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Analysis of Waiting Time for Outpatient Services for BPJS Health Patients at Tritya Eye Clinic in Surabaya Using a Fishbone Diagram

Mateus Andhi Kurniawan[1*], Ulfi Pristiana[2], Estik Hari Prastiwi[3]
Program Studi Magister Manajemen, Fakultas Ekonomi dan Bisnis, Universitas 17 Agustus 1945 Surabaya, Indonesia
Corresponding Author: Mateus Andhi Kurniawan, 1262300049@surel.untag-sby.ac.id

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ABSTRACT

This study aims to comprehensively analyze the waiting time for BPJS Kesehatan outpatient services at Tritya Eye Clinic Surabaya, identify the fundamental root causes of the long waiting time, and develop an effective and implementable improvement strategy framework. This study adopted a sequential explanatory mixed methods (Quan → qual) approach, a robust two-stage approach to problem diagnosis. The initial quantitative phase applied Queuing Theory with the M/M/S model to objectively measure and validate the performance of the service system. This phase was followed by an in-depth qualitative phase, using the Fishbone Diagram as an analytical framework supported by data from interviews and direct observations to explore the root causes of the problem. The quantitative research results showed that the average total service time reached 64.7 minutes, significantly exceeding the established Minimum Service Standard of 60 minutes. Further analysis during peak hours revealed a critical system failure condition, where the initial examination and doctor examination stages experienced extreme overload with system utilization levels skyrocketing to 560% and 318%, respectively.

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INTRODUCTION

Health clinics, as the frontline and primary access point in the outpatient medical services ecosystem, play a vital role in a country's healthcare system. These facilities serve as a bridge between the public and more complex healthcare services, providing relatively easy, fast, and affordable access to a wide range of needs, from general practitioner consultations and preventive health check-ups to focused specialist care. One such specialty that plays a crucial role in maintaining the community's quality of life is the primary eye clinic. The importance of eye health cannot be underestimated; vision is a fundamental sense that impacts nearly every aspect of life, from children's learning abilities and adult work productivity to the independence of the elderly. Given the high prevalence of eye diseases, which, according to data from the Surabaya City Health Office (2020), ranked 8th out of 10 most common diseases in 2019, the existence of high-quality and efficient eye clinics is essential to address public health needs.

The healthcare landscape in Indonesia has undergone a dramatic transformation with the implementation of the National Health Insurance (JKN) program administered by the BPJS Kesehatan (Social Security Agency for Health). With the noble goal of achieving universal health coverage, this program has successfully opened up healthcare access for millions of people. Consequently, healthcare facilities partnering with BPJS, including specialist clinics, are faced with a massive operational challenge: an unprecedented surge in patient volume. Unfortunately, this increase in demand is often not matched by a commensurate adjustment in service capacity, whether in terms of human resources, infrastructure, or workflow efficiency. This fundamental imbalance between supply and demand has given rise to a phenomenon that has now become a chronic issue and a common feature of healthcare in Indonesia: long queues and protracted waiting times.

Waiting time, technically defined as the time from a patient's first contact with the system (registration) to receiving the core service (doctor consultation), has become a key barometer of service quality and efficiency. The government, through Law Number 30 of 2022, has established Minimum Service Standards (SPM) with a limit of no more than 60 minutes for outpatient waiting times. This standard serves as an objective reference, but in practice, many healthcare facilities, including Tritya Eye Clinic Surabaya, struggle to meet it. Waiting times exceeding the standard are no longer simply a momentary inconvenience, but a strong signal of systemic inefficiencies that have broad and profound negative impacts.

From a patient's perspective, prolonged waiting is a physically and emotionally draining experience. It can cause frustration, heighten health-related anxiety, and create deep dissatisfaction. Poor waiting experiences often become their most enduring memories, ultimately tarnishing their perception of overall service quality, even if the clinical interaction with the doctor was excellent. In the long term, this dissatisfaction can erode the foundation of patient trust and loyalty, leading them to seek alternative services, ultimately harming the clinic's reputation and sustainability. For the clinic itself, poorly managed wait times are a reflection of operational inefficiencies. They indicate wasted resources (staff may be overwhelmed at one point while idle at another), complex and inefficient workflows, and serious bottlenecks that hinder productivity and patient throughput.

At Tritya Eye Clinic in Surabaya, this phenomenon is clearly and measurably evident. Internal clinic data provides undeniable evidence. The top complaint consistently reported by patients is "too long service," accounting for 42% of all complaints received. This figure serves as a clarion call, signaling that waiting times are no longer a minor or incidental issue but have become a central issue most felt and complained about by customers. Further validation comes from quantitative data from the Advanced Referral Health Facility (FKRTL) queuing system, which records an average total service time for BPJS patients of 67 minutes. This figure definitively confirms that the clinic has exceeded the established SPM standards. This situation creates an irresistible urgency for management to shift from simply acknowledging the problem to conducting a thorough and systematic diagnostic investigation to uncover its root causes and formulate effective, data-driven, and sustainable improvement strategies.

