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Analysis of the Relationship Between Drug Stockout Incidents and the Use of Hospital Management Information System (SIMRS) Technology with Patient Satisfaction at the Pharmacy Installation of Bogor City Hospital

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ABSTRACT

Drug stockouts remain a significant challenge in healthcare systems, particularly in hospital pharmacy installations, directly impacting patient treatment and satisfaction. Efficient drug inventory management is crucial to mitigating these incidents. The adoption of Hospital Management Information System (SIMRS) technology presents a potential solution to optimize inventory control and enhance service quality. This research analyzes the relationship between drug stockout incidents and the use of Hospital Management Information Systems (SIMRS) technology with patient satisfaction at the Pharmacy Installation of Bogor City Hospital. Drug stockouts significantly affect patient treatment and satisfaction, necessitating efficient drug inventory management. The research employs a cross-sectional analytical approach, collecting data from pharmacy personnel and patients through surveys. The findings indicate that drug stockouts occur frequently, influenced by factors such as delayed deliveries and payment issues. Conversely, the effective implementation of SIMRS technology enhances drug management efficiency and improves patient satisfaction. Statistical analysis reveals a significant correlation between the incidence of drug stockouts and patient satisfaction, as well as a strong positive impact of SIMRS usage on reducing stockouts. The study highlights the importance of optimizing SIMRS to ensure drug availability, thereby enhancing the quality of healthcare services.

Keywords: Drug stockouts, patient satisfaction, Hospital Management Information Systems (SIMRS), healthcare quality, inventory management.

INTRODUCTION

Drug stockout refers to a situation when the supply of drugs in hospitals or other healthcare facilities is depleted or unavailable to meet patient demand (Zuma, 2022). Drug stockout can interfere with the patient's treatment process, causing delays in the administration of therapy and thus affecting the quality of care provided. Therefore, effective and efficient drug inventory management is essential to avoid stockout events that can harm patients (Bahiru Tefera & Tilahun Anbessa, 2022). With a good system in place, hospitals can ensure that the medications necessary for the patient's therapy are always available, as well as improve patient safety and comfort during treatment (Embrey, 2018).

In addition to internal factors that affect the occurrence of drug stockout, such as immature planning and inefficient management, external factors such as disruptions in the supply of drugs from manufacturers or distribution can also trigger stock shortages. Hospitals' reliance on limited drug suppliers or logistical issues, such as delivery delays, can make drug stocks unsecured (Made, Sanjaya, & Darma, 2023).

Several studies and reports show that drug stockouts are a problem that continues to occur globally. The incidence of drug stockouts in hospitals from various countries has been reported

since 2018 (WHO, 2021). The WHO states that more than 50% of developing countries face ongoing drug supply shortages. Countries with limited resources, including those in Africa and Asia, are most often stocked out on essential medicines such as antibiotics, anti-malarial drugs, as well as medicines for chronic diseases. According to the WHO, this problem is also caused by a lack of an efficient logistics system and inadequate investment in the health sector.

A study published in *The Lancet Global Health* shows that in many Sub-Saharan African countries, more than 30% of hospitals experience drug stockouts in a given period, especially for vital drugs such as antiretrovirals (ARVs) for HIV. Countries such as Uganda, Tanzania, and Kenya report high stockout levels, indicating logistical and drug supply chain management challenges that must be improved (World Health Organization, 2019).

A report from USAID discussing the resilience of health systems in developing countries states that drug shortages are common in low- and middle-income countries. USAID recommends strengthening drug information systems and improving supply chains to reduce stockouts, which have a direct impact on the quality of patient care (WHO, 2021). Countries with weak health systems often face higher risks associated with drug shortages. Indonesia, for example, has been reported to experience several instances of stockouts for critical medicines in hospitals caused by inefficient procurement and distribution issues (GHSI Report, 2019).

According to the Indonesian Ministry of Health in 2020, it was reported that more than 20% of hospitals in Indonesia experience a shortage of essential medicines every year. Especially in government hospitals such as regional general hospitals (RSUD), stockouts often occur for essential medicines needed by patients with chronic diseases and infections (apt. Hanie Kusuma Wardani, M. Farm., 2023). Several reasons contribute to this, including delays in the procurement of medicines, limited funds, and distribution problems occurring in the national logistics system.

Research conducted by the Center for Health Service Research and Development (P2P-Kemenkes) from 2019 to 2021 found that more than 30% of government hospitals experienced drug stockouts at least once a year. Drugs often in short supply include those for infection therapy, such as antibiotics, and drugs for patients with chronic diseases like hypertension and diabetes (P2PM Directorate, 2022). This study also shows that hospitals in remote areas experience stockouts more frequently than hospitals in big cities, mainly due to distribution difficulties and procurement administration problems.

Based on a report released by the Audit Board (BPK) in 2020, there are indications that the procurement of medicines is not timely and does not meet needs. Some government-owned hospitals are unable to meet patient demand due to insufficient drug stock, which causes patients to not receive treatment as needed (Wilda et al., 2024). This highlights imperfections in the planning, procurement, and inventory management of drug supplies in government hospitals.

A case study at Cipto Mangunkusumo Hospital (RSCM) showed periodic drug stockouts for certain types of drugs, especially those with high prices and which require special procurement procedures. Cancer drugs and biological drugs for the therapy of autoimmune diseases are the most often in short supply. The main factors identified are problems in the drug procurement system and dependence on imported products, often hampered by long bureaucratic processes (Ministry of Health, 2020).

