



Activity-Based Costing and Patient Satisfaction in Cataract Surgery Services: The Role of Resource Consumption and Cost Drivers

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Abstract

Background: The complexity of healthcare services requires effective operational cost management while maintaining high-quality patient-centered care. Cataract surgery involves various clinical and administrative activities that generate substantial costs, while traditional costing systems may not accurately allocate indirect costs, potentially reducing operational efficiency and service quality.

Objective: This study aimed to examine the effects of resource consumption and cost drivers on patient satisfaction in cataract surgery services, with *Activity-Based Costing* (ABC) as a moderating variable.

Methods: A quantitative survey was conducted involving 100 cataract surgery patients at Klinik Utama Rawat Inap KL during 2024–2025. Data were collected using a five-point Likert-scale questionnaire and analyzed using *Structural Equation Modeling–Partial Least Squares* (SEM–PLS) with SmartPLS 3.0.

Results: Resource consumption ($\beta = 0.43$; $t = 4.85$; $p = 0.000$) and cost drivers ($\beta = 0.35$; $t = 3.92$; $p = 0.000$) demonstrated positive and significant effects on patient satisfaction. *Activity-Based Costing* strengthened the relationship between operational management factors and patient satisfaction by enabling more accurate cost allocation and improving operational efficiency.

Conclusion: *Activity-Based Costing* plays an important strategic role in enhancing healthcare cost management, operational effectiveness, and patient-centered service quality. This approach provides valuable implications for healthcare organizations in optimizing resource utilization and improving patient experiences.

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INTRODUCTION

Healthcare organizations are increasingly required to provide high-quality healthcare services while maintaining operational efficiency and financial sustainability (Kaplan & Porter, 2011). The growing demand for healthcare services, technological advancements, and increasing operational complexity have significantly increased healthcare costs worldwide. Healthcare providers are therefore challenged to improve service quality while ensuring efficient resource utilization and cost transparency. This challenge is particularly important in specialized healthcare services such as cataract surgery, which involves multiple interconnected operational activities, including patient registration, preoperative examinations, surgical procedures, medical equipment utilization, postoperative monitoring, and administrative coordination.

In Indonesia, the implementation of the National Health Insurance system (Badan Penyelenggara Jaminan Sosial Kesehatan [BPJS Kesehatan]) has further increased pressure on healthcare organizations to improve operational effectiveness while maintaining affordable healthcare services. Healthcare providers are expected to deliver efficient and patient-centered

services despite limited operational resources and increasing patient volumes. Consequently, healthcare organizations require more accurate cost management systems capable of supporting operational efficiency, service quality improvement, and healthcare sustainability ([Kementerian Kesehatan Republik Indonesia, 2023](#)).

According to the Kementerian Kesehatan Republik Indonesia ([2023](#)), the average cost of cataract surgery in Indonesia ranges from IDR 7 to 15 million per eye, with significant variations depending on the surgical technique used and the type of healthcare facility. Meanwhile, patient satisfaction surveys conducted by BPJS Kesehatan indicate that only 68% of cataract surgery patients reported satisfaction with the overall service process, highlighting the need for improved operational management and cost transparency in these services ([Mosadeghrad, 2014](#)).

Traditional costing systems are often considered inadequate in healthcare organizations because they allocate indirect costs using simplistic allocation methods that may not accurately reflect actual resource utilization. As a result, healthcare organizations may experience cost distortions, inefficient operational processes, inaccurate service costing, and reduced managerial effectiveness. These conditions may negatively affect healthcare quality, operational responsiveness, and patient satisfaction. Therefore, healthcare organizations increasingly require operational management systems that provide more accurate cost allocation and greater operational transparency.

Activity-Based Costing (ABC) has emerged as an important strategic cost management approach capable of improving cost allocation accuracy by tracing costs based on activities and actual resource utilization ([Quesado & Silva, 2021](#); [Tahir et al., 2025](#)). Unlike traditional costing systems, ABC identifies activities that generate operational costs and allocates expenses according to healthcare resource consumption patterns ([Yang et al., 2020](#)). *Cost & Effect: Using Integrated Cost Systems to Drive Profitability and Performance* ([1998](#)) emphasized that Activity-Based Costing enables organizations to improve operational transparency, identify non-value-added activities, strengthen managerial decision-making, and optimize operational efficiency. In healthcare organizations, ABC has increasingly been recognized as an effective managerial tool for improving healthcare operational control, service effectiveness, and healthcare cost transparency ([Yang et al., 2020](#)).