The study of waiting time management in healthcare facilities has been the focus of extensive research, both nationally and internationally, consistently highlighting this issue as a universal challenge in service operations management. In Indonesia, a study by Dewi et al. (2020) at Dr. Achmad Darwis Suliki Regional Hospital provides a classic illustration of this problem, finding that outpatient waiting times significantly exceeded the established SPM (less than 60 minutes). The recommended solutions are fundamental and frequently encountered, namely increasing human resources (staff) and formalizing workflows through the development of Standard Operating Procedures (SOPs). This study confirms that fundamental issues such as staff shortages and the lack of clear procedures remain major obstacles in many regional healthcare facilities. Internationally, research tends to explore more sophisticated solutions. Almomani & AlSarheed (2016), in their study in Saudi Arabia, identified waiting times as a major weakness in outpatient clinics, directly impacting patient satisfaction. They not only identified the problem but also used simulation methods to test and prove that well-designed interventions can significantly reduce waiting times, demonstrating the power of modeling as a decision-making tool. Technology-based approaches are becoming increasingly dominant. Deoraj et al. (2024) proposed the development of a digital-based virtual queuing system as an innovative way to minimize physical waiting times, a solution that transforms the patient experience from a physical wait to a virtual wait.

From a purely operational management perspective, principles from other industries are often adopted. Research by Madania (2021), although conducted in a coffee shop, found a highly relevant principle: adding service units (in their case, cashiers and baristas) can optimize service levels and reduce queues. This fundamental principle of queuing theory—balancing capacity with demand—is at the heart of solutions across various sectors, including healthcare. Meanwhile, other research digs deeper into the procedural root causes. Nadira & Ratna (2022) found that waiting time issues are caused not only by internal clinic factors but also external factors. They identified the root causes of the problem in the methodological aspects, such as the lack of promotion and education to the public about the online registration system and the absence of clear SOPs, as well as the material aspects, where patients often arrive with incomplete required documents, leading to delays from the outset.

A significant research gap, the primary focus of this study, emerged at the intersection of several unique contexts: a specialist eye clinic operating as an Advanced Referral Health Facility (FKRTL) and serving a large volume of JKN-BPJS patients. Tritya Eye Clinic Surabaya faces significantly more complex operational challenges than a general hospital or primary clinic. The clinic must simultaneously manage complex service flows for multiple patient segments (general, private, and BPJS), each of which may have different administrative and verification flows. Very specific internal data—a 42% complaint of "too long service" and a total service time of 67 minutes for BPJS patients—strongly indicate that generic solutions that may have worked elsewhere will be ineffective without in-depth analysis tailored to the specific processes at this clinic.

The novelty and primary contribution of this study lies in its analytical methodology, namely the use of the Fishbone (Ishikawa) Diagram as the primary diagnostic analysis tool to systematically, holistically, and structuredly dissect the root causes of the problem. Fundamentally different from previous studies that tend to stop at identifying the problem or proposing general solutions, this study will conduct an "autopsy" of the waiting time problem. This approach will classify the specific causes of long waiting times into comprehensive 6M categories (Man, Machine, Method, Material, Measurement, Environment). The use of this framework forces the analysis to go beyond the symptoms (long queues) and dig to the roots, such as inefficient work processes, suboptimal staff allocation, or technological constraints. This approach allows for much more precise problem identification and relevance to the unique operational context of an eye clinic serving BPJS patients. Thus, the purpose of this study is not only to confirm that the waiting time at Tritya Eye Clinic has not met the standard, but more importantly, to provide an in-depth and evidence-based diagnostic analysis, which can serve as a clear roadmap for management to formulate targeted, efficient, and sustainable improvement strategies.

Table 1. Patient Complaints at Tritya Eye Clinic Surabaya (Jan-Dec 2024)

No.	Complaint	Count	Percentage
1.	Service is too slow	10	42%
2.	Unsatisfactory staff service	8	33%
3.	Availability of the intended doctor	3	13%
4.	Inadequate facilities and infrastructure	2	8%
5.	Information not received by the patient	1	4%
Total		24	100%

