ANALYSIS OF SERVICE TIME WITH ANTREAN THEORY APPROACH USING THE M / M / 1 METHOD (Case Study of Summarecon Fried Taichan Satay, West Bekasi)

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Abstract

This study aims to determine the queuing system currently applied by Sate Taichan Goreng Summarecon Bekasi Barat in providing services to customers by using queue theory and then calculating the queue to get restaurant service results to customers who are present.

The results showed that the queuing model used in Sate Taichan Goreng Summarecon, West Bekasi is Single Channel-Single Phase (M / M / 1). Methods of data analysis using software "POM-QM ver.3.0" software with Waiting Lines module. Based on research on January 15 - 24 2020, Summarecon Bekasi West Bekasi Fried Taichan Sate has one cashier, with an average hourly customer arrival value (kedatangan) of 13.8 customers, an average hourly service level (□) of 20 customers, The average service usability level (□) which can be said to be close to optimal is 69%, of the working time and this value is close to 100%. The average probability of not having a customer in the system (P0) is 31%. The average time spent on a customer in the system (Ws) was 10,557 minutes and the average time spent by a customer waiting in line (Wq) was 7,557 minutes. This shows that the cashier service found in Summarecon Bekasi West Bekasi Fried Taichan Sate can be said to be optimal because the level of utility is quite high, namely 69% and the value is more than 50% and almost close to 100%. The average probability of not having a customer in the system (P0) is 31%. The average time spent by a customer in the system (WS) is 10, 557 minutes and the average time spent by a customer waiting in line (Wq) is 7, 557 minutes, so there is no need for service evaluation

Keywords: Queuing System, service, cashier

I. INTRODUCTION

One of the services provided by fast food restaurants is take out food product services. This service includes direct purchases at fast food restaurant outlets (or special kiosks provided) as well as purchases or orders via telephone / fax / internet. Products purchased, specially packaged, then handed over to consumers to be consumed outside the restaurant (if the buyer comes directly), or delivered to a certain location (if using a delivery service).

Sate Taichan Goreng is one of the fast food restaurants located in Summarecon, West Bekasi, the rapid development of Sate Taichan cannot be separated from the role of hundreds of professional experts plus the presentation of attractive dishes for consumers when they first visit the outlet and the packaging is neatly packed. increase the attractiveness of its consumers.

Sate Taichan Goreng chooses the middle to upper class segment that loves fast food, coffee, and atmosphere. So that the concept that is carried out is in line with it.

Namely, fast food restaurants with the concept of a five-star restaurant taste with varied and competitive prices. Indeed, apart from carrying excellence in taste and packaging, Fried Taichan Sate is also able to provide a wide variety of foods at a fairly affordable price. This variety of menus and affordable prices makes visitors queue to eat at the fried taichan satay, here is the level of the queue at Summarecon Fried Taichan Sate, West Bekasi.

In the reviews some visitors said, “We tried the one near Summarecon Mall Bekasi. Oh apparently, the waiting list. Maybe there are many enthusiasts, yes, many are curious too (like me) ”(Syifa). Then, "To summarize, the dining experience here is a bit disappointing. I waited 30 minutes because the system first ordered at the cashier and sat down and the service took a long time ”. (Magdalena Fridawati). The presentation is very long, maybe for those of you who at that time want to hang out, its not a matter. But, for us, who at that time was for lunch, 45 minutes was a very long time. (Chillaworld.com). With the presence of several visitor reviews about Sate Taichan Goreng Summarecon, West Bekasi, this has further aroused the author's curiosity to research the queuing system at this restaurant.

II. LITERATURE REVIEW

2.2 Theoretical basis

2.2.1 Definition of Restaurant

Atmodjo (2015: 7), a restaurant is a place or building that is commercially organized, which provides good service to all consumers in the form of food or drinks.

Powers, Barrows, and Reynolds (2012: 68), restaurant comes from French 'restaurer' which means "restorer of energy" or energy return. The term was used in the early to mid 1700's to define a public place selling soup and bread. Today, however, any public place that sells food can be called a restaurant.

Suyono (2014: 1) states that a restaurant is a place that functions to refresh one's condition by providing easiness to eat and drink.

From the theoretical definition above, it can be concluded that a restaurant is a place or building that is commercially organized with the aim of providing food and beverage services in a professional manner.

2.2.2 Definition of Management

The basic understanding of management according to Robin and Coulter, includes coordination and supervising one's work so that activities can run effectively and efficiently.

T Hani Handoko (2012: 8) states that management is working with people to determine, interpret, and achieve organizational goals by implementing the functions of planning, organizing, arranging personnel, directing, leadership and supervision.

Griffin (2012: 20) states a series of activities (including planning, decision-making, organizing, leading, and controlling) directed at organizational resources (human, financial, physical, and information) with the aim of achieving organizational goals efficiently and effectively.

Malayu S.P. Hasibuan (2012: 1) states that management is a science and art that regulates the process of utilizing other human resources effectively and efficiently to achieve certain goals.