Previous studies regarding Activity-Based Costing have primarily focused on manufacturing industries and general hospital financial efficiency. Several studies have also examined the implementation of ABC in healthcare operational management and healthcare service costing systems. However, limited studies have integrated resource consumption, cost drivers, ABC, and patient satisfaction within a single research framework, particularly in specialized outpatient healthcare services such as cataract surgery. Specifically, previous studies show conflicting findings: while [Conceição et al. \(2023\)](#) found positive effects of ABC on hospital efficiency, [Li et al. \(2018\)](#) reported that its benefits depend heavily on organizational context and implementation quality. Moreover, most prior studies examined ABC in general hospital settings without addressing its moderating role in linking operational variables to patient satisfaction outcomes.

This inconsistency and contextual limitation create a clear research gap that the present study addresses. The novelty of this study lies in (1) examining ABC as a moderating variable rather than a direct predictor, (2) integrating resource consumption and cost drivers into a unified framework with patient satisfaction, and (3) applying this framework specifically to specialized cataract surgery services in Indonesia, a context that has received minimal attention in the existing literature. Cataract surgery services possess unique operational characteristics because they involve intensive medical resource utilization, strict operational scheduling, healthcare coordination, and high patient expectations regarding service responsiveness and healthcare quality.

Patient satisfaction has become an important indicator of healthcare organizational performance and competitiveness ([Andaleeb, 2001](#); [Oliver, 2014](#)). In healthcare services, patient satisfaction is influenced not only by clinical outcomes but also by operational effectiveness, healthcare cost transparency, administrative responsiveness, and overall patient experiences throughout treatment processes ([Donabedian, 1988](#); [Parasuraman et al., 1988](#)). Efficient resource utilization and effective operational management therefore play important roles in improving healthcare quality and delivering patient-centered healthcare services.

Despite the increasing implementation of Activity-Based Costing in healthcare organizations, empirical studies examining the moderating role of ABC in strengthening the relationship between operational management variables and patient satisfaction remain limited. Therefore, this study addresses an important research gap by integrating management accounting and healthcare operational perspectives within cataract surgery services.

This study aims to examine the influence of resource consumption and cost drivers on cataract surgery patient satisfaction, with Activity-Based Costing functioning as a moderating variable at Klinik Utama Rawat Inap KL. This study is expected to contribute theoretically to the healthcare management accounting literature by extending the application of ABC within specialized healthcare services. Practically, the findings are expected to provide managerial insights regarding the importance of operational efficiency, healthcare cost transparency, and activity-based cost management systems in improving patient-centered healthcare quality and organizational sustainability.

Literature Review

Resource Consumption

Resource consumption refers to the utilization of organizational resources during operational activities, including healthcare personnel, medical equipment, healthcare facilities, operational time, and healthcare capacity utilization. In healthcare organizations, efficient resource utilization is essential because healthcare services involve complex operational processes that require substantial indirect costs and intensive operational coordination. Inefficient resource utilization may lead to operational inefficiencies, prolonged waiting times, and reduced healthcare service quality (Haizer, J., Render, B., Munson, 2020). Therefore, effective healthcare resource management plays an important role in improving operational effectiveness and enhancing patient-centered healthcare performance.

In cataract surgery services, resource consumption includes the utilization of surgeons, nurses, operating rooms, medical devices, and healthcare support facilities. Efficient allocation and utilization of these resources are expected to improve healthcare responsiveness, minimize service delays, and enhance patient experiences throughout the treatment process. Consequently, healthcare organizations are required to optimize resource utilization to maintain service quality and ensure operational sustainability.

Cost Drivers

Cost drivers represent operational factors that generate healthcare service costs, including surgery duration, frequency of healthcare activities, complexity of medical procedures, and intensity of medical equipment utilization. According to Edward (2019), cost drivers explain the causal relationship between operational activities and organizational resource consumption. Accurate identification of cost drivers enables healthcare organizations to improve cost transparency, reduce unnecessary operational expenditures, and strengthen operational efficiency.