Source: Internal Data of Tritya Eye Clinic Surabaya, 2024

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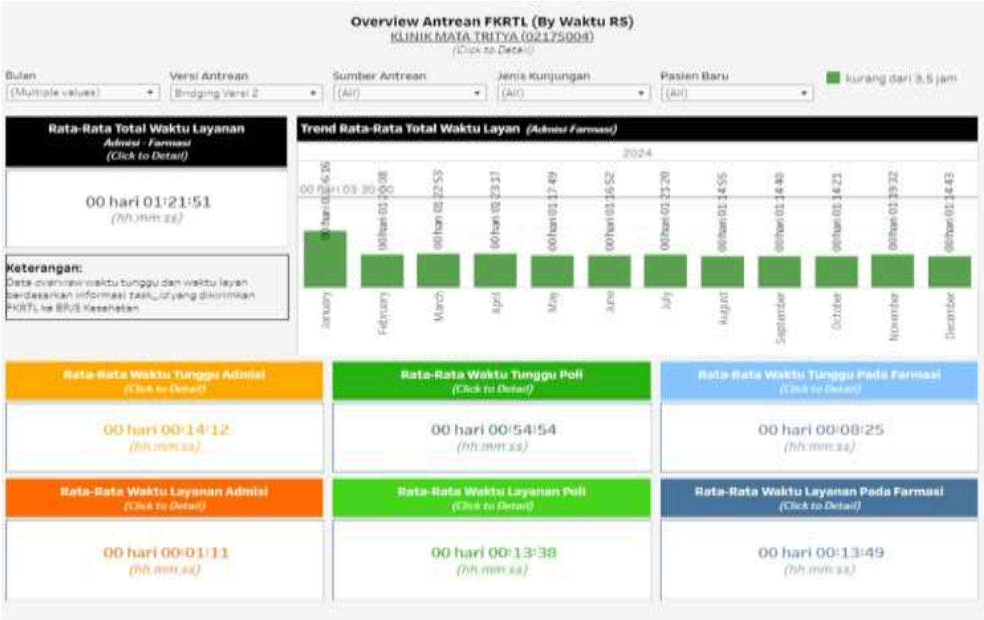

Figure 1. Average Total Service Time (Admissions-Pharmacy) 2024

Source: Tritya Eye Clinic FKRTL Queue Overview, 2024

Based on the complaint data and service time graph above, it is clear that waiting time is the most pressing issue to be addressed. The high percentage of complaints (42%) and the consistent average service time exceeding 60 minutes strongly justify this research. Therefore, this study aims to analyze waiting times for outpatient services for BPJS Kesehatan patients at the Tritya Eye Clinic in Surabaya using a Fishbone diagram, with the ultimate goal of formulating a comprehensive improvement strategy.

LITERATURE REVIEW

Service Waiting Time

Waiting time, in the context of outpatient healthcare, is generally defined as the total duration a patient spends from the time they first contact the service system (usually at the point of registration) until they receive the core service they were seeking (a consultation with a doctor or other healthcare professional). This concept is more than just a number; it is a quantitative representation of the patient experience and the operational efficiency of a healthcare facility. According to the Decree of the Minister of Health of the Republic of Indonesia No. 129/Menkes/SK/II/2008 concerning Minimum Service Standards (SPM) for Hospitals, this indicator serves as an important and official benchmark for assessing the efficiency and responsiveness of a healthcare facility. The established standard is that outpatient waiting times should ideally not exceed 60 minutes. Waiting times exceeding this standard have twofold implications. First, they indicate fundamental operational inefficiencies, such as workflow bottlenecks, a chronic imbalance between patient demand and available service capacity, or overly complex and bureaucratic process flows. Second, and often more consequential, they directly impact patient perceptions of service quality. A systematic literature review by Paramesthi & Prayoga (2023) confirmed a significant negative relationship between waiting time and patient satisfaction.

This means that the longer patients wait, the lower their satisfaction, regardless of the quality of the clinical service they ultimately receive. Therefore, wait time management is not simply an attempt to meet administrative standards, but rather a crucial strategy for holistically improving service quality, managing public perception, and maintaining customer loyalty in an increasingly competitive healthcare landscape.

Queueing Theory

Queuing theory is a powerful discipline within operations research, which uses mathematical models to analyze, understand, and predict the behavior of systems in which "customers" (who can be people, physical objects, or data) arrive for service, may have to wait in a queue if the service facility is busy, and then leave the system after being served. This theory provides a valuable analytical framework for balancing two often conflicting forces in service management. According to Heizer and Render (2016), the primary goal of queue analysis is to find the optimal equilibrium point between the costs of providing service (e.g., staff salaries, facility maintenance costs, technology investments) and the "costs" of waiting borne by customers (e.g., wasted time, frustration, dissatisfaction, and potential loss of future business). By decomposing the system into basic components such as the customer arrival pattern (arrival process), service time distribution, number of servers or service facilities, and queuing discipline (e.g., First-Come, First-Served, or FCFS), a manager can make data-driven decisions to improve efficiency and effectiveness.

The basic structure of a queuing system can be classified into various models, ranging from the simplest to the most complex, often using Kendall's notation. The most basic model is the Single-Channel, Single-Phase (M/M/1) model, which describes a system with a single queue line served by a single server, such as a single ticket counter at a small train station. A more relevant model to the context of this research is the Multi-Channel, Single-Phase (M/M/S) model. This model describes a system where there is a single main queue line served by multiple servers working in parallel. This accurately reflects many real-world service systems, such as a teller system at a bank, multiple cashiers at a supermarket, or multiple registration counters at a clinic. There is also the Multi-Phase model, where customers must pass through several service stations sequentially to complete their service. The service flow in many healthcare facilities, which begins with registration, continues with an initial examination by a nurse, and finally a consultation with a doctor, is a perfect example of a Multi-Channel, Multi-Phase system.