The phenomenon of stockout not only interferes with the patient's healing process but can also reduce patient satisfaction with pharmaceutical services in hospitals (Hidayati, 2020). In an ideal healthcare system, the availability of drugs must be maintained so that patients can get the right treatment. When medicines are not available, either due to poor procurement management or mismatches between demand and supply, the quality of services will decline and patient satisfaction will be negatively affected (Indarti, Satibi, & Yuniarti, 2019).

The importance of analyzing the influence of stockout incidents cannot be ignored, as these incidents directly impact the quality of hospital pharmacy services and affect patient trust in the hospital itself (George & Elrashid, 2023). Therefore, to increase patient satisfaction, it is important to overcome the problem of stockout through more effective approaches, one of which is by using technology (Fahrul Pratama & Purwanto, 2023).

In recent years, the use of information technology, especially *Hospital Management Information Systems* (SIMRS), has become an increasingly relevant solution for drug management in hospitals. By utilizing SIMRS, hospitals can avoid stockouts that often occur due to inefficient inventory management or errors in drug procurement planning. Research by Wijaya and Nugroho (2020) shows that the implementation of SIMRS can reduce the incidence rate of drug stockout, increase procurement efficiency, and ultimately have a positive impact on patient satisfaction.

One of the most important aspects of using SIMRS is its ability to integrate the entire drug management process in one digital platform. This includes automatic procurement, distribution, and monitoring of drug stocks, which can speed up decision-making and improve hospitals' responses to fluctuations in drug demand. Research by Sari and Wulandari (2021) shows that the good use of SIMRS can minimize human error in drug stock management and improve timeliness in drug procurement, ultimately reducing the incidence of stockout. Thus, the use of SIMRS technology has proven to be a key factor in overcoming stockout problems and improving the quality of pharmaceutical services.

The level of patient satisfaction in a hospital pharmacy facility is greatly influenced by the availability of the medications they need. A positive patient experience occurs when medication is available according to the prescription and can be administered on time. Conversely, the continuous occurrence of drug stockouts creates discomfort for patients, which can cause them to be less satisfied with the pharmaceutical services they receive (Peer, Journals, Publishing, & Chain, 2023).

A study conducted by Hidayati (2020) found that unmet drug needs due to stockouts have the potential to reduce patients' trust in the hospital, which ultimately affects their satisfaction level. The use of SIMRS integrated with drug management systems can address these problems by providing more accurate and real-time data on drug availability. This allows hospitals to make better predictions about drug demand based on historical data and demand patterns, as well as anticipate potential supply shortages before they occur (Tangel, Manampiring, & Kapantow, 2023).

Research by Dewi et al. (2021) also shows that the use of SIMRS improves accuracy in drug management, enabling hospitals to avoid stockouts harmful to patients and increasing their satisfaction. In addition, SIMRS can optimize the drug procurement process by using more sophisticated data analysis. With historical data available in the system, hospitals can identify drug usage trends and manage procurement more efficiently. This reduces reliance on

manual procurement methods, which are often slow and prone to errors that can lead to drug stockouts (Prasetyo et al., 2020).

However, it is important to note that while SIMRS can help reduce drug stockout incidence, its implementation must be thorough and supported by good drug management policies. The implementation of this technology must be accompanied by training for medical and pharmaceutical personnel to ensure that they can make optimal use of the system. Research by Rizal et al. (2022) revealed that poor management of SIMRS without adequate support can lead to failures in drug stock management, which can still trigger stockout events. Therefore, in addition to relying on technology, hospitals need to enhance human resource capacity in system management (Ali, Siregar, Irwan, & Nasution, 2024).

The Bogor City Regional General Hospital is one of the referral government hospitals in Bogor City which operates as a Regional Public Service Agency (BLUD). Hospitals with BLUD status are given the authority to manage their own budgets and revenues, allowing greater flexibility in decision-making, including full authority to manage operational costs such as pharmaceutical logistics. However, pharmaceutical logistics management at the Bogor City Hospital Pharmaceutical Installation is still not optimal. This is evidenced by the occurrence of drug stockouts in 2024 at inpatient pharmaceutical depot facilities averaging 5.45% per month, outpatient pharmaceutical depot facilities averaging 7.87% per month, and at Chemotherapy Dispensing Depot facilities averaging 1.54% per month.

The occurrence of drug stockouts at the Bogor City Regional General Hospital can have a direct impact on patient satisfaction and potentially increase patient complaints. It was recorded that patient complaints about stockout drugs increased compared to the previous year.

The occurrence of drug stockouts at the pharmaceutical installation of the Bogor City Regional General Hospital (RSUD) is a significant challenge that affects the quality of health services and patient satisfaction. The unavailability of necessary drugs not only hinders the healing process but also has the potential to lower public trust in the health services provided. Although the use of the *Hospital Management Information System* (SIMRS) is expected to improve drug inventory management efficiency, the implementation of this technology at Bogor City Hospital still faces various obstacles. One main problem is that the optimization of the SIMRS application has not been fully realized, limiting the system's ability to manage inventory effectively.

Additionally, some other SIMRS features, such as monitoring the procurement process, real-time drug inventory, and more structured stock management, have also not been utilized to their fullest extent. Procurement processes that are not digitally monitored can lead to delays in decision-making and reduce hospitals' responsiveness to fluctuations in medication demand. Irregularities in inventory management can cause mismatches between drug supplies and patient needs and even lead to shortages of vital and essential medications that frequently disrupt patient therapy. This certainly affects patient satisfaction, as patients feel underserved, their treatment process is disrupted, and patient safety may be at risk. Therefore, to increase patient satisfaction, Bogor City Hospital needs to focus more on the full implementation of SIMRS and adopt a more efficient inventory system to ensure drug availability for patients.

