{2\ minute} \text{ X } 60 \text{ minute}$$

Figure 4.1 Queue Performance Results on Wednesday, 17 June 2020



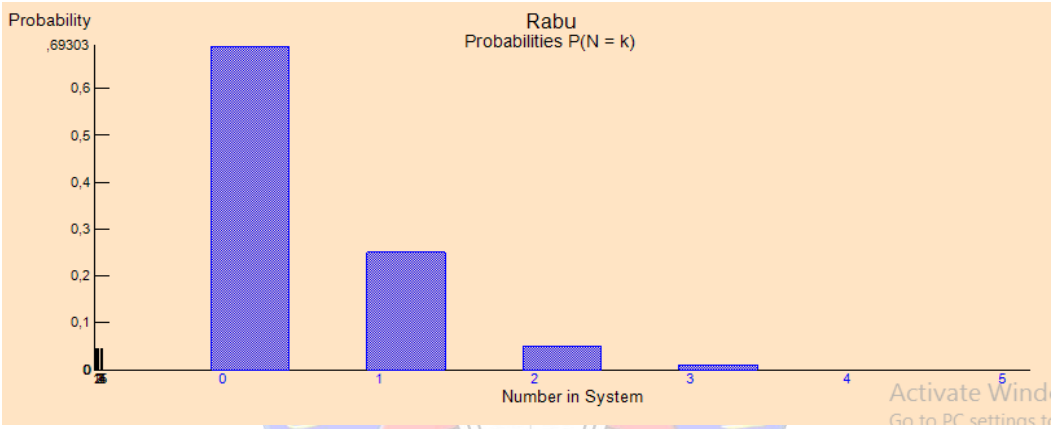
QM for Windows - [Data] Results

Rabu Solution

Parameter	Value		Parameter	Value	Minutes	Seconds
M/M/s			Average server utilization	,09167		
Arrival rate(lambda)	11		Average number in the queue(Lq)	,00006		
Service rate(mu)	30		Average number in the system(L)	,36672		
Number of servers	4		Average time in the queue(Wq)	,00001	,00032	,01898
			Average time in the system(W)	,03334	2,00032	120,019

Source: Data processed with POM-QM Software (2020)

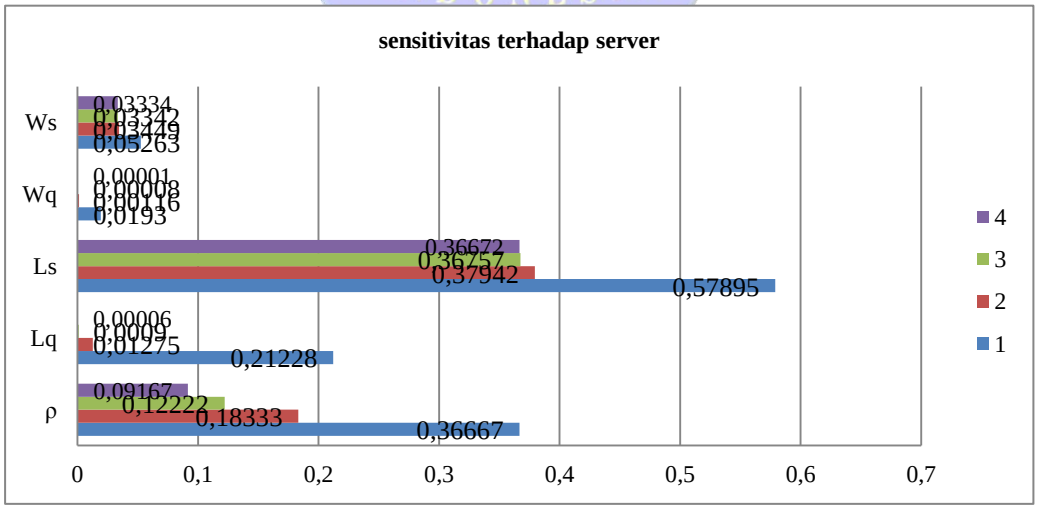
Figure 4.2 Probability Graph Wednesday, 17 June 2020



Source: Data processed with POM-QM Software (2020)

Seen in the graph of the average probability of 0 customers in the system (P0) of 0.69303 or 69.30%.

Figure 4.3 Sensitivity Bar Chart for servers on Wednesday, 17 June 2020



Source : Processed Data (2020)

Based on the detailed data that researchers have obtained during the observations in Figures 4.1 to 4.16, the following is the performance of the BRI KC Kalimalang queuing system as a whole for 5 days in Table 4.2.

Table 4.2 Queuing Performance Results at BRI KC Kalimalang, East Jakarta for 5 days with four tellers operating

Variable Name	**Value**				
	Monday	Tuesday	Wednesday	Thrusday	Friday
λ/o'clock	16	10	11	8	13
μ	30	30	30	30	30
M	4	4	4	4	4
P	0,13333	0,08333	0,09167	0,06667	0,10833
Po	0,5866	0,71653	0,69303	0,76593	0,64833
L*s*	0,53368	0,33337	0,36672	0,26668	0,43346
Ws	2,00132	2,00022	2,00032	2,00009	2,0006
Lq	0,00035	0,00004	0,00006	0,00001	0,00013
Wq	0,00132	0,00022	0,00032	0,00009	0,0006

Source : Processed Data (2020)

From the summary shown in table 4.2, it can be recalculated the average observation for 5 working days at BRI KC Kalimalang. Here are the results of the average calculation:

Table 4.3 The results of the calculation of the average queue performance for 5 days of observation with 4 tellers operating

Variable Name	Average calculation results (from table 4.2)
λ	11,6
μ	30
M	4
ρ	0,096666
P0	0,682084
Ls	0,386782
Ws	2,00051
Lq	0,000118
Wq	0,00051

Source : Processed Data (2020)

Based on Table 4.3 the average in one week of observation (5 working days) can be analyzed that BRI KC Kalimalang has 4 tellers (M) with a standard service of 2 minutes per customer so that the average service level (μ) is 30 customers in intervals. 60 minutes (per hour) with an average value of customer arrivals (λ), namely 11.6 (12) people. The average level of service use (ρ) was

0.096666 or 9.67%. This means that at the time of observation, there was no long queue at Bank BRI KC Kalimalang.