The application of queuing theory in the healthcare context is vital for scientifically diagnosing waiting time problems. By measuring key parameters such as the average patient arrival rate per unit time (lambda), the average service rate per server (mu), and the number of available servers (s), we can calculate a series of performance metrics that provide deep insights into the health of the system. One of the most crucial metrics is the system utilization rate (rho), which measures the proportion of time that the service facility (staff) is busy. If the rho value approaches or, more severely, exceeds 1 (or 100%), this is a clear mathematical indication that the system is overloaded with demand exceeding capacity and queues will grow exponentially. Other important metrics include the average time customers spend waiting in line (W_q) and the average total number of customers in the system, both waiting in line and being served (L_s). This analysis allows for objective and quantitative identification of bottlenecks in the service flow, providing a sound scientific basis for designing appropriate interventions, such as adjusting staffing during peak hours, investing in technology, or reengineering work processes.

Fishbone Diagram

The Fishbone Diagram, also commonly known as the Ishikawa Diagram (in honor of its creator, Dr. Kaoru Ishikawa) or Cause-and-Effect Diagram, is a fundamental visualization tool in quality management. It was developed in the 1960s as part of a basic quality control toolkit, with the primary goal of helping teams identify, explore, categorize, and ultimately understand all potential root causes of a specific problem or effect. It is called a "Fishbone" because its structure visually resembles the skeleton of a fish. In this diagram, the "head of the fish," located on the right side, represents the primary problem, effect, or undesirable output being analyzed. The main "backbone" is the horizontal line leading from the head. From this backbone emerge major "bones" or branches that represent general categories of causes. It is a particularly effective tool used as a framework in team brainstorming sessions, as it structures the often-random thought process into a logical and comprehensive analysis, ensuring that no important aspects are overlooked.

In modern quality management practices, particularly in manufacturing and service, the most commonly used and time-tested cause category framework is the 6Ms: Man, Machine, Method, Material, Measurement, and Mother Nature/Environment. This 6Ms framework provides a logical and comprehensive taxonomy for problem analysis. The Man category relates to all factors related to human resources, such as competency levels, training needs, fatigue, communication, or inadequate staffing. The Machine category covers all equipment, hardware, and technology used in the process, including its reliability, maintenance, and calibration. The Method category is an analysis of workflows, standard operating procedures (SOPs), policies, and work instructions—essentially, “the way we do things.” The Material category focuses on the raw materials, inputs, or information used in the process. The Measurement category reviews the measurement, data, and inspection systems used to monitor and control the process. Finally, the Environment category considers physical conditions (temperature, lighting, layout) or work culture that can affect outcomes.

The application of a Fishbone Diagram in the context of healthcare, as used in this study to analyze complex issues such as wait times, is highly relevant and valuable. Once the primary problem (“longer wait times for services exceeding the standard”) is established at the head of the fish, the research team can use the 6M categories as a guide to map all potential causes identified through various data collection methods, such as staff interviews, direct field observations, and document analysis. For example, under the category of People, sub-causes might be identified such as "insufficient staffing during peak hours" or "lack of training on the new system." Under Method, "slow and cumbersome physical medical record handover flow" might be identified. Under Machine, "frequent IT system errors" might be identified. By visualizing all these potential causes in one structured diagram, the complex cause-and-effect relationships between factors become much clearer and easier to understand. This allows the team to move from simply blaming symptoms to identifying the most fundamental and influential root causes, allowing them to prioritize the most effective and high-impact remedial actions.

METHODOLOGY

This study was designed using a mixed methods approach, specifically an Explanatory Sequential (Quan → qual) design. This design was strategically chosen due to its superior ability to provide a comprehensive and multi-layered understanding of the waiting time problem, which has both quantitative and qualitative dimensions. The first stage is quantitative analysis (Quan), which serves as a diagnostic foundation. The goal of this stage is to objectively measure the performance of the existing service system and provide irrefutable empirical evidence regarding the existence and scale of the waiting time problem. In this stage, time data for each phase of the service from registration, through the initial examination (history taking and refraction), to the completion of the doctor's examination was collected through systematic direct observation over a one-week period to capture daily variations. The collected numerical data were then analyzed in depth using mathematical models from Queuing Theory, specifically the M/M/S (Multi-Channel, Multi-Phase) model, to calculate a series of key performance metrics. These metrics include the system utility rate (rho), which indicates the level of staff busyness; the average waiting time in the queue (W_q); and the average total number of patients in the system (L_s). The result of this stage is a clear quantitative portrait of where and how severe the bottlenecks are occurring.