Based on the explanation above, this study aims to analyze the relationship between the incidence of drug stockout and the use of *simrs* technology with patient satisfaction in the pharmaceutical installation of Bogor City Hospital. By understanding this relationship,

strategic steps can be taken to reduce drug stockout incidents, increase patient satisfaction with pharmaceutical services at Bogor Hospital, enhance the use of SIMRS technology, and improve the quality of health services at the Bogor City Regional General Hospital.

The incidence of drug stockouts at the Bogor City Hospital Pharmacy Installation in 2024 was 5.45% at inpatient depots, 7.87% at outpatient depots, and 1.54% at chemotherapy dispensing depots, resulting in an average monthly drug stockout rate of 4.95%. These stockouts interfere with the pharmaceutical service process and have the potential to reduce patient satisfaction with the quality of service they receive. Underutilization of SIMRS technology also negatively affects patient satisfaction levels. Poorly managed patient satisfaction can impair pharmaceutical installation performance, reduce the quality of health services, and damage the hospital's positive image. Therefore, analyzing the relationship between drug stockouts and the use of SIMRS technology with patient satisfaction is crucial.

The purpose of this study is to analyze the relationship between drug stockout incidence, the use of *Hospital Management Information System* (SIMRS) technology, and patient satisfaction at the Bogor City Hospital Pharmaceutical Installation. In general, this study aims to explore various aspects related to drug stockout occurrences, their causative factors, and the use of SIMRS technology with patient satisfaction. Specifically, the study will describe drug stockout occurrence in Pharmaceutical Installations, explore causative factors, and provide an overview of SIMRS technology use and patient satisfaction levels. Additionally, this study will examine the relationship among these variables.

This research is expected to contribute scientifically to hospital administration by clarifying the relationship between drug stockout incidence and SIMRS technology usage, enabling strategies to prevent patient complaints and increase satisfaction. Methodologically, selecting appropriate methods aims to produce objective data and in-depth analysis that accurately represent pharmacists and patients. Practically, the findings will serve as input and evaluation material for hospitals developing strategies to improve patient satisfaction.

Moreover, this research prioritizes the values of Al-Islam and Kemuhammadiyahan, which emphasize respecting others' rights, including patients' right to good services, and providing benefits to others as a form of almsgiving. In the hospital context, this means efficient drug management and the effective use of technology to facilitate patient access to health services. Thus, efforts to avoid drug stockout incidents and ensure SIMRS technology functions properly are essential steps to maximize benefits for the community, especially patients needing medical services.

METHOD

This study used a cross-sectional analytical approach to analyze the relationship between the incidence of drug stockout and the use of simrs technology with patient satisfaction at the Pharmaceutical Installation of Bogor City Hospital. This research was conducted at the Bogor City Regional General Hospital from March to July 2025, including the preparation of research proposals, primary and secondary data collection, as well as data processing and presentation.

The research population is all functional staff of the Bogor City Hospital Pharmacy Installation which is 40 people and patients in the Bogor City Hospital Pharmaceutical Installation. Data collection will be carried out in the period of June - July 2025. The subjects of this study are pharmaceutical functional personnel and patients in the pharmaceutical

installation of the Bogor City Regional General Hospital meet the following inclusion and exclusion criteria:

a. Patient inclusion criteria
    1) Outpatients aged 18–60 years who are able to read and fill out questionnaires independently
    2) Patients who take their own medication
    3) Patients who carry mobile phones
    4) Patients who visit Bogor City Hospital at least 2 times
b. Patient exclusion criteria
    1) Outpatients aged 0-17 years and over 60 years old
    2) Inpatient
    3) Patients who do not carry mobile phones
    4) Patients whose medication is taken by their family and medication delivery services
    5) Patients who come to Bogor City Hospital for less than 2 visits
    6) Patients who have a history of mental disorders

Samples are a part of the subjects in the population studied, who are certainly able to represent their population (Sugiyono, 2018). The sampling technique for pharmaceutical personnel in this study was carried out by the total sampling method which is a sampling technique where the number of samples is equal to the number of populations. The reason for using total sampling is because according to Sugiyono (2018) the number of populations that are less than 100 of the entire population can be used as a research sample. The sample in this study amounted to 40 pharmaceutical functional personnel at the Pharmaceutical Installation of the Bogor City Hospital.

The large calculation of patient samples was carried out using the Lemeshow (1990) formula. This is because the number of the intended population is large and unknown (variable).

Lemeshow formula:

$$n = \frac{Z^2 \, p \, (1 - p)}{d^2}$$

Where:

n = minimum sample count

Z = standard value = 1.96

p = Maximum estimate = 50% = 0.5

d = margin of error (error tolerance limit 0.05 to 5%)

$$n = \frac{1.96^2 . \, 0{,}5 \, (1 - 0{,}5)}{0.05^2}$$

$$n = 3.8416 . \, 0.25 = 0.9604 = 384.16$$

0,0025 0,0025

So, the minimum sample = 385 respondents

The method of data collection in this study is by distributing questionnaires in the form of G-Form. The questionnaire was used to obtain independent variable data on the incidence of drug stockout and the use of SIMRS technology, and the data on dependent variables on patient satisfaction was made a questionnaire that will be tested for validity and reliability first.