Within healthcare services, cost drivers are important because healthcare operational activities involve varying levels of complexity and resource utilization. In cataract surgery services, operational cost drivers may include procedure duration, patient volume, frequency of medical examinations, and intensity of medical equipment utilization. Effective management of these cost drivers enables healthcare organizations to improve healthcare process efficiency while maintaining service quality and cost affordability. Therefore, accurate identification of healthcare cost drivers contributes positively to operational effectiveness and strengthens patient trust through improved healthcare cost transparency.

Activity-Based Costing

Activity-Based Costing (ABC) is a strategic cost management system that allocates operational costs based on activities performed and actual resource utilization. Unlike traditional costing systems, ABC traces costs to specific operational activities, thereby improving cost allocation accuracy and enhancing operational transparency. Activity-Based Costing enables organizations to identify value-added and non-value-added activities more effectively, allowing managers to improve operational efficiency and support better managerial decision-making.

In healthcare organizations, Activity-Based Costing has increasingly been recognized as an important managerial tool for improving healthcare operational control, service effectiveness, and cost transparency. Through activity-based cost allocation, healthcare organizations can better understand operational processes and identify activities that contribute significantly to healthcare costs. Consequently, ABC supports more efficient healthcare resource management and improves operational sustainability. In cataract surgery services, the implementation of ABC may assist healthcare organizations in improving operational coordination, optimizing clinical workflows, and strengthening patient-centered healthcare quality.

Patient Satisfaction

Patient satisfaction refers to patients' evaluations of healthcare quality, operational effectiveness, healthcare transparency, and overall healthcare experiences received during medical treatment processes. In healthcare services, patient satisfaction is influenced not only by clinical outcomes but also by operational responsiveness, administrative efficiency, healthcare transparency, and service reliability. Parasuraman et al. (2020) explained that healthcare quality dimensions, including responsiveness, reliability, assurance, empathy, and tangibility, significantly influence patient satisfaction and healthcare perceptions.

In cataract surgery services, patient satisfaction is strongly influenced by service responsiveness, waiting time, healthcare coordination, and transparency regarding healthcare procedures and costs. Patients tend to perceive healthcare services more positively when operational processes are efficient, transparent, and professionally managed. Therefore, healthcare organizations are increasingly required to strengthen operational effectiveness and patient-centered healthcare quality to maintain healthcare competitiveness and enhance patient trust.

Conceptual Framework and Hypotheses

This study examines the relationships among resource consumption, cost drivers, Activity-Based Costing (ABC), and patient satisfaction in cataract surgery services. Efficient utilization of healthcare resources and accurate identification of operational cost drivers are expected to improve healthcare operational effectiveness, cost transparency, and patient satisfaction. In addition, Activity-Based Costing is proposed as a moderating variable that strengthens the relationships between operational management variables and patient satisfaction through more accurate cost allocation and improved operational efficiency. Based on the theoretical framework and previous studies, the conceptual framework of this study is presented in Figure 1.

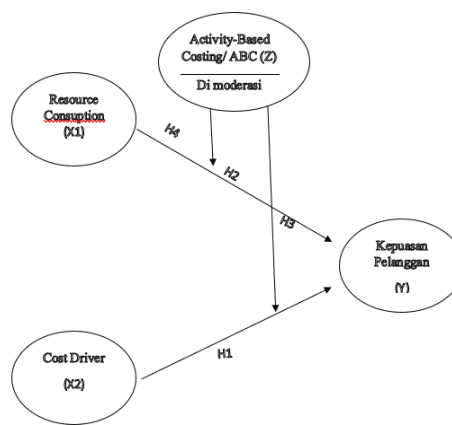


Figure 1. Theoretical Framework

Hypotheses Development

H1: Resource consumption positively and significantly affects patient satisfaction.

H2: Cost drivers positively and significantly affect patient satisfaction.

H3: Activity-Based Costing positively moderates the relationship between resource consumption and patient satisfaction.

H4: Activity-Based Costing positively moderates the relationship between cost drivers and patient satisfaction.

METHOD

This study employed a quantitative research approach using a survey method to examine the relationships among resource consumption, cost drivers, Activity-Based Costing (ABC), and patient satisfaction in cataract surgery services at Klinik Utama Rawat Inap KL. A quantitative approach was selected because this study aimed to analyze causal relationships among variables through statistical testing and empirical analysis.