The second phase is qualitative analysis (qual), designed to answer the why questions behind the numbers generated in the first phase. This phase aims to explain, provide context, and gain a deeper understanding of the quantitative findings. In this phase, in-depth semi-structured interviews were conducted with four key informants purposively selected based on their strategic roles in the service flow. These informants were the Medical Records Manager (representing the starting point), the Head of the Outpatient Unit (representing the core nursing process), an Ophthalmologist (representing the main clinical service), and the Head of the Facilities and Infrastructure Unit (representing the supporting infrastructure). These interviews were designed to elicit their perspectives, experiences, operational challenges, and suggestions for improvement. In addition to the interviews, direct observation of work processes was conducted to capture dynamics and obstacles that may not have been revealed in the interviews. This rich and diverse qualitative data was then systematically analyzed and structured using a Fishbone Diagram with the 6M framework (Man, Machine, Method, Material, Measurement, Environment). This tool serves to identify, categorize, and map the root causes of problems visually and logically. The main strength of this design lies in the integration of quantitative and qualitative findings, which allows the formulation of improvement strategies that are not only based on valid empirical data but also highly relevant and implementable in the unique social and operational context of Tritya Eye Clinic Surabaya. Data validity was ensured through a process of source triangulation (comparing information from various informant roles) and method triangulation (comparing interview data with observation data).

RESEARCH RESULTS AND DISCUSSION

Results of Measurement of Waiting Time and Length of Service Waiting Time Based on Queuing Theory

1. Initial Diagnosis: Actual Performance and Problem Decomposition

The first step in this investigation was to measure the actual performance of the service system to obtain a realistic picture on the ground. Data carefully collected over a one-week observation period definitively showed that the average total service time spent by patients at Tritya Eye Clinic, from the point of registration to the completion of the doctor's consultation, was 64.7 minutes. This single figure immediately served as the first warning signal and irrefutable quantitative evidence, as it directly confirmed that the clinic's performance was below established standards. With the Minimum Service Standard (SPM) mandating a maximum wait time of 60 minutes, this 4.7-minute overrun, while seemingly small, is indicative of systemic inefficiencies impacting hundreds of patients each week. The following table presents daily data demonstrating the consistency of this problem.

Table 2 Daily Service Waiting Time (Minutes)

Date	Average Registration Duration	Average Service Waiting Duration (Initial Examination)	Average Service Duration (Doctor)	Total Service Waiting Time
May 5, 2025	2	57	11	70
May 6, 2025	2	45	7	54
May 7, 2025	2	44	6	52
May 8, 2025	2	54	9	65
May 9, 2025	2	51	12	65
May 10, 2025	2	62	12	76
May 11, 2025	1	60	10	71
Average	1.8	52.3	9.5	64.7

Source: Research observation results, 2025

However, this average, like other aggregate statistics, tends to mask the complexity that lies beneath. A more crucial and illuminating analysis comes from decomposing this total time of 64.7 minutes into its component parts. A patient's journey through the clinical care pathway can be divided into three main phases, and the time allocation within each phase exhibits a very extreme and unequal disproportion:

1. Registration Phase: This process was remarkably efficient, with an average completion time of just 1.8 minutes. This speed indicates that the entry point to the clinic's service system is not a major source of delay.
2. Doctor Examination Phase: The duration of direct service by a specialist doctor, which is a core service, also shows a relatively reasonable and efficient time, namely an average of 9.5 minutes.
3. Initial Examination Phase: This is where the most significant anomaly lies and is the epicenter of the entire wait time issue. This middle phase, which includes the history taking process by the nurse and the refraction examination by the optical refractionist, takes up the largest portion of the patient's time, averaging 52.3 minutes.

This single component dramatically dominates the overall service time, accounting for over 80% of the total time patients spend in the clinic. The most fundamental and game-changing finding of the analysis is that this 52.3 minutes is not passive waiting time. The research data explicitly identifies that the average active waiting time (the time during which patients are actively being served by staff) for this stage is 50.43 minutes per patient. This is a crucial revelation: the biggest problem reflected in the average data is not the length of time patients wait to be served, but rather the length of the service process itself. The implications of this finding are profound, as it shifts the focus of the solution from simply queue management (managing patient flow) to the urgent need to reengineer internal work processes (optimizing each step in the 50-minute examination). When this service time is subtracted, the remaining time, which is pure waiting in line (waiting before the initial examination and before seeing the doctor), averages only 1.87 minutes. These extremely low numbers create a sharp paradox: how can a clinic exceed waiting time standards when the data shows such short waiting times?

2. Advanced Diagnosis with Queuing Theory: Unraveling Paradoxes and Revealing System Failures

This paradox demonstrates the fatal limitations of using averages to analyze dynamic systems. To debunk this statistical illusion and diagnose the true health of a system under stress, Queuing Theory is applied to a worst-case scenario: the day shift, when staffing is at its minimum. The analysis uses an M/M/S model and focuses on the system utilization rate (rho) metric, which measures how busy staff are. A rho value above 100% indicates system overload.

Table 3 Analysis of Queuing System Based on Utility Level (rho)

Service Phase	Shift	Arrival Rate (λ) (patients/min)	Service Time (Ts) (minutes)	Service Rate (μ) (patients/min)	Number of Staff(s)	Total Capacity (s x μ)	Utilization Rate (ρ = λ / (sx μ))	Status
Registration	All	0.333	1,711	0.585	4	2,340	14.2%	Very Smooth
	Morning	0.333	50.43	0.0198	5	0.099	336%	Critical

Initial Examination								Overload
	Afternoon	0.333	50.43	0.0198	3	0.059	560%	System Collapse
	Evening	0.333	50.43	0.0198	4	0.079	420%	Critical Overload
Doctor's Examination	Morning	0.333	9.57	0.1045	3	0.314	106%	Overload
	Afternoon	0.333	9.57	0.1045	1	0.105	318%	Critical Overload
	Evening	0.333	9.57	0.1045	2	0.209	159%	Severe Overload

Source: Research data analysis, 2025

The results of this queuing theory analysis are dramatic and reveal a much worse reality than the average figures suggest.