The supporting data needed in this study is the Personnel data of the Bogor City Regional General Hospital obtained from the Personnel Section.

This study uses a quantitative analysis method expressed by numbers. To make it easier to analyze and understand data, the data obtained will be presented in the form of a table so that what is presented is more systematic. Data from the survey results were collected, grouped and tabulated based on variables and types of respondents. SmartPLS software version 4 is a calculation tool used for data processing (Hair et al, 2017).

Data Preparation, i.e. Data is collected through a questionnaire in a format that is acceptable to SmartPLS, such as Excel and then the data is checked to avoid missing values, and input errors, then Import Data to SmartPLS, i.e. Import dataset and make sure all variables have been correctly recognized.

RESULTS AND DISCUSSION

Description of Research Data

1. Respondent Characteristics

This study uses respondent data from all functional personnel of pharmaceutical installations and patients of the Bogor City Hospital in 2025 as the subject of the study. It was carried out through the distribution of questionnaires to 40 pharmaceutical functional personnel and 385 patients. The description of the research respondents is described as follows:

Table 1. Patient Respondent Overview

No	Characteristics	Category	Frequency	Percentage (%)
1	Gender	Man	133	34,55
		Woman	252	65,45
2	Age	18-30	77	20
		31-45	146	37,92
		46-60	162	42,08
3	Frequency of Visits	2-5 times	197	51,17
		>5 times	188	48,83

Source: Primary Data Processed, 2025

Of the 385 patient respondents, most were women (65.45%) with the highest age range in the 46–60 years group (42.08%). And all patients have visited the Bogor City Hospital more than twice according to the research inclusion criteria.

Table 2 Overview of Employee Respondents

No	Characteristics	Category	Frequency	Percentage (%)
1	Gender	Man	6	15
		Woman	34	85
2	Age	<30 years old	15	37,5
		30-40 years old	19	47,5
		>40 years old	6	15
3	Long Time Working	<5 years old	4	10

No	Characteristics	Category	Frequency	Percentage (%)
		5-10 years	30	75
		>10 years	6	15
4	Education	Pharmacist	18	45
		Pharmaceutical Technical Personnel	22	55

Source: Primary Data Processed, 2025

Based on Table 5.2, the majority of employee respondents are women (85%) and are in the age range of 30–40 years. Most have worked for 5–10 years, which shows a fairly mature work experience in pharmaceutical services and the use of SIMRS. According to the level of education of the respondents, it is known that the most respondents are D3 Pharmacy.

2. Description of Research Variables

There are three variables used in this study, namely the incidence of drug *stockout*, the use of simrs technology, and patient satisfaction. Each variable's data was collected through the distribution of a questionnaire measured on a Likert scale (on a scale of five), the description of the data of each variable was described as follows:

1) Description of Drug Stockout Occurrence Data

The Dimension of Drug *Stockout* Incidence is measured through five statements as described as follows:

Table 3 Description of Drug Stockout Occurrence Data

Code	Statement	Mean	SD
X1.1	Certain drugs (*slow moving*) are not immediately distributed from PBF (Pharmaceutical Wholesalers) even though the stock is running low	3.90	**1.114**
X1.2	The internal distribution process prioritizes certain drugs (*fast moving*) while other drugs (Slow moving) are often sent late to the pharmaceutical unit.	3.6	**0.940**
X1.3	Drug delivery is often delayed (due to waiting times from different suppliers) causing stock delays	4.05	**0.865**
X1.4	Drug orders cannot be fulfilled because stocks are out at PBF (Pharmaceutical Wholesalers)	3.925	**1.058**
X1.5	**PBF once delayed the delivery of drugs because the hospital was late in making payments**	**4.450**	**0.893**

Source: Primary Data Processed, 2025

Based on the data provided, the following are the conclusions regarding the occurrence *of drug stockouts*:

a. Slow moving drugs are not immediately distributed from PBF despite low stock (X1.1): An average of 3.90 indicates that most respondents agree that *slow moving* drugs are not immediately distributed. The standard deviation of 1.114 shows that this view varies quite a bit among the respondents, some agree and some do not
b. The internal distribution process prioritizes *fast moving* drugs while *slow moving* drugs are often delivered late (X1.2): The average of 3.60 indicates that most respondents agree that the internal distribution process prioritizes *fast moving drugs while* slow moving *drugs*

often sent late. The standard deviation of 0.94 shows that this view varies quite a bit among respondents, some agree and some don't

c. Drug shipments are often delayed (due to waiting times from different suppliers) resulting in stock delays (X1.3): The average of 4.05 indicates that the majority of respondents agree that drug shipments are often delayed (due to waiting times from different suppliers) resulting in stock delays. The standard deviation of 0.865 indicates that views vary slightly among respondents.
d. Drug orders cannot be fulfilled due to out-of-stock at PBF (Pharmaceutical Wholesalers) (X1.4): The average of 3,925 indicates that the majority of respondents agree that drug orders cannot be fulfilled due to out-of-stock at PBF (Pharmaceutical Wholesalers). The standard deviation of 1,058 showed significant variation among respondents.
e. PBF has once delayed the delivery of medicines because the hospital was late in making payments (X1.5): The average of 4,450 showed that the majority of respondents strongly agreed that the PBF had delayed the delivery of medicines because the hospital was late in making payments. The standard deviation of 0.893 indicates that views vary slightly among respondents.