Then, the probability that there are 0 customers in the system (P0) or customers currently being served plus customers who are waiting is 0.682084 or 68.20%. The average number of customers waiting in the system (Ls) is quite low, namely 0.386782 or 0 customers. Meanwhile, the average customer waiting in the queue (Lq) is the same as the average number of customers waiting in the system, namely 0.000118 or 0 customers. The waiting time spent by the customer in the queue (Wq) is 0.00051 minutes and the average waiting time spent by the customer in the system (Ws) is 2.0051 minutes.

Because the average customer arrival value (λ) is lower than the service level (μ) and there are an average of 0 customers waiting in a queue (Lq), it can be concluded that the teller service performance set by BRI KC Kalimalang Bank uses 4 people. tellers are not yet optimal because tellers are more idle.

4.3. Queue Evaluation

To optimize the use of tellers due to more idle time, according to the author, it is better to reduce one open teller. The reduction is done to optimize the teller so that the time wasted can be used for other departments or to help with work that is busy / urgent. Queuing system analysis by reducing from 4 tellers to 3 open tellers.

Table 4.4 Results of Queuing Performance at BRI KC Kalimalang, East Jakarta for 5 days with three tellers operating

Variable Name	**Value**				
	Monday	Tuesday	Wednesday	Thursday	Friday
λ/o'clock	16	10	11	8	13
μ	30	30	30	30	30
M	3	3	3	3	3
P	0,17778	0,11111	0,12222	0,08889	0,14444
Po	0,58606	0,71642	0,69288	0,76588	0,64806
Ls	0,53723	0,33396	0,36757	0,26693	0,43507
Ws	2,01461	2,00373	2,00493	2,00194	2,00801
Lq	0,0039	0,00062	0,0009	0,00026	0,00173
Wq	0,01461	0,00373	0,00493	0,00194	0,008

Source : Processed Data (2020)

From the summary shown in table 4.4, it can be recalculated the average observation for 5 working days at BRI KC Kalimalang. Here are the results of the average calculation:

Table 4.5 The calculation results of the average queue performance for 5 days of observation with 3 tellers operating

Variable Name	Average calculation results (from table 4.4)
λ	11,6
μ	30
M	3

P	0,128888
P0	0,68186
Ls	0,388152
Ws	2,006644
Lq	0,001482
Wq	0,006642

Source : Processed Data (2020)

From the calculation of the reduction of one teller in table 4.20, it can be seen that the utility increased from 9.67% to 12.89% even though it still has 0 average customers waiting in the queue (Lq). Bank BRI KC Kalimalang can serve its customers with 3 open tellers and is still achieved in accordance with service standards which have an average waiting time spent by customers in the system (Ws) of 2.006644 minutes.

4.4. Research Findings

The results of this study are not much different from Prayogo, Pondaag & Ferdinand Tumewu (2017) who suggest that tellers are transferred to other sections such as tax reporting during low hours. However, it is different from research conducted by Nuryadin & Pebriani (2020) and Naomi & Marpaung (2018) which need to add a teller so that the average waiting time spent by customers in queues (Lq) is reduced by 4.134 minutes and the average time spent by customers in the system (Ws) it is reduced by 10.02 minutes. The results of this research are also different from Hilda, Saharuddin & Husein (2018), Ilham, Husein & Asngadi (2020) which state that the M / M / S model gets optimal results and the busiest performance is at teller 2.Then, the research results are also different with those conducted by Eshetie Berhan (2015), Obinwanne & Darlingtina (2015) and research by Azad, Sithil & Rafi (2020) which stated that it is optimal with five tellers, the service level is greater than the arrival and the service level will be optimal along with a reduction in waiting time .

V. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusion

Based on the results of observations made by researchers at Bank BRI Kalimalang Branch, the following conclusions were obtained:

1. It is known from the observations, The queuing model applied by Bank BRI KC Kalimalang is the M / M / S model, which means that several servers are available, in this case, tellers for all types of transaction services and use the *First Come First Served (FCFS)* queuing discipline.
2. Based on the results of the calculation, the queue performance at BRI KC Kalimalang is not yet optimal due to the large number of idle tellers, so the researcher suggests that one teller is reduced when the arrival rate is low in order to help other busy jobs.
3. Because the arrival rate (λ) of customers was low at the time of observation, there was no heavy queue at Bank BRI KC Kalimalang. Therefore, to optimize teller service, it would be better if one teller is hired to another division / another busy job.

5.2 Suggestions

From the results of calculations and observations made by researchers, some suggestions are obtained as follows:

1. Bank BRI KC Kalimalang should optimize the use of tellers when conditions or queues are not congested by doing other jobs related to tellers or others.

2. Bank BRI KC Kalimalang should use speakers and a TV screen that displays the queue number when calling a customer queue as is done by Customer Service so that there is no misunderstanding in the queue call between customers.
3. Bank BRI KC Kalimalang should provide seats for all waiting customers so they are not too tired when queuing.

5.3 Researcher Limitations and Further Research Development

The limitation in this study is that the researchers conducted the research for only 5 days and it would be better if it was done for one full month or 30 days. It is hoped that further researchers can conduct longer research with other models and certain characteristics, for example by considering the cost of salaries if the human resources used are not correct.

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