1. Registration Stage (s=4): A utility rate (rho_1) of only 14.2% mathematically proves that the registration system has far too much capacity. With four staff, the total capacity is 2.34 patients per minute, while only 0.333 patients arrive per minute. This means that registration staff have a significant amount of idle time, and queues at this point are almost impossible.
2. Initial Examination Stage (Day Shift, s=3): The situation has taken a 180-degree turn. With only three officers and extremely long service times (50.43 minutes), the utilization rate (rho_2) skyrockets to 560%. This is a catastrophic system failure. In practical terms, this means that for every one patient successfully served, nearly six new patients have arrived and joined the queue. The system is under extreme overload, causing the queue to grow indefinitely.
3. Doctor Examination Phase (Day Shift, s=1): With only one doctor on duty, this phase becomes the second critical bottleneck. The utilization rate (rho_3) reaches 318%. Demand for doctor services is more than three times greater than available capacity.

Conclusively, queuing theory analysis mathematically proves that during peak periods, the clinic's service system is essentially in a state of failure. The initial screening and doctor's appointment stages are severely overloaded, creating a critical bottleneck that leads to unpredictable and potentially very long wait times—a harsh reality masked by seemingly low weekly averages.

Root Cause Analysis of Service Waiting Times Using the Fishbone Approach

To understand why this quantitatively proven systemic failure occurred, a Fishbone Diagram was used to structure and deeply analyze the qualitative findings from interviews and observations. This analysis dissects the problem into the 6M framework, revealing the complex interaction of various causal factors.

a. *Method*

Methodological aspects, encompassing workflow and procedures, were identified as the most dominant and fundamental cause. The root cause was not the queue itself, but rather systemic inefficiencies in the core process, manifested in the initial examination service duration of 50.43 minutes. This unusually long time indicates significant waste in the workflow, such as unnecessary staff movement to retrieve equipment, duplication of data recording between manual records and EMR input, or examination steps that could be standardized and expedited without sacrificing quality. These inefficient processes automatically become the rate-limiting step in the overall service flow, creating backlogs before patients even reach the doctor's consultation stage.

These inefficiencies are exacerbated by a reliance on manual, paper-based workflows, particularly in medical records management. The slow, manual handover of physical medical records creates significant lag and delays between service steps. An interview with the Head of the Outpatient Unit explicitly stated, "The factor that contributes to long wait times is waiting for medical records from the registration officer." This manual process is not only slow but also prone to misplacement and loss, creating hidden, unproductive waiting time and directly increasing the total duration of patient stays in the clinic. Furthermore, reactive, rather than proactive, queue management exacerbates the situation. Clinics experience a backlog of patients at certain times, a problem exacerbated by the fact that not all BPJS patients utilize the online queuing system (MJKN). This creates an unevenly distributed pattern of patient arrivals, leading to peak loads that paralyze the system during peak hours, while capacity may be underutilized at other times.

b. *Human Resources*

Human resource factors emerged as the second pillar of system failure, primarily due to staff allocation disproportionate to the workload during peak hours. This is not merely a perception, but a fact mathematically proven through queuing theory analysis. The reduction in staffing on the day shift (only three staff members for initial examinations and one doctor) was the direct cause of the capacity bottleneck that led to the system's collapse. From a staff perspective, utilization rates of 560% and 318% created a highly stressful work environment, increasing the risk of burnout, lowering morale, and significantly increasing the potential for medical errors due to haste.

This capacity crisis is further exacerbated by unanticipated variability in patient conditions within the scheduling system. Outpatient Unit Heads and Specialists highlighted that treating patients who are less cooperative or require special attention (e.g., children, elderly people with mobility or cognitive limitations, people with disabilities) naturally lengthens the duration of care. In a system already operating far beyond its capacity, there is no "wiggle room" or buffer time to absorb this variability. Consequently, a single patient requiring longer wait times can cause a domino effect, delaying the entire queue and exponentially worsening the backlog.

c. Machines/Equipment

The machinery and equipment aspect highlights the dual nature of the problem: dependence on outdated technology and the unreliability of modern technology. The physical medical record system itself is an outdated and fundamentally inefficient "machine" in a high-volume healthcare environment. This dependency is a systemic problem that is at the root of slow and risky handover flows. Unsurprisingly, all key informants, from administrative staff to physicians, voiced the urgency of transitioning fully to Electronic Medical Records (EMR) as a transformative solution.