2) Description of SIMRS Technology Use Data

The dimensions of the use of SIMRS technology are measured through five statements as described as follows:

Table 4 Description of SIMRS Technology Use Data

Code	Statement	Mean	SD
X2.1	The use of SIMRS Technology simplifies the process of ordering and distributing medicines.	4.250	**0.829**
X2.2	SIMRS technology provides reliable information about drug availability and stock	4.30	**0.678**
X2.3	The menus and features in SIMRS are easy to understand and access.	4.175	**0.738**
X2.4	I have no difficulty finding medication data	4.225	**0.821**
X2.5	**SIMRS provides an easily traceable history of drug transactions**	**4.350**	**0.726**

Source: Primary Data Processed, 2025

Based on the data provided, the following are the conclusions regarding the use of SIMRS technology:

a. The use of SIMRS technology simplifies the ordering and distribution process of medicines (X2.1): The average of 4,250 indicates that the majority of respondents strongly agree that the use of SIMRS technology simplifies the process of ordering and distributing medicines. The standard deviation of 0.829 indicates that this view varies slightly among respondents, some agreeing and some not
b. SIMRS technology provides reliable information regarding the availability and stock of drugs (X2.2): An average of 4.30 indicates that the majority of respondents strongly agree that SIMRS technology provides reliable information regarding the availability and stock of drugs. This is an indicator with a high value, indicating a positive assessment from respondents regarding the information available in the SIMRS. The standard deviation of 0.678 indicates relatively low variation, indicating a fairly consistent judgment.

c. Menus and features in SIMRS are easy to understand and access (X2.3): An average of 4,175 indicates that respondents found SIMRS navigation easy, although slightly lower than other indicators. The standard deviation of 0.738 indicates that the variation of the answer remains relatively low to medium
d. I had no difficulty finding drug data (X2.4): An average of 4,225 indicates that respondents tend to agree that the system has good information integration. The standard deviation of 0.821 indicates a slight variation in answers among the respondents
e. SIMRS provides an easily traceable drug transaction history (X2.5): An average of 4,350 indicates the most positive assessment of respondents regarding the information available in SIMRS. This is the indicator with the highest value. The standard deviation of 0.726 indicates relatively low variation and the judgment is quite consistent.

3) Description of Patient Satisfaction

The dimension of patient satisfaction is measured through five statements as described as follows:

Table 5. Description of Patient Satisfaction Data

Code	Statement	Mean	SD
Y1	I was satisfied with the speed with which the pharmacist provided me with the medication I needed	4.371	**0.717**
Y2	I am satisfied with the promptness of the pharmacy officers in handling the empty medicines	4.403	**0.696**
Y3	I feel that hospitals have a good information system in maintaining the availability of drugs	4.416	**0.705**
Y4	I am satisfied with the hospital's ability to manage the stock of medicines so that they remain available	4.410	**0.712**
Y5	**I rarely run into a drug shortage when redeeming prescriptions at this hospital.**	**4.382**	**0.751**

Source: Primary Data Processed, 2025

Based on the data provided, the following are conclusions related to patient satisfaction:

a. I am satisfied with the speed of the pharmacist in providing the medication I need (Y1) : The average of 4.371 indicates the lowest mean value but still shows a very good level of satisfaction. The standard deviation of 0.717 indicates that the meaning of respondents' perceptions is relatively homogeneous to slightly variable, but there is no extreme difference.
b. I am satisfied with the promptness of the pharmacy staff in handling the drugs that are currently empty (Y2): The average of 4,403 shows that the Respondents tend to agree and still show a very good level of satisfaction. The standard deviation of 0.696 indicates that the meaning of respondents' perceptions is relatively homogeneous to slightly variable, but there is no extreme difference
c. I feel that the hospital has a good information system in maintaining the availability of medicines (Y3): The average of 4,416 indicates that this aspect gets the highest level of satisfaction from respondents. This is the indicator with the highest value. The standard deviation of 0.705 indicates that respondents' perceptions are relatively homogeneous to slightly variable, but there is no extreme difference.

d. I am satisfied with the hospital's ability to manage the stock of medicines to keep them available (Y4): The average of 4,410 shows that the Respondents tend to strongly agree and still show a very good level of satisfaction. The standard deviation of 0.712 indicates that the meaning of respondents' perceptions is relatively homogeneous to slightly variable, but there is no extreme difference
e. I rarely experience a shortage of medication when redeeming prescriptions at this hospital (Y5): The average of 4,382 shows that Respondents tend to agree very much and still show a very good level of satisfaction. The standard deviation of 0.751 indicates that the meaning of respondents' perceptions is relatively homogeneous to slightly variable, but there is no extreme difference.

PLS Data Analysis

Data analysis in proving the research hypothesis was carried out using *Partial Least Square* through program assistance *SmartPLS* Version 4. Analysis *PLS* The first stage uses the *PLS Algorithm* which gives the output of the model as follows:

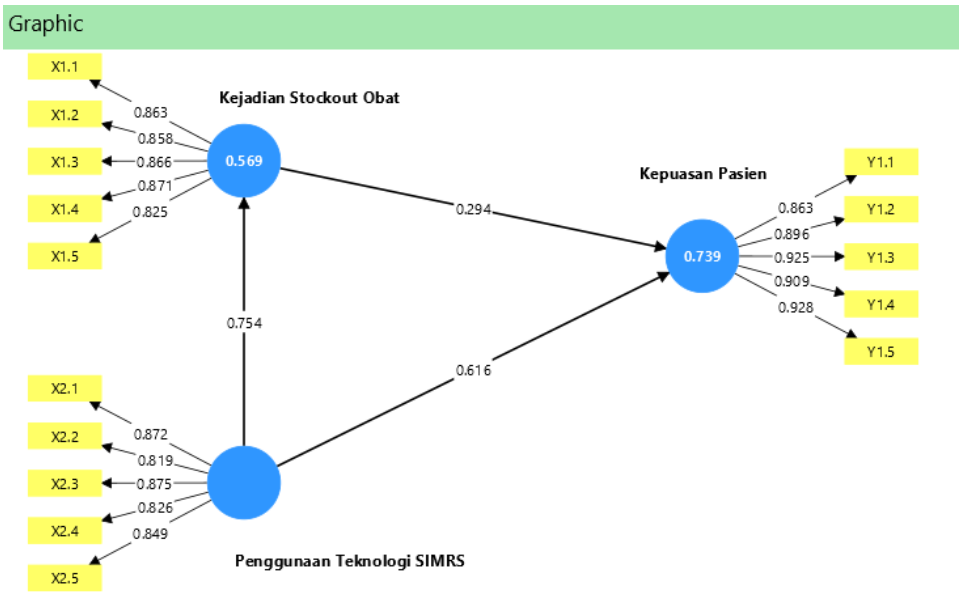

Figure 1. Output *PLS Algorithm*

Source: Data Processed with *SmartPLS* version 4 (2025)

Figure 1 describes the output of the model based on the analysis by the *PLS Algorithm*, which in the analysis of this method provides a series of results that are the basis for the evaluation of the model *PLS* next:

1) Evaluation *of the Outer Model*

The evaluation of *the external model* includes testing the validity and reliability of indicators.

a. Validity Test

1. Convergent Validity Test

The convergent validity test was evaluated with the value of the *loading factor*, the indicator of each variable was declared valid when it had a *loading factor* value of > 0.7. The results of the convergent validity test are presented in the following table:

Table 6 Convergent Validity Tests

Instruments	Occurrence of *Drug Stockout*	Use of SIMRS Technology	Patient Satisfaction	Information
X1.1	0.863			Valid
X1.2	0.858			Valid
X1.3	0.866			Valid
X1.4	0.871			Valid
X1.5	0.825			Valid
X2.1		0.872		Valid
X2.2		0.819		Valid
X2.3		0.875		Valid
X2.4		0.826		Valid
X2.5		0.849		Valid
Y1.1			0.863	Valid
Y1.2			0.896	Valid
Y1.3			0.925	Valid
Y1.4			0.909	Valid
Y1.5			0.928	Valid

Source: Data Processed with *SmartPLS* version 4 (2025)

The results of the evaluation showed that all indicators had been declared to meet the conditions of convergent validity with a value of 40 *loading factor* > 0.7. so that they could be declared to meet the validity criteria. This finding is confirmed by the fulfillment of the following tests with *average variance extracted (AVE):*

Table 7 Convergent Validity Test with *AVE*

Variable	*Average variance extracted*	Information
Occurrence of Drug Stockout	0.735	Valid
Use of SIMRS Technology	0.720	Valid
Patient Satisfaction	0.818	Valid

Source : Data Processed With *SmartPLS* Verses 4 (2025)

The *Average Variance Extracted* (AVE) value for each variable was 0.735 drug *stockout* incidence, SIMRS technology use of 0.720, and patient satisfaction of 0.818. Since all three variables have *an AVE* value of ≥ 0.50, they meet the validity criteria and can be declared as valid constructs in the measurement model.

2. Discriminating Validity Test

The next indicator validity test is discriminant validity, and can be evaluated by *Cross Loading*. An indicator or statement is considered valid if its *cross loading* value for the constructed or variable measured is higher than the *cross loading* value for other constructs.

This means that the indicator has a stronger correlation to the construct in question compared to other constructs in the model. The results of the analysis are presented in the following table:

Table 8 Discriminant Validity Test with *Cross Loading*

Instruments	Occurrence *of Drug Stockout*	Patient satisfaction	Use of SIMRS technology	Information
X1.1	**0.863**	0.751	0.686	Valid
X1.2	**0.858**	0.642	0.658	Valid
X1.3	**0.866**	0.644	0.647	Valid
X1.4	**0.871**	0.668	0.659	Valid
X1.5	**0.825**	0.516	0.569	Valid
Y1.1	0.553	**0.863**	0.664	Valid
Y1.2	0.563	**0.896**	0.666	Valid
Y1.3	0.733	**0.925**	0.824	Valid
Y1.4	0.711	**0.909**	0.759	Valid
Y1.5	0.819	**0.928**	0.842	Valid
X2.1	0.672	0.800	**0.872**	Valid
X2.2	0.594	0.630	**0.819**	Valid
X2.3	0.623	0.711	**0.875**	Valid
X2.4	0.655	0.665	**0.826**	Valid
X2.5	0.650	0.732	**0.849**	Valid

Source: Data Processed with SmartPLS version 4 (2025)

Cross Loading *values on the variables of drug* stockout *incidence*, patient satisfaction, and use of SIMRS technology showed that the correlation between each indicator and its respective construct was higher than its correlation with other constructs. The results of *the convergent validity* and *discriminant validity* tests also showed consistency, where all indicators were declared valid. These findings indicate that the measurement model used has a good degree of conformity and is able to effectively distinguish different constructs. Thus, it can be concluded that the measuring tool used in this study is valid.