Based on the expert's definition, it can be concluded that management is a series of activities ranging from planning, organizing, directing, controlling and supervising by utilizing human resources and other resources to achieve a predetermined organizational goal.

2.2.3 Definition of Operations Management

Operations management is one of the three main functions in any organization and is integrally linked with all other business functions. All organizations market (sell), finance (account for), and produce (operate) and it is important to know how operations management activities function. Operations management is an expensive part of an organization. A large percentage of the revenues of most companies are spent on operations management functions. In fact, operations management provides a great opportunity for an organization to increase its profitability and expand the services it provides to society.

Hezier and Render (2016: 3) reveal that operations management is an activity related to the creation of goods and services through a transformation process from input (input) to output (result).

Jacobs and Chase (2015: 4) state that operations management is the design, operation and improvement of the systems used to create and trade the company's main products and services.

In other words, operations management is the study of decision making in the operations function, in order to achieve the goals set by the company. The application of

management to convert input (input) into output (output) in accordance with the standards set. So that the output produced is in accordance with the wishes of the customers in the most effective way possible.

2.2.4. Services

2.2.4.1. Definition of Services

Suparyanto and Rosad (2015: 125), services are any action or performance that can be offered to other parties, are basically intangible and do not result in any ownership, the production of services may be related to physical products or not.

Setyaningrum (2015: 92). Service is a product that consists of various activities, benefits or satisfaction offered for sale and is basically intangible and does not result in ownership of something, such as banking activities, hotel services, air travel, retail companies, and beauty salon.

From the definition of services above, it can be concluded that services are intangible and do not result in any ownership to meet customer needs in achieving organizational or company goals.

2.2.4.2 Service Characteristics

Gregorius (2012: 28) states that services have 4 (four) main characteristics, namely:

1. Intangible (intangible)

Services differ significantly from physical goods. When goods are objects, tools, materials, or objects that can be seen, touched, and felt with the five senses. Then service is actually an act, action, experience, process, performance, or effort which is abstract in nature. If goods can be owned, services tend only to be consumed but not possessed.

2. Inseparable (inseparability)

Services that are produced and consumed simultaneously. This does not apply to physical goods that are produced, stored in stock, distributed through multiple sellers, and consumed later. If someone provides the service, the provider is part of the service, because the customer is also present when the service is produced, the interaction of the service provider for the customer is a special feature of price marketing.

3. Varies (variability)

Services are variable or heterogeneous because they are non-standardized outputs, meaning that the shape, quality and type vary widely, depending on who, when and where the service is produced. Service buyers are aware of this diversity and often talk with others before choosing a service provider.

4. Not durable (perishability)

Perishability means that services are perishable commodities, which cannot be stored for future reuse, resale or return. Demand for services also fluctuates and changes, as a result service companies often experience difficult problems. Therefore service companies devise strategies to be better at running their business by adjusting demand and supply.

Fried taichan satay is a fast food restaurant company with one form of service that provides services to consumers, which is included in the tangible service characteristics, because the restaurant provides an action or performance to consumers, so that services can be felt in the form of products that consumers accept.

2.2.5. Services

2.2.5.1 Services Definition

Antono (2013: 2) states that service is an activity or sequence of activities that occurs in direct interaction between a person and another person or a physical machine, and provides customer satisfaction.

Tjiptono (2012: 4) states that service is usually seen as a system consisting of two main components, namely service operations that are invisible or unknown to the customer (back office or backstage) and service delivery that is usually seen or known. customer.

From the definition of service above, it can be concluded that service is an activity carried out by a person or group of people in meeting customer needs.

2.2.5.2 Services Dimention

Tjiptono (2012: 174) explains that there are five dimensions of service to measure service quality, namely as follows:

1. Reliability, related to the company's ability to provide services that are presented appropriately and satisfactorily as promised to customers.

2. Responsive (Responsiveness), namely awareness or desire to act quickly to help customers and provide timely service.

3. Assurance (Assurance) is their knowledge and politeness as well as their ability to foster employee confidence. The assurance dimension has competency characteristics to provide service, is polite and has respect for customers.

4. Empathy (Empathy), giving individual customer attention in particular. This empathy dimension has characteristics: a willingness to approach, provide protection and an effort to understand customer wants, needs and feelings.

5. Physical evidence (Tangibles), means something that is visible or real, namely: the appearance of employees, and other physical facilities such as equipment and equipment that support the implementation of services.

The best possible restaurant must optimize service to consumers by knowing what kind of service consumers want. In this study, if the customer arrival rate is high, then the number of available cashiers should be increased and if the customer arrival rate is low, it is better to reduce the number of available cashiers. Of course, by not ignoring the quality of service and not going out of the standard set by the restaurant, so that the service provided is optimal. Both in terms of consumers and restaurants.

2.2.6 Understanding Queuing Theory

The queuing theory was first put forward by a mathematician, namely A.K. Erlang in 1909 in his book Solution of some Problem in the Theory of probability of significance in Automatic Telephone Exchange. He developed a queuing model to determine the optimal number of telephone switching facilities used to serve existing requests. The purpose of using queuing theory is to design facilities, address service requests that fluctuate randomly and maintain a balance between service fees and costs required during queuing.