The population of this study consisted of all patients who underwent cataract surgery at Klinik Utama Rawat Inap KL during the 2024–2025 period, comprising approximately 450 patients based on clinic administrative records. The respondents included BPJS patients, private insurance patients, and self-paying patients who had directly experienced the healthcare services, operational procedures, and payment systems provided by the clinic.

This study applied a purposive sampling technique because not all patients met the criteria relevant to the research objectives. The selected respondents were patients who had completed the entire cataract surgery process, including preoperative examinations, surgical procedures, administrative services, payment procedures, and postoperative care.

A total of 100 respondents participated in this study. The sample size was considered adequate for Structural Equation Modeling–Partial Least Squares (SEM-PLS) analysis. According to Hair et al. (2019), SEM-PLS is appropriate for studies involving relatively small sample sizes and complex research models.

Data were collected through structured questionnaires distributed directly to patients after they had completed the healthcare services. Prior to data collection, content validity was established through expert judgment involving two academic experts in management accounting and one healthcare management practitioner. The experts evaluated each questionnaire item based on relevance, clarity, and representativeness. Items with a Content Validity Index (CVI) below 0.80 were revised or replaced, resulting in a final instrument comprising 12 items across four constructs. A pilot test involving 30 respondents was subsequently conducted to assess preliminary reliability, with all constructs achieving Cronbach's alpha values above 0.70. The questionnaire employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The measurement indicators for each variable were adapted from previous studies and relevant management accounting literature to ensure content validity and consistency with the research objectives.

The variables examined in this study consisted of resource consumption, cost drivers, Activity-Based Costing, and patient satisfaction. Resource consumption refers to the utilization of healthcare resources, including medical personnel, healthcare facilities, operational time, and medical equipment usage. Cost drivers refer to operational factors that generate healthcare service costs, such as surgery duration, frequency of healthcare activities, service complexity, and the intensity of healthcare resource utilization. Activity-Based Costing refers to a cost management system that allocates operational costs based on activities and actual resource utilization. Meanwhile, patient satisfaction refers to patients' evaluations of healthcare quality, operational effectiveness, transparency, and overall healthcare experiences during cataract surgery services.

Data analysis was conducted using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 3.0 software. SEM-PLS was selected because it can analyze complex relationships among latent variables, including moderating effects, while accommodating relatively small sample sizes and non-normal data distributions.

The analysis process consisted of two stages: outer model evaluation and inner model evaluation. The outer model evaluation was conducted to assess the validity and reliability of the research instruments through convergent validity, discriminant validity, composite reliability, and Cronbach's alpha testing. Meanwhile, the inner model evaluation was performed to examine the structural relationships among variables using path coefficients, the coefficient of determination (R-square), predictive relevance (Q-square), and moderating effect analysis. These analyses were conducted to evaluate the proposed hypotheses and determine the explanatory capability of the research model.

Overall, the research method applied in this study is expected to provide empirical evidence regarding the role of Activity-Based Costing in improving operational efficiency, healthcare cost transparency, and patient satisfaction in cataract surgery services.

RESULTS AND DISCUSSION

Results

Measurement Model Evaluation (Outer Model)

The outer model evaluation was conducted to assess the validity and reliability of the measurement model used in this study. The evaluation included convergent validity, discriminant validity, composite reliability, and Cronbach's alpha analysis to ensure that all indicators appropriately measured their respective latent constructs.

Convergent Validity

Convergent validity was evaluated using loading factor values and Average Variance Extracted (AVE). According to Hair et al. (2019), loading factor values above 0.70 indicate acceptable indicator reliability, while AVE values above 0.50 indicate adequate convergent validity.

Table 1. Outer Loading Results

Variable	Indicator	Loading Factor
Resource Consumption	RC1	0.81
	RC2	0.84
	RC3	0.79
Cost Driver	CD1	0.82
	CD2	0.85
	CD3	0.80
Activity-Based Costing	ABC1	0.86
	ABC2	0.83
	ABC3	0.81
Patient Satisfaction	PS1	0.88
	PS2	0.86
	PS3	0.84

The results presented in Table 1 show that all loading factor values exceeded the recommended threshold of 0.70. These findings indicate that all indicators have satisfactory reliability and are able to measure their respective constructs appropriately.