3. Reliability Test

The reliability test was carried out to see the level of consistency of the indicator as a research instrument. The validity test was carried out using *Cronbach's Alpha (CA)* and *Composite Reliability (CR)* formulas, the test results are presented in the following table:

Table 9 Reliability Test

Variable	*Cronbach's alpha*	*Composite reliability*	Information
Occurrence *of Drug Stockout*	0.910	0.933	Reliable
Patient satisfaction	0.945	0.957	Reliable
Use of SIMRS technology	0.902	0.928	Reliable

Source: SmartPLS Data Processing 4, 2025

The results showed that *the Cronbach's Alpha* and *Composite reliability* values for constructs or drug *stockout* occurrence variables were 0.910 and 0.933, the use of SIMRS

technology was 0.902 and 0.928 and patient satisfaction variables were 0.945 and 0.957. All *of Cronbach's Alpha* and *Composite reliability* values ≥ 0.70. So that all variables have good reliability.

1. Inner Model *Evaluation*

The inner model in *PLS-SEM* describes the relationships between latent variables and is evaluated to see the strength and significance of these relationships. The evaluation includes three main aspects: Significance of the relationship (hypothesis testing), *R Square* and *Effect Size*.

a. R Square (R^2)

In *PLS-SEM*, the *R Square value* is used to assess the extent to which an independent latent variable can explain variations in dependent latent variables. The *R^2 value reflects the predictive strength level of the model as a whole. The value of R^2 ranges from 0 to 1, where a higher value indicates a better model at explaining variance.* Here are the *R-Square* values in this analysis.

Table 10 Reliability Test

Variable	*R-square*	*R-square adjusted*
Occurrence *of Drug Stockout*	0,569	0,558
Patient satisfaction	0,739	0,725

Source: SmartPLS Data Processing 4, 2025

Based on the table above, it is known that the R-square value for the Drug *Stockout* Event is 0.569, which means that 56.9% of the variation in the drug *stockout* incidence can be explained by an independent variable in the model, namely the Use of SIMRS Technology. Meanwhile, the remaining 43.1% is explained by other variables outside this research model. Furthermore, the *R-square* value for Patient Satisfaction is 0.739, which shows that the variables of Drug *Stockout* Incidence and the Use of SIMRS Technology together can explain 73.9% variation in the level of patient satisfaction at the Bogor City Hospital Pharmaceutical Installation. Thus, only 26.1% were explained by factors outside the study variables. According to Chin (1998), *an R-square* value of 0.67 or more is categorized as strong, values between 0.33 to 0.67 as moderate, and values below 0.33 as weak. Based on these criteria, the *R-square* value in the Patient Satisfaction variable is in the strong category, while *the R-square* value in the Drug Stockout *Incidence variable* is included in the medium category. This shows that this research model has good predictive power, especially in explaining patient satisfaction based on the incidence of drug *stockout* and the use of SIMRS technology. Thus, these findings support that both variables have an important contribution to patient satisfaction in hospital pharmacy installations.

b. Significance (Hypothesis Testing)

Testing the significance of relationships in *PLS-SEM* aims to assess whether relationships between latent variables in the model are statistically significant. This procedure is generally carried out by *the bootstrapping method*, which is the process of resampling data to obtain an estimate of *the path coefficient* value and its standard error. The test results are presented in the form of *t-statistical* or *p-value*. A relationship is considered significant if *the p-value* is smaller than the predetermined significance limit (in this study a significance level of 0.05 was used). *A significant path coefficient* indicates a statistically supported relationship between

independent and dependent latent variables, so that the proposed hypothesis is acceptable. Through *the PLS Bootstrapping* method, *the output is obtained*
Model as follows:

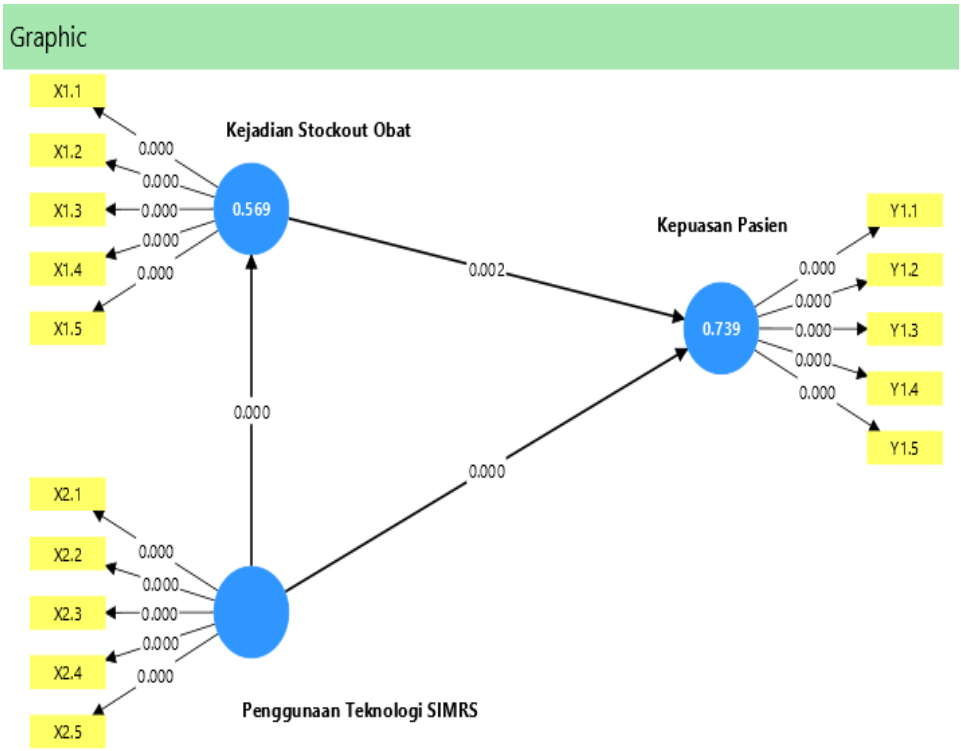

Figure 2. Output PLS Bootstrapping
Source: Data Processed with *SmartPLS* version 4 (2025)