Waiting line knowledge, often known as queuing theory, is an important part of operations and a valuable tool for operational managers. Queuing lines are a common situation.

The waiting line model is useful, both in manufacturing and in services. Queue analysis in terms of waiting line length, average waiting time, and other factors that help us understand service systems (e.g., fast food restaurant queues), maintenance activities (which will repair broken machines), and floorwork control activities store.

Heizer and Render (2016: 852) queuing theory is an important part of operational activities and a valuable tool for operational managers. Queuing line is a common situation that occurs while waiting for goods or services.

Handoko (2013: 263) explains that the queuing theory is also called a waiting line model which is developed to help managers decide how long a waiting line is most acceptable and to minimize a total of two costs, namely the direct costs of providing service facilities and indirect costs arising from individuals must wait to be served.

Based on the above understanding, it can be interpreted that queuing theory is a science that contains concepts or models used to measure arrival patterns, service patterns, and the average number of arrivals and services to assess effectiveness in performing services in the queue.

2.2.7 Characteristics of the waiting line system (queue)

Heizer and Render (2016: 853) explain that there are three characteristics of queues, namely:

1. Arrivals or inputs to the system: These have characteristics such as population size, behavior, and statistical distribution.

2. Queue discipline, or the waiting line itself: The characteristics of a queue include whether it is limited or unlimited in length and the discipline of the people or goods that are in it.

3. Service facilities: characteristics include their design and distribution of service time statistics.

In the case above, each of the three characteristics will be examined, namely:

1. Characteristics of arrival

The arrival (source) magnitude of the population The population quantity is considered to be infinite (essentially infinite) or finite (finite). When the number of consumers or arrivals at a certain time is only a small portion of the total potential arrivals, the population arrivals are considered to be unlimited or infinite.

Consumer behavior, most of the queuing models assume that consumers who come are patient consumers. Patient customers are people or machines who wait in line for them to

be served, and do not divert between the lines, and customers who ignore are the ones who enter the line, but become impatient and leave without completing their transaction. In fact these two situations only serve to highlight the need for queue theory and waiting line analysis.

The pattern of arrival in a system, consumers who come to service facilities are adjusted to a known schedule (for example, one patient every 15 minutes or one student every half hour) or they come randomly. Arrivals are considered random when they are independent of one another and their presence cannot be predicted with accuracy. The number of arrivals per unit can be estimated by a probability distribution also known as a poisson distribution.

2. Waiting line characteristics

The waiting line is the second component of the queue system. The length of the line can be limited or unlimited. A limited line when it cannot, by law due to physical obstacles, increases its extension infinitely.

The second waiting line characteristic relates to queuing discipline. It refers to the rules by which the concept is queued to receive services. Most systems use the following queuing discipline:

(1) FCFS (First Come, First Served) is a rule where customers who are served first are customers who come first. An example is customers who queue at fast food sales counters.

(2) LCFS (Last Come, First Served) is a queue where the customer who comes last will be served first. For example in the queue for loading and unloading in trucks, where the last incoming goods will come out first.

(3) SIRO (Service in Random Number) is one of the queuing disciplines where services are carried out in a random order (Random Order). For example, such as in an arisan activity, where the winner is based on a lottery process.

(4) Priority Queue, namely priority services that are carried out specifically for main customers who have high priority compared to customers who have low priority. For example, such as in hospital patients who get priority treatment first because they have a more severe disease than other patients.

2.2.8 Service Characteristics

There are two basic designs of queuing systems, namely the single-channel queuing system and the multiple-channel queuing system. The single line queuing system is a service system that has one line and one service point. Multiple line queuing system is a service system that has one line with several points.

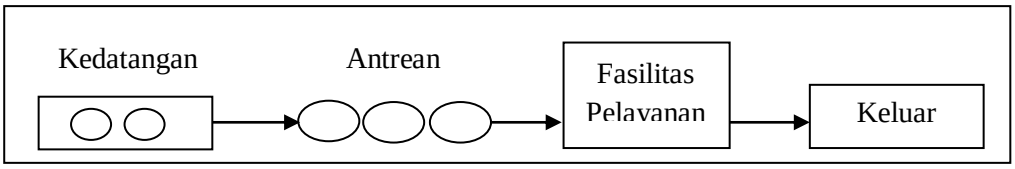
The arrangement of service facilities is divided into two stages, namely a single-phase system and a multi-phase system.

A single-stage system is a system where customers receive services from only one service facility and then leave the system. The multiple stage system is a system where customers receive services from several service facilities before leaving the system. Based on the lines and stages of the queue, there are four basic structures of the queuing system consisting of:

1. *single channel, single phase*

A service system that has one line and one point of service. The queue structure is the simplest, and there is a simple formula to solve the problem in the standard distribution pattern of arrivals and services. When the distribution is non-standard, the problem is easily solved by computer simulation. An example of this line structure is a haircut shop run by one person.