Table 2. AVE Results

Variable	AVE
Resource Consumption	0.71
Cost Driver	0.69
Activity-Based Costing	0.73
Patient Satisfaction	0.76

Based on Table 2, all AVE values exceeded the minimum recommended value of 0.50. This result indicates that each construct has adequate convergent validity and can explain the variance of its indicators satisfactorily. Overall, the convergent validity results confirm that the measurement model used in this study meets the validity requirements and is appropriate for further analysis in the structural model evaluation stage.

Discriminant Validity

Discriminant validity testing was conducted to ensure that each latent construct in the research model was empirically distinct from the other constructs. In this study, discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT) criterion. According to Hair et al. (2019), HTMT values below 0.90 indicate adequate discriminant validity.

Table 3. HTMT Results

Variable	RC	CD	ABC	PS
Resource Consumption	—			
Cost Driver	0.72	—		
Activity-Based Costing	0.68	0.70	—	
Patient Satisfaction	0.75	0.73	0.77	—

The results presented in Table 3 show that all HTMT values were below the recommended threshold value of 0.90. These findings indicate that each construct has adequate discriminant validity and can be distinguished clearly from the other constructs in the research model. The results also demonstrate that resource consumption, cost drivers, Activity-Based Costing, and patient satisfaction represent conceptually distinct variables with independent explanatory capability. Therefore, the measurement model is considered appropriate for further structural model analysis using the SEM-PLS approach.

Reliability Test

Reliability analysis was conducted to evaluate the internal consistency of the measurement model using Cronbach's Alpha and Composite Reliability values. According to Hair et al. (2019), values above 0.70 indicate satisfactory construct reliability.

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability
Resource Consumption	0.89	0.91
Cost Driver	0.87	0.89
Activity-Based Costing	0.88	0.90
Patient Satisfaction	0.91	0.92

Based on Table 4, all variables achieved Cronbach's Alpha and Composite Reliability values above the recommended threshold value of 0.70. These results indicate that all constructs have satisfactory internal consistency and measurement reliability. Overall, the reliability test confirms that the measurement model used in this study is reliable and suitable for further structural model evaluation within the SEM-PLS framework.

Inner Model Evaluation

The inner model evaluation was conducted to examine the structural relationships among the latent variables and to assess the explanatory capability of the proposed research model. In SEM-PLS analysis, the inner model evaluation is important because it explains the extent to which the independent variables influence the dependent variable and evaluates the predictive capability of the structural model. The evaluation included coefficient of determination (R-square), predictive relevance (Q-square), and model fit evaluation.

Coefficient of Determination (R-Square)

The coefficient of determination (R-square) was used to measure the explanatory power of the structural model. The R-square value for patient satisfaction was 0.72, indicating that 72% of the variance in patient satisfaction could be explained by resource consumption, cost drivers, and Activity-Based Costing. An R-square value above 0.67 indicates substantial explanatory capability. Therefore, the structural model used in this study demonstrates strong predictive power in explaining patient satisfaction in cataract surgery services.

Table 5. R-Square Result

Variable	R Square
Patient Satisfaction	0.72

The relatively high R-square value indicates that operational resource management and cost management systems contribute significantly to patient perceptions regarding healthcare service quality, operational effectiveness, and healthcare transparency.

The findings also suggest that the integration of Activity-Based Costing strengthens the explanatory capability of the model through improved cost allocation accuracy and operational transparency. This indicates that efficient operational management and transparent healthcare processes play important roles in improving patient satisfaction within cataract surgery services. Overall, the results show that the proposed research framework can explain the relationships among the variables examined in this study.

Predictive Relevance

Predictive relevance analysis was conducted using the Q-square value to evaluate the predictive capability of the structural model. The analysis produced positive Q-square values, indicating that the model has adequate predictive relevance and can explain patient satisfaction in cataract surgery services.

The results indicate that the integration of resource consumption, cost drivers, and Activity-Based Costing provides meaningful predictive insights regarding healthcare operational effectiveness and patient-centered healthcare quality.