Ironically, modern technological infrastructure, which should be the solution, often becomes the source of new problems. The instability of the existing IT infrastructure is a significant obstacle. Periodic technical issues with the internal SIM Clinic, the frequent errors or slowness of the BPJS VClaim system, and problems with the fingerprint verification tool often halt or drastically slow down the service process, especially at the registration entrance. Every minute of downtime in these systems directly translates into increased waiting times for patients, creating an unpredictable and difficult-to-manage bottleneck.

d. Environment

The physical environment in which services take place plays a significant role in shaping patient perceptions. Inadequate waiting room capacity during peak hours is a problem acknowledged by the Head of the Facilities and Infrastructure Unit. Overcrowded waiting rooms, where patients and families may have to stand or be crowded, not only create physical discomfort but also significantly worsen psychological perceptions of waiting time. Based on the principles of waiting time psychology, waiting in uncomfortable, noisy, and crowded conditions will make the objective duration feel significantly longer and more stressful.

In addition to capacity, spatial layouts that potentially impede flow are also a concern. Internal considerations for space reorganization demonstrate an awareness that the current physical layout may not fully support the most efficient patient flow. Unintuitive layouts can lead to confusion, unnecessary staff and patient movement (waste of motion), and create intersecting flows that actually slow down the overall process, rather than streamline it.

e. Measurement

The analysis revealed problems with how performance was measured and understood. Management's reliance on average metrics proved highly misleading. A pure average wait time of just 1.87 minutes risked creating a false sense of security and prevented management from recognizing and addressing system failures that regularly occurred during peak periods, which are the most impactful experiences for most patients. Effective performance measurement must go beyond averages and begin tracking metrics such as variance, 90th percentile wait times, and peak hour performance.

More fundamentally, there's a crucial gap in the definition of "wait time" itself. From a clinic's operational perspective, "wait time" might simply be defined as passive time spent in line. However, from a patient's perspective, "wait time" is the total duration they spend at the facility, their total "time cost." When active service times (such as an initial exam of 50.43 minutes) are excessively long, patients still perceive them as part of the "wait." This failure to understand and measure performance from the patient's perspective is a major obstacle to achieving true customer satisfaction.

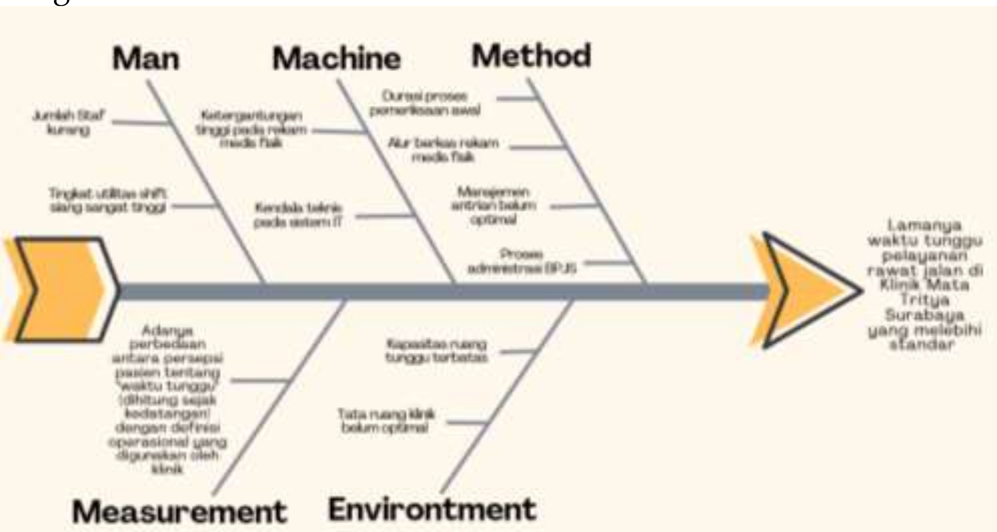

Figure 2. Fishbone Analysis of the Root Cause of Service Waiting Time

Strategy Design for Improving Waiting Time for Services at Tritya Eye Clinic Surabaya

Based on an in-depth multifactorial analysis that identified systemic issues ranging from work processes and resource allocation to technological infrastructure, the design of an improvement strategy cannot be partial or one-size-fits-all. It requires a holistic, structured, and evidence-based approach that simultaneously addresses the root causes from multiple angles. This strategy is formulated into three interrelated and reinforcing pillars, with specific actions designed for the short, medium, and long term.

1. Pillar I: Human Resource Optimization and Work Process Reengineering (Focus on Man & Method)

This pillar directly addresses the two most fundamental root causes identified: the imbalance in human resource (HR) capacity that causes system shutdowns during peak hours, and the inefficiency of core work processes that consume excessive time. The goal is to rebalance capacity with demand and make workflows leaner, faster, and more efficient.