Gambar 2.1. (*Single Channel,Single Phase*)

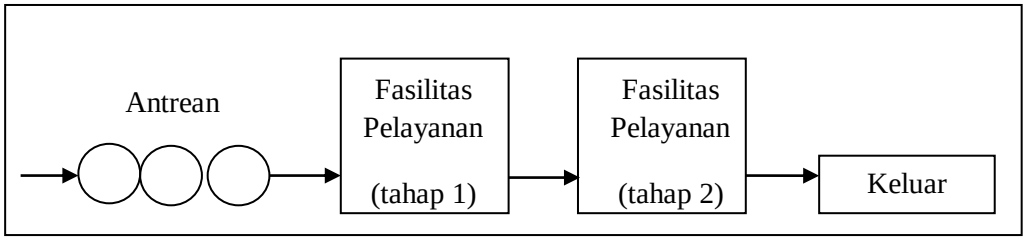


Source: Jacob dan Chase (2015)

2. *single channel,multiphase*

A service system that has one line with several service points. An example of a queue structure is a car wash because a series of services (cleaning, wetting, washing, rinsing, drying, window cleaning and parking) are carried out in a fairly uniform order. An important factor in the case of a single line with a series of services is the number of additional services the provider may be able to provide, which in turn becomes a separate queue line.

Gambar 2.2. Saluran tunggal, tahapan ganda (*Single Channel,Multiphas*

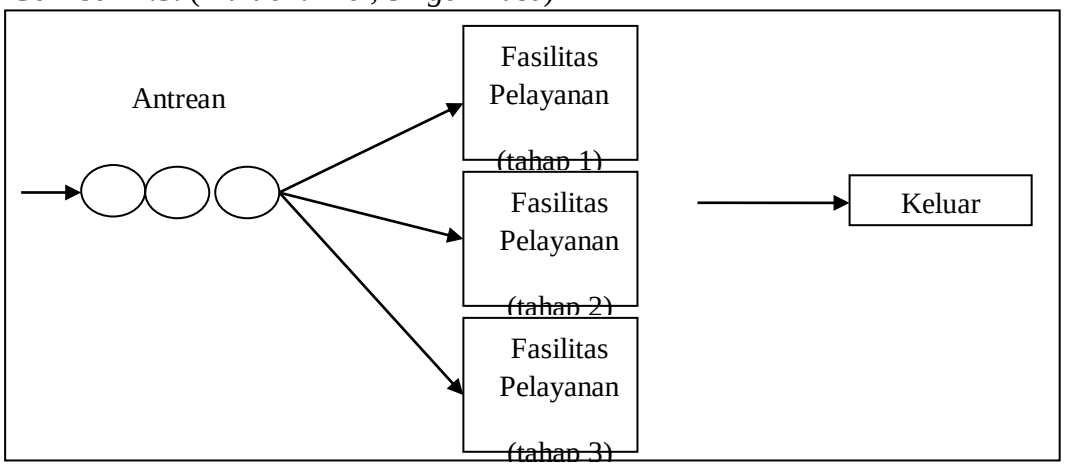


Source: Jacob dan Chase (2015)

3. *multichannel,single phase*

A system where the customer receives service from only one station and then leaves the system. The teller counters at a bank and the cashier desks of a busy shopping center demonstrate this type of structure. The main problem with this structure is the need for tight line control to maintain order and to direct customers to available service providers.

Gambar 2.3. (*Multichannel, Singe Phase*)

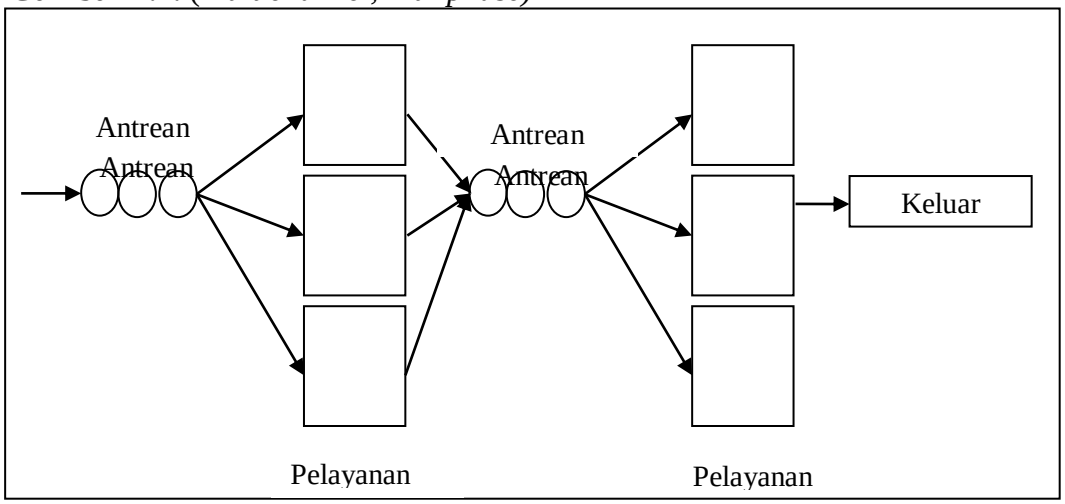


Source: Jacob dan Chase (2015)