From a managerial perspective, these findings suggest that healthcare organizations should focus on improving operational efficiency, healthcare transparency, and activity-based operational management systems to enhance healthcare quality and patient satisfaction. The implementation of Activity-Based Costing may also support managerial decision-making by providing more accurate information regarding healthcare activities, operational costs, and resource utilization.

Overall, the predictive relevance results confirm that the proposed structural model has satisfactory predictive capability and practical relevance within healthcare operational management.

Model Fit Evaluation

Model fit evaluation was conducted to assess the overall goodness-of-fit of the structural model. The model fit results are presented in Table 6.

Table 6. Model Fit Results

Model Fit Index	Value	Recommended Value
SRMR	0.067	< 0.08
NFI	0.91	> 0.90

Based on Table 6, the SRMR value of 0.067 is below the recommended threshold value of 0.08, indicating satisfactory model fit. In addition, the NFI value of 0.91 exceeds the recommended value of 0.90, which indicates that the structural model demonstrates acceptable goodness-of-fit.

These findings confirm that the proposed model is appropriate for explaining the relationships among resource consumption, cost drivers, Activity-Based Costing, and patient satisfaction within cataract surgery services.

Hypothesis Testing

Table 7. Hypothesis Testing Results

Variable Relationship	Coefficient	T-Statistic	P-Value	Result
Resource Consumption → Patient Satisfaction	0.43	4.85	0.000	Supported
Cost Driver → Patient Satisfaction	0.35	3.92	0.000	Supported
Activity-Based Costing × Resource Consumption → Patient Satisfaction	0.22	2.45	0.015	Supported
Activity-Based Costing × Cost Driver → Patient Satisfaction	0.20	2.31	0.020	Supported

Discussion

Effect of Resource Consumption on Patient Satisfaction

The hypothesis testing results showed that resource consumption had a positive and significant effect on patient satisfaction, with a path coefficient value of 0.43, a T-statistic value of 4.85, and a P-value of 0.000. These results indicated that the first hypothesis was supported.

The findings suggested that effective healthcare resource utilization contributed positively to patient satisfaction in cataract surgery services. Proper management of healthcare personnel, medical equipment, healthcare facilities, and operational capacity helped improve service effectiveness and healthcare responsiveness. Efficient resource utilization also reduced operational delays, minimized waiting times, and improved coordination throughout the treatment process.

In cataract surgery services, patients generally expect healthcare services that are timely, well-organized, and professionally managed. Effective operational coordination and adequate healthcare resources may increase patient confidence and create more positive healthcare experiences. Therefore, healthcare organizations that effectively manage operational resources are more likely to improve the quality of patient-centered healthcare services.

These findings were consistent with Kaplan & Anderson (2007), who explained that effective resource utilization significantly contributes to operational effectiveness and organizational performance. From a theoretical perspective, these results supported the Resource-Based View (RBV) theory, which posits that efficient management of organizational resources constitutes a source of competitive advantage and superior performance. In the healthcare context, resources such as skilled medical personnel, advanced surgical equipment, and well-coordinated operational processes represent valuable, rare, and difficult-to-imitate capabilities that directly influence service quality and patient perceptions. Similarly, the World Health Organization (2021) emphasized that operational efficiency plays an important role in improving healthcare quality and patient experiences within healthcare organizations.

From a managerial perspective, healthcare organizations should continuously improve operational planning, optimize healthcare resource allocation, and strengthen workflow coordination to maintain service quality and operational responsiveness. For cataract surgery clinics specifically, this implies the need for standardized preoperative assessment protocols, optimized operating room scheduling systems, and systematic postoperative follow-up procedures that collectively reduce patient waiting times and improve the overall treatment experience. Monitoring operational capacity and identifying inefficient activities are also essential to support sustainable healthcare service improvement.

Effect of Cost Drivers on Patient Satisfaction

The hypothesis testing results showed that cost drivers had a positive and significant effect on patient satisfaction, with a path coefficient value of 0.35, a T-statistic value of 3.92, and a P-value of 0.000. These results indicated that the second hypothesis was supported.

The findings suggested that accurate identification and management of healthcare cost drivers contributed positively to patient satisfaction. In healthcare services, cost drivers include several operational factors, such as surgery duration, frequency of healthcare activities, complexity of medical procedures, and intensity of healthcare resource utilization. Proper management of these operational factors may improve operational efficiency, enhance healthcare cost transparency, and reduce unnecessary operational expenses.