The results of the analysis in the image above present data on the *t-value of the statistic* more complete described in the following table:

Tabel 11. Hasil *Path Coefficient Bootstrapping*

Path Coefficients	*Original sample* (O)	*Sample mean* (M)	*Standard deviation* (STDEV)	*T statistic*	*P values*	Ket
Drug *stockout* incidents→Patient satisfaction	0.294	0.295	0.103	2.858	0.002	Evident
Use of SIMRS Technology→Drug Stockout Occurrence	0.754	0.771	0.048	15.570	0.000	Evident
Use of SIMRS Technology→Patient satisfaction	0.616	0.617	0.098	6.305	0.000	Evident

Source: SmartPLS Data Processing 4, 2025

a. The Relationship between Drug *Stockout* Incidence and Patient Satisfaction
Based on the results of *the Partial Least Square* test in figure 4.11.4, a *statistical t value* of 2.858 was obtained with a probability of significance (P value) of 0.002. It can be seen that

the *statistical t-value* > 1.96 and the P value < 0.05, H2 is declared accepted, meaning that the incidence *of drug stockout* has a significant effect on patient satisfaction.

These findings are in line with the research of Savitri *et al*. (2021) which states that the availability of drugs is one of the main factors in determining the quality of pharmaceutical services and has a direct impact on patient satisfaction. Likewise, a study by Budhi (2018) shows that drug scarcity (stockout) can trigger patient complaints and reduce trust in hospital services.

In theory, this is supported by the Customer Satisfaction Theory of Parasuraman, Zeithaml & Berry, which states that patient satisfaction is achieved when their expectations meet or exceed the experience received, including in terms of the availability of drugs as part of the reliability and *responsiveness* dimensions in service.

b. The Relationship of the Use of SIMRS Technology to the Incidence of Drug Stockout

Based on the results of *the Partial Least Square* test in figure 4.11.4, a statistical t value of 15.570 was obtained with a probability of significance (*P value*) of 0.000. It can be seen that the statistical t-value > 1.96 and *the P value* < 0.05, H1 is declared accepted, meaning that the use of SIMRS Technology has a significant effect on the occurrence of drug stockout.

This finding is in line with the opinion of Hamid & Azwar (2019) who stated that SIMRS can improve the efficiency of logistics and drug stock management through electronic recording, automatic reporting, and early warning systems for reorder points. This technology helps pharmacists and hospital management in making faster and more informed decisions.

In the context of information systems theory, this is relevant to the DeLone & McLean model, which states that system quality and information quality can affect the use of systems and their net benefits, one of which is in supporting more efficient management of drug stocks.

c. The Relationship of the Use of SIMRS Technology to Patient Satisfaction

Based on the results of *the Partial Least Square* test in figure 4.11.4, a statistical t value of 6.305 was obtained with a probability of significance (P value) of 0.000. It can be seen that the statistical t-value > 1.96 and *the P value* < 0.05, H3 is declared acceptable, meaning that the use of SIMRS Technology has a significant effect on patient satisfaction. This shows that the existence of SIMRS technology not only has an impact on internal operational efficiency, but is also directly felt by patients in the form of faster, accurate, and informative services.

This research is in line with the findings of Wiyono (2020) who stated that the implementation of SIMRS in pharmaceutical services increases the speed of service, the accuracy of drug information, and the acceleration of the administration process, all of which have a positive impact on patient satisfaction.

Theoretically, this is also in line with the DeLone & McLean model which states that usability, perceived ease of use and user acceptance of information technology will have an impact on the acceptance of the system and the user experience, including the patient as a recipient of the service.

CONCLUSION

This research concludes that the occurrence of drug stockouts at the Bogor City Hospital Pharmacy Installation is still occurring, mainly influenced by distribution delays and payment constraints. The implementation of SIMRS technology has been well and proven to significantly reduce the incidence of stockout (coefficient = 0.754) as well as increase patient satisfaction (coefficient = 0.616). Key findings show that SIMRS not only improves internal efficiency but is also directly perceived by patients through faster and more transparent services. Overall, the two variables were able to explain 73.9% of patient satisfaction, confirming the critical role of technology in supporting drug availability and quality of healthcare. The main contribution of this research is providing empirical evidence that optimizing SIMRS is a crucial strategic step for hospitals to improve drug availability, operational efficiency, and ultimately, the quality of healthcare services and patient satisfaction. Based on the findings of the study, it is recommended that the Bogor City Hospital optimize the use of SIMRS features, especially in terms of early warning of drug stocks and real-time data integration, to minimize the occurrence of stockout. In addition, it is necessary to improve coordination with drug distributors (PBF) and improve the payment administration process to avoid delivery delays. Periodic training for pharmacy staff is also important to ensure maximum utilization of SIMRS. For future research, it can be developed by adding other variables and expanding the scope of the sample so that the results are more generalized.

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