4. *Multichannel, Multiphase*

A system where customers receive services from several stations before leaving the system. This structure consists of two or more services provided consecutively. Hospital patient registration follows this pattern because there is usually a certain sequence of steps that must be followed, namely coming to the registration desk, filling out forms, making an identification bracelet, obtaining a room, escorting the patient to the room, and so on. Since there are usually multiple service providers for this procedure, they can serve more than one patient at a time

Gambar 2.4. (*Multichannel, Muliphase)*



Source: Jacob dan Chase (2015)

2.2.9. Measuring Queuing Performance

The queue model helps managers make decisions that balance service costs with waiting line costs. Queue analysis can derive many measures of waiting line system performance, including the following:

1. The average time each customer or object spends in line.

2. Average queue length

3. Average time each customer spends in the system (waiting time plus service time).

4. The average number of consumers in the system.

5. The probability that the service facility will be idle

6. Utilization of factors for the system.

7. The probability of the number of consumers in the system specifically

2.2.10. Model - Queue Model

A single line queuing model with a poisson distributed arrival pattern and exponential service time will be denoted by M / M / 1. A double line queuing model with three service facilities whose arrival pattern is a Poisson distribution and a constant service time will be denoted by M / D / 3. A queuing model with four service facilities whose

arrival patterns are Poisson distributed, and service times are normally distributed will be denoted by the notation M / G / 4.

Heizer and Render (2016: 858) explain that there are four queuing models, namely:

1. Model A, (M / M / 1 model) single line queuing model with Poisson distributed arrivals and exponential service time.

In this model the arrivals form a single line to be served by a single station. It is assumed that the system is in the following conditions:

(1) Arrivals are serviced on a first in, first out (FIFO) basis, and each arrival is waiting to be served regardless of the length of the queue.

(2) Arrivals are not tied to previous arrivals, only that the average number of arrivals does not change with time.

(3) Arrivals are represented by a Poisson probability distribution and come from an infinite or very large population.

(4) Service time varies from one customer to another and is independent of one another, but the average level of service time is known.

(5) The service time corresponds to a negative exponential probability distribution.

(6) The service level is faster than the arrival rate.

The queue formula used in model A is as follows:

λ = number of arrivals - average per unit time

μ = number of customers served per unit time

Tabel 2.1. Model A Queue Formula: M / M / 1

No	Formula	Description	Unit
1	$L_{s=} \frac{\lambda}{\mu - \lambda}$	Average number of units (customers) in the system (customers waiting and to be served)	Customers (Customers)

2	$W_s = \frac{1}{\mu - \lambda}$	Unit average time spent in the system (waiting time plus service time)	Minutes
3	$L_q = \frac{\lambda^2}{\mu(\mu-\lambda)}$	Average number of units waiting in the queue of Customers	Customers
4	$W_q = \frac{\lambda}{\mu(\mu-\lambda)} = \frac{L_q}{\lambda}$	Average unit time spent waiting in line	Minutes
5	$\rho = \frac{\lambda}{\mu}$	The utility factor for the system	
6	$P_0 = 1 - \frac{\lambda}{\mu}$	Probability of 0 units in the system (i.e. idle service units)	
7	$P_{n>k} = (\frac{\lambda}{\mu})^{k+1}$	Probability that there are more than k units in the system, when n is the number of units in the system	

Source : Heizer dan Render (2011)

2. Model B, (M / M / S model) multiple line queuing model

This model is a multiple line queuing system where there are two or more lines or service systems available to serve incoming customers. The assumption is that customers waiting for service form one line and will be served on the service system available for the first time at that time or first come, first serve. Here is the formula for model B: M / M / S

Table 2.2. Model B Queue Formula: M / M / S

No	Formula	Description	Unit

1	$P_0 = \frac{1}{\left\{\sum_{n=0}^{M-1} \frac{1}{n!}\left(\frac{\lambda}{\mu}\right)^n\right\} + \frac{1}{M!}\left(\frac{\lambda}{\mu}\right)^M \frac{M\mu}{M\mu-\lambda}} for\ M\ \mu > \lambda$	The probability that there are 0 people or units in the system	-
2	$Ls = \frac{\lambda\mu\left(\frac{\lambda}{\mu}\right)^M}{(M-1)!(M\mu-\lambda)^2} P_0 + \frac{\lambda}{\mu}$	Average unit time spent in the system	Customers
3	$W_s = \frac{Ls}{\lambda}$	Average unit time spent in the system	Minutes
4	$L_q = L_s - \frac{\lambda}{\mu}$	Average number of people or units in line	Customers
5	$W_q = W_s - \frac{1}{\mu} = \frac{Lq}{\lambda}$	Average time spent by someone in line	Minutes

Source: Heizer dan Render (2011)

3. Model C, (model M / D / 1) constant service time model

Some service systems have a fixed service time, when customers are processed according to a certain cycle such as in an automatic car wash or amusement park rides, the service time is generally constant. Here's the formula for the C: M / D / 1 model