The results also indicated that patients tended to perceive healthcare services more positively when healthcare costs were transparent and aligned with the services provided. Cost transparency may strengthen patient trust because patients often associate healthcare quality with fairness, service reliability, and administrative effectiveness. Therefore, healthcare organizations need to continuously improve operational monitoring and cost management systems to maintain patient confidence and healthcare service quality.

These findings were consistent with Edward (2019), who stated that cost drivers explain the relationship between operational activities and resource consumption within organizations. Effective management of cost drivers enables organizations to improve operational efficiency, reduce unnecessary costs, and support better managerial decision-making. In addition, Dural Selcuk & Vasilakis (2023) explained that operational complexity and service variability

significantly influence healthcare cost structures and operational sustainability.

From a managerial perspective, healthcare organizations should regularly evaluate operational activities that generate significant costs and determine whether these activities effectively contribute to healthcare value creation. Reducing non-value-added activities and improving operational transparency may help healthcare organizations strengthen service effectiveness and improve patient-centered healthcare quality.

Moderating Effect of Activity-Based Costing on the Relationship between Resource Consumption and Patient Satisfaction

The hypothesis testing results show that Activity-Based Costing has a significant moderating effect on the relationship between resource consumption and patient satisfaction, with a path coefficient value of 0.22, a T-statistic value of 2.45, and a P-value of 0.015. These results indicate that the third hypothesis is supported.

The findings suggest that the efficient utilization of healthcare resources becomes more effective when supported by an accurate cost allocation system. The implementation of Activity-Based Costing enables healthcare organizations to allocate operational costs based on healthcare activities and actual resource utilization. As a result, healthcare organizations can improve cost transparency and strengthen operational control within cataract surgery services.

Activity-Based Costing also helps healthcare organizations identify value-added and non-value-added activities more clearly. This enables healthcare managers to improve workflow coordination, optimize resource utilization, and reduce operational inefficiencies. These improvements may contribute positively to healthcare quality and patient experiences throughout the treatment process.

In cataract surgery services, operational efficiency is essential because healthcare procedures involve coordination among healthcare personnel, utilization of medical equipment, and service scheduling. Without accurate operational cost management, healthcare organizations may encounter inefficiencies that negatively affect service effectiveness and patient satisfaction. Therefore, the implementation of Activity-Based Costing plays an important role in supporting operational effectiveness and enhancing patient-centered healthcare quality.

These findings are consistent with Rasisi et al. (2026), who explained that Activity-Based Costing improves operational transparency and managerial decision-making through more accurate operational cost information. In addition, Niñerola et al. (2021) stated that the implementation of Activity-Based Costing contributes positively to healthcare operational efficiency and healthcare service quality.

From a managerial perspective, healthcare organizations should integrate Activity-Based Costing into their operational management systems to improve healthcare cost transparency, operational coordination, and resource optimization. Effective implementation of ABC may also support long-term healthcare sustainability and enhance patient satisfaction.

Moderating Effect of Activity-Based Costing on the Relationship between Cost Drivers and Patient Satisfaction

The hypothesis testing results show that Activity-Based Costing has a significant moderating effect on the relationship between cost drivers and patient satisfaction, with a path coefficient value of 0.20, a T-statistic value of 2.31, and a P-value of 0.020. These results indicate that the fourth hypothesis is supported.

The findings suggest that the implementation of Activity-Based Costing strengthens the influence of cost drivers on patient satisfaction. Through activity-based cost allocation, healthcare organizations can identify operational cost structures more accurately and improve cost transparency. This enables healthcare managers to better understand the operational activities that contribute to healthcare costs and improve the efficiency of healthcare processes.

The results also indicate that accurate cost management contributes positively to patient trust and healthcare service quality. Patients tend to perceive healthcare services more positively when healthcare costs are managed transparently and aligned with the services provided. Therefore, the implementation of Activity-Based Costing may strengthen the relationship between operational management and patient-centered healthcare quality.

In cataract surgery services, healthcare operational processes involve various activities,

including patient registration, preoperative examinations, surgical preparation, surgical procedures, postoperative monitoring, and administrative coordination. These activities require different levels of resource utilization and generate varying operational costs. Without an accurate cost allocation system, healthcare organizations may experience inefficiencies and cost distortions that affect healthcare service effectiveness and patient satisfaction.