The most urgent first step is to address the capacity crisis. This isn't simply about adding staff, but about making intelligent adjustments. Management should immediately conduct daily and weekly workload analyses to accurately map patient arrival patterns and identify peak hours. Based on this data, rescheduling and staffing of nurses, refractionists, and physicians should be implemented during the afternoon shift, which has been mathematically proven to be extremely overloaded (utilization of 560% and 318%). Options range from reallocating staff from quieter shifts, offering flexible work hours centered around peak times, to hiring part-time staff specifically to handle peak loads. The justification is clear: this is the most direct intervention to address the capacity shortage. Without adequate capacity, other process improvements will be ineffective. This is a step to "stop the bleeding" before performing more complex "surgery" on the process itself.

2. Pillar II: Accelerating Comprehensive Digital Transformation (Focus on Machine & Method)

This pillar aims to replace outdated, manual, and unstable work infrastructure with an integrated, reliable, and efficient digital system. This is a long-term investment that will lay the foundation for future operational excellence. Management must prioritize the complete transition from physical medical records to Electronic Medical Records (EMR). This requires the development of a clear and measurable roadmap, not just an intention. This roadmap should include: investment in adequate hardware (computers/tablets) at every point of service, selection of a user-friendly EMR system, comprehensive and recurring training for all staff to ensure smooth adoption, and allocation of resources for the gradual digitization of legacy medical records. The justification is compelling: it is the most effective solution to permanently eliminate the bottleneck caused by searching and transferring physical files. EMR will speed up information flow, reduce the risk of misinterpretation of handwritten notes, improve patient data security, and provide structured data for better performance analysis.

3. Pillar III: Reengineering the Physical Environment and Patient Perception Management (Focus on Environment & Measurement)

This pillar addresses the physical and psychological dimensions of the waiting experience, which are often as important as the actual wait time in shaping patient satisfaction. This is a low-cost, high-impact change. Management should create and train registration staff to implement a new standard operating procedure (SOP): providing each patient with a realistic wait time estimate at check-in. This information should be based on real-time queue conditions and the number of physicians on duty. Additionally, installing digital signage in the waiting room displaying the current queue status (e.g., Now Serving Number A-50, Next A-51) would be helpful. The psychology of waiting shows that waiting with uncertainty feels significantly longer than waiting with clear expectations. Transparency, even when the news is less than favorable (e.g., "Your estimated wait time is 90 minutes"), has been shown to significantly increase patient satisfaction and reduce frustration by providing them with a sense of control and certainty.

The integrated and committed implementation of these three evidence-based strategic pillars will not only be a solution to meet the 60-minute waiting time standard, but will also be a transformative step for Tritya Eye Clinic to evolve into a more efficient, responsive, and truly patient-centered organization. The integrated and committed implementation of these three pillars of evidence-based strategy will not only be a solution to meet the 60-minute wait time standard, but will also be a transformative step for Tritya Eye Clinic to evolve into a more efficient, responsive, and truly patient-centered organization.

CONCLUSIONS AND RECOMMENDATIONS

Overall, this study concludes that the chronic waiting time problem at Tritya Eye Clinic Surabaya is not simply a phenomenon of long queues, but rather a manifestation of a complex and interconnected network of problems. The root cause is systemic, centered on inherently long core processes, strategically inadequate human resource capacity when facing peak loads, and suboptimal work methods and supporting infrastructure. The average total service time recorded at 64.7 minutes, which exceeds the 60-minute SPM standard, was dominated by the active service duration during the initial examination phase, which reached 50.43 minutes. This finding shifts the focus from mere queue management to the urgent need for process reengineering. Further queuing theory analysis demonstrated systemic failures during peak hours, with staff utilization rates skyrocketing to 560% during initial examinations and 318% during doctor's examinations. These figures mathematically confirm conditions of extreme, intolerable overload.

Based on these multifactorial findings, a holistic improvement strategy framework based on three key, mutually reinforcing pillars is recommended. The first pillar is human resource optimization and work process reengineering. The most urgent step is adjusting the allocation of staff to the day shift to address the quantitatively proven capacity bottleneck. This should be accompanied by the adoption of a continuous improvement framework such as Lean to systematically analyze and eliminate waste in the initial examination flow, which takes 50 minutes. The second pillar is the acceleration of the total digital transition. This centers on the full implementation of Electronic Medical Records (EMR) to eliminate the bottleneck caused by reliance on physical files, and is supported by the optimization and widespread promotion of the online queuing system (MJKN) to equitably manage the distribution of patient arrivals. The third pillar focuses on reengineering the physical environment and perception management. This includes reorganizing waiting areas to improve flow and capacity, and, importantly, implementing a proactive communication policy regarding estimated wait times to patients to manage expectations and reduce frustration. The integrated implementation of these three pillars of evidence-based strategy will not only enable clinics to meet established wait time standards, but will also fundamentally improve operational efficiency, enhance service quality, and most importantly, restore patient satisfaction and trust.

ADVANCED RESEARCH

Future studies can employ technological and predictive analysis approaches to enhance outpatient service efficiency. The use of system simulations and artificial intelligence (AI) can help predict patient surges and optimize staff scheduling and resource allocation in real time. Additionally, further research on integrating digital queueing systems and electronic medical records (EMR) can evaluate their impact on waiting times and patient satisfaction, leading to a more adaptive and patient-centered healthcare service system.

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