Table 2.3. Model Queue Formula C: M / D / 1

No	Formula	Description	Unit
1	$L_q = \frac{\lambda^2}{2\mu(\mu-\lambda)}$	Average queue length	Customers
2	$W_q = \frac{\lambda}{2\mu(\mu-\lambda)}$	Wait time in line is average	Minutes
3	$L_s = L_q + \frac{\lambda}{\mu}$	The number of subscribers in the system is average	Customers
4	$W_s = W_q + \frac{1}{\mu}$	Average waiting time in the system	Minutes

Source : Heizer dan Render (2011)

4. Model D, (finite population model)

When there is a limited population of potential customers for a service facility, different queuing models should be considered. This model is different from the three previous queuing models, because currently there is an interdependent relationship between queue length and arrival rate. The extreme situation can be described as follows: a factory has five machines and all of them are broken, it is being repaired, then the arrival rate will fall to zero. Thus, the queue line becomes longer in the limited population model, so the customer arrival rate decreases. Notation:

D = The probability that a unit will have to wait in line

F = Efficiency factor

H = Average number of units currently in line

J = Average number of units not in queue

L = Average number of units waiting to be served

M = Number of service lines

N = Number of potential customers

T = Service time is average

U = Average time between units requiring service

W= Average time a unit waits in line

X = Service factor

Table 2.4. Queue Formula Model D (Limited Population)

No	Formula	Description	Unit
1	$X=\frac{T}{T+U}$	Service Factor	-
2	L= N (1-F)	Average queue count	Unit
3	$W=\frac{L(T-U)}{N-L}=\frac{T(1-F)}{XF}$	Wait time is average	Minutes
4	J= NF (1-X)	Average number of services	Unit
5	H= FNX	Amount in service is average	Unit
6	N= J+L+H	Total population	Customers

Source: Heizer dan Render (2011)

2.2.11. Services and Services

Lupiyoadi (2013: 7) services are all economic activities whose results are not only products in physical form or construction, which are generally consumed at the same time as time produced and provide added value (for example, comfort, entertainment, pleasure, or health) or solutions to problems faced by consumers.

Wijaya (2018: 66) services are any action or activity that can be offered by one party to another party, which has an intangible basis and does not result in any ownership. The production can be associated or not associated with physical products.

2.3. Research Conceptual Framework

Provision of a number of service facilities to the cashier needs to be planned in order to provide good service. The capacity of service time needs to be provided in

sufficient quantities so that demand which varies quite high can be served properly. In this case, the queue theory is a science that can help restaurants in solving problems related to queues. Thus, the company can determine the best time and facilities in order to serve customers properly and efficiently.

ρ This research was conducted by direct observation into the restaurant in order to obtain direct information. The information obtained by researchers is in the form of the number of customer arrivals and the number of cashiers available at the time of conducting the research. This study uses a single channel, single stage (single channel, single phase) and queuing discipline that means that every customer who comes early is served first (first come-first serve / FCFS). Single channel, single phase occurs where there is one service facility that is supplied by a single stream, to find out:

ρ : The usability level of the service section

P_0 : Probability that there are 0 customers in the system

$P_{n>k}$: The probability that there are more than k units in the system, when n

is the number of units in the system

L_q : Average number of customers waiting in line

L_s : Average number of customers waiting in the system

W_q : Average time a customer spends in line

W_s : Average time a customer spends in the system

Selanjutnya dilakukan perhitungan agar dapat mengetahui kinerja antrean pada restoran ini sudah berjalan optimal atau tidak optimal dalam hal kegunaan fasilitas layanan dan waktu tunggu pelanggan dalam antrean. Jika tidak optimal maka dilakukan evaluasi agar pelayanan menjadi optimal. Tahap terakhir yaitu peneliti dapat menyimpulkan serta memberikan saran kepada perusahaan mengenai sistem antrean yang optimal guna pelayanan yang lebih baik dan dapat meningkatkan kepuasan nasabah.

III. RESEARCH STRATEGY

The research strategy used is a quantitative descriptive strategy. Descriptive research is a conscious and systematic effort of one type of research that aims to obtain in-depth information and describe systematically, factually, and accurately about the facts and characteristics of certain populations, or try to describe phenomena in detail at present (Yusuf Mansyur, 2014: 62). And the type of data that will be used as a reference is primary data from the results of field surveys (Case and Field Study). So the research strategy that the researchers applied in this study was a descriptive strategy. Descriptive strategy is a type of research by describing or formulating clear data about the state of the object under study.

Echdar (2017: 284) said the research data source consisted of primary data and secondary data.

1. Primary data

Primary data is data obtained directly from the original source (not through intermediary media). To obtain this data, researchers used field research by observing directly the events or activities on the object under study and observing the average waiting time of customers guided by research instruments. The instrument used is a checklist that is adjusted to the needs of the analytical tool used, in this case the queue model, the questionnaire is then recorded based on direct observation and records the results of observations at the research location. This method was chosen because it is in accordance with the research objectives to be achieved, namely the data is obtained directly and originally from natural settings and does not ask directly to the respondent, so it does not make the respondent depressed.