These findings are consistent with Niñerola et al. (2021), who explained that Activity-Based Costing contributes to healthcare operational efficiency, cost control, and managerial effectiveness. Similarly, Najjar et al. (2017) stated that activity-based costing systems help healthcare organizations improve operational processes and service sustainability through more accurate operational cost analysis.

From a managerial perspective, healthcare organizations should strengthen operational monitoring systems and integrate Activity-Based Costing into healthcare financial management processes. Effective implementation of ABC may help healthcare organizations improve workflow efficiency, reduce non-value-added activities, optimize budgeting processes, and strengthen patient trust regarding healthcare cost transparency and service quality.

Overall, the findings confirm that Activity-Based Costing plays an important role in supporting operational efficiency, healthcare cost transparency, and patient-centered healthcare services within cataract surgery organizations. However, it should be noted that all four hypotheses yielded positive and significant results, which warrants critical reflection. The consistently positive findings may partly be attributed to social desirability bias, as patients completing post-treatment questionnaires may tend to provide favorable responses. Additionally, the relatively homogeneous sample drawn from a single clinic may limit the variability of responses. The research model also does not account for potentially confounding variables, such as patient socioeconomic status, differences in insurance coverage, or prior surgical experience, which could independently influence satisfaction levels. Future studies should consider incorporating control variables and employing mixed-methods approaches to provide more nuanced insights into the relationship between Activity-Based Costing and patient satisfaction in healthcare settings.

Theoretical Contribution

This study contributes to the healthcare management accounting literature by extending the application of Activity-Based Costing (ABC) within specialized healthcare services, particularly cataract surgery services. Previous studies have generally focused on the implementation of ABC in manufacturing industries and hospital financial management. In contrast, this study examines the moderating role of Activity-Based Costing in the relationship between operational management variables and patient satisfaction within healthcare services.

This study also contributes to the operational management literature by integrating resource consumption, cost drivers, and patient satisfaction into a single research framework. The findings indicate that operational efficiency and healthcare cost transparency play important roles in improving patient-centered healthcare quality. These results provide further insight that operational management systems influence not only organizational efficiency but also patients' perceptions of healthcare service quality.

Furthermore, this study strengthens the theoretical understanding of Activity-Based Costing as a strategic operational management tool within healthcare organizations. The findings demonstrate that ABC is not limited to financial cost allocation functions but also supports operational transparency, workflow coordination, and healthcare service effectiveness.

Overall, this study contributes to the development of healthcare management accounting theory by demonstrating that the integration of operational resource management and activity-based cost allocation systems can improve operational effectiveness and patient satisfaction within specialized healthcare services.

Managerial Implication

The findings of this study provide several managerial implications for healthcare organizations, particularly clinics and hospitals providing cataract surgery services. The results indicate that efficient resource utilization, accurate identification of cost drivers, and effective implementation of Activity-Based Costing (ABC) contribute positively to patient satisfaction and

healthcare operational effectiveness.

Healthcare organizations should improve operational coordination and optimize healthcare resource utilization to enhance service responsiveness and reduce operational inefficiencies. Proper management of healthcare personnel, operating room capacity, healthcare facilities, and medical equipment utilization may help reduce waiting times, improve workflow coordination, and strengthen patients' perceptions of healthcare service quality.

The findings also demonstrate that operational transparency and effective cost management influence patient trust and satisfaction. Therefore, healthcare managers need to identify operational activities that generate significant costs and evaluate whether these activities effectively contribute to healthcare value creation. The implementation of Activity-Based Costing may help healthcare organizations identify non-value-added activities, improve operational efficiency, and optimize resource allocation.

In addition, healthcare organizations are encouraged to integrate Activity-Based Costing into operational and financial management systems to support managerial decision-making and improve healthcare sustainability. Through more accurate cost allocation and operational analysis, healthcare managers can enhance budgeting effectiveness, operational transparency, and patient-centered healthcare services.

From a strategic perspective, the implementation of Activity-Based Costing may also strengthen healthcare organizations' competitiveness by supporting operational effectiveness, cost control, and long-term service sustainability within increasingly competitive healthcare environments