2. Secondary Data

Secondary data is data obtained by researchers indirectly through intermediary media (obtained and recorded by other parties). Researchers obtained data through literature study, by reading, quoting and collecting several theories related to the research title as a reference by studying several existing theories in books, documents or news archives as well as reports that were officially created or published by Sate Taichan Goreng Restaurant. , so that it can be used as a theoretical framework related to the material to serve as a supporting reference in this study.

The data collection methods used in this study are as follows:

1. Literature Study

Data collection is carried out through various literatures such as books, journals, and other sources related to and supporting research, both from the internet and library media.

2. Observational Study

Data collection is carried out through direct observation, which the author does by taking data from the number of customer arrivals, the average waiting time in the queue, and the customer service time at the checkout until the transaction is completed for 10 working days from 15-24 January 2020. Continuous starts from 13.00 - 20.00 WIB.

This method is built in accordance with the queue model contained in the research object. The queuing model contained in the research object is a single line queuing system with a single service. Based on this model, the assumptions used are as follows:

1. Many services, one stage of service

2. Arrival based *Poisson* (λ)

3. Distributed service *Poisson* ($\lambda < \mu$)

4.*First come – first served*, where all arrivals await in lines of indefinite length (*infinite length*).

The difficulty in this model is that the service time provided to customers is not the same, so that the speed or flow between the queues is not the same. As a result, some customers may be served before other customers arrive earlier, and it is possible to shift lines in line.

To optimize the transaction process, the queuing formula can be used for model A (M / M / 1): Single line queuing system with single service as follows:

Table 3.2. Single Line Queuing System Formula with Single Service Method A (M / M / 1)

No.	Single Line Queue System Formula with Single Service Model A (M / M / 1)	Formula
1.	Probability that there are 0 customers in the system (absence of customers in the system)	$P_0=(1-\frac{\lambda}{\mu})$
2.	Average number of customers in the system	$Ls = \frac{\lambda}{\mu - \lambda}$
3.	Average time of customers in the system	$Ws = \frac{1}{\mu - \lambda}$
4.	Average number of customers in line	$Lq = \frac{\lambda^2}{\mu(\mu - \lambda)}$
5.	Average time a customer is in line	$Wq = \frac{\lambda}{\mu(\mu - \lambda)}$
6.	Probability of server busy / integrity level	$Pw = \frac{\lambda}{\lambda}$
7.	The probability that there are more than k units in the system	$P_{n>k} = (\frac{\lambda}{\mu})^{k+1}$

Source : Heizer dan Render (2015)

Description :

λ = Number of arrivals - average customer per unit time (hours)

μ = Average number of customers served per line time (hours)

P_0 = Probability that there are 0 customers in the system

Ls = Average number of subscribers in the system

Ws = Average time customers in the system are being served (minutes)

Lq = Average number of customers waiting in line

Wq = Average time a customer waits in the queue system (minutes)

Pw = Probability on busy servers

Pn>k= The probability that there are more than k units in the system

IV. RESEARCH RESULTS AND DISCUSSION

4.1 Description of Respondents

Sate Taichan Goreng is a fast food restaurant located in Summarecon, West Bekasi, which was founded in 2018 and is a direct branch of Sate Taichan Goreng which has a center in Bandung which was established in 2016, the rapid development of Sate Taichan is inseparable from its role. hundreds of professional experts are also added with the presentation of dishes that attract consumers when they first visit the outlet and the packaging is neatly packed to add to the appeal of consumers.

Sate Taichan Goreng chooses the middle to upper class segment that likes heavy fast food, coffee, and atmosphere. So that the concept that is carried out is in line with it. Namely, fast food restaurants with the concept of a five-star restaurant taste with varied and competitive prices. Indeed, apart from carrying excellence in taste and packaging, Fried Taichan Sate is also able to provide a wide variety of foods at a fairly affordable price. Not only for the upper economic groups, but also for the middle class.

Although the price is affordable, Fried Taichan Sate doesn't reduce the quality of its products. Fried Taichan Sate doesn't only sell fast food in the form of rice / lontong and various fried satay without skin, but also serves other foods in the form of drinks and banana satay as well as a comfortable atmosphere for visitors. Buyers can also enjoy cakes and a cup of delicious drinks at this Fried Taichan Satay outlet, a model like this is rarely found in other restaurants. The choice of location for Fried Taichan Satay is also different. This Fried Taichan Satay Outlet occupies a separate location that is easily accessible and is equipped with a large parking area.

4.2 Data Description

At Summarecon Bekasi Fried Taichan Satay, there is a cashier available to serve customers who will make order and payment transactions, etc.

Based on the observations of researchers, the type of queuing system model used by Summarecon Bekasi Fried Taichan Sate is a single channel single phase, where there is one cashier that can serve customers with a phase that is passed by the customer to make transactions via cashier only once. The time it takes for cashiers to serve one another is not the same.

In an effort to maintain the level of productivity in the transaction process, Summarecon Bekasi Fried Taichan Sate determines a 3-minute service standard for each customer in making transactions at the cashier. The service discipline applied to Summarecon Bekasi Fried Taichan Sate is a First Come First Served (FCFS) service discipline, where the customer comes first and then queues for the cashier that has been provided by Sate Taichan Goreng management, then the customer can immediately receive services from the cashier to place orders and make payments. at the cashier and if the customer has completed the transaction, the customer can get out of the queue and go straight to the table or place that has been provided by the management of Fried Taichan Sate, while waiting for the order to be prepared..

4.3 Research Data Analysis

Currently, Summarecon Bekasi Fried Taichan Satay serves customers 7 days a week. Within 1 day of providing 11 hours of service, the time of service provided is from 11.00 - 22.00 WIB.

Data retrieval by researchers is by making observations, with observations made by researchers at Summarecon Bekasi Fried Taichan Sate for 10 consecutive days according to the set date. Researchers can see the level of customer arrival and the level of customer service at Summarecon Bekasi Fried Taichan Sate.

The following is data on the arrival of customers at Summarecon Bekasi Fried Taichan Sate from observations (observations) for 10 days by the researcher:

Table 4.1. Hourly Customer Arrival Data

No	Date	Working days	Working hours 13.00 – 20.00 WIB							Number of Customers
			13.00-14.00	14.01-15.00	15.01-16.00	16.01-17.00	17.01-18.00	18.01-19.00	19.01-20.00	
1	15-01-20	Wednesday	20	28	15	5	10	21	6	105

2	16-01-20	Thursday	21	23	12	8	12	15	7	98
3	17-01-20	Friday	10	22	18	9	13	21	12	105
4	18-01-20	Saturday	23	17	18	5	11	18	20	112
5	19-01-20	Sunday	15	10	12	9	8	20	10	84
6	20-01-20	Monday	15	10	10	5	10	10	10	70
7	21-01-20	Tuesday	17	13	12	8	12	10	12	84
8	22-01-20	Wednesday	18	22	11	2	13	15	10	91
9	23-01-20	Thursday	16	23	12	5	14	20	15	105
10	24-01-20	Friday	21	10	17	7	15	27	15	112
Total Customers / Hour			176	178	137	63	118	177	117	

Source: Data processed (2020)

From table 4.1, it can be seen that the most customer arrivals are at 14.01-15.00 WIB. While the lowest customer arrivals are at 16.01-17.00 WIB, this is common because at that time a lot of customers are still completing their activities and work and the next lowest time is at 19.01-20.00 WIB which is the time to go to the restaurant. will close, so the number of customers who will place orders will decrease.

V. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusions

Based on the results of research that has been conducted by the author regarding the queue system at Summarecon Bekasi West Bekasi Fried Taichan Sate, the following results are obtained:

1. The results showed that the queue system at Sate Taichan Goreng Summarecon Bekasi can be said to be optimal because the level of utility is quite high, namely 69% and the value is more than 50% and almost close to 100%. The average probability of not having a customer in the system (P0) is 31%. The average time spent by a customer in the system (Ws) is 10,557 minutes and the average time spent by a customer waiting in line (Wq) is 7,557 minutes, so there is no need for service evaluation.

2. Based on the research results, the results of the queue system performance at cashier services, at 1 cashier with an average number of customer arrivals (□) of 14 customers / hour and a cashier's busyness (() of 69% and customer waiting time of 3 minutes (the average time customers wait in the system minus the average waiting time of customers in line), the researcher can say that Summarecon Bekasi West Bekasi Fried Taichan Sate can be said to have reached optimal, because it has an appropriate waiting time of 3 minutes and has a level of facility usability (□) namely 69%. This shows that the level of busy cashiers is high and there is little time for unemployed cashiers, and does not neglect the waiting time for customers in queuing, which is 3 minutes.

3. The results of customer service using the M / M / 1 queuing method at Summarecon Fried Taichan Sate, West Bekasi can be said to be optimal because it has a fairly high level of facility usability, namely 69%, which indicates a high level of cashier activity so there is no idle time. for cashiers and the appropriate customer waiting time is 3 minutes.

5.2. Suggestions

1. Researchers suggest that Summarecon West Bekasi Fried Taichan Sate can make efforts in measuring customer satisfaction such as complaints and suggestions, as well as regular customer satisfaction surveys. This was done to facilitate Summarecon West Bekasi Fried Taichan Sate in an effort to improve service quality performance, because when viewed from the research results that the company can be said to be optimal in the customer waiting system and service time, so that it can further improve company services.

2. For corporate investors, it is also advisable to carry out regular repairs to the company's operational network system because at certain times offline systems often occur which result in customers waiting for longer times and long queues, and if needed, the company can increase the number of cashier services use a self-order machine to reduce excessively high queuing levels.

3. For Science, this research is expected to provide input and contribute to the application of the M / M / 1 method in companies and daily life, to optimize service time performance and reduce the occurrence of excessive queues in the queuing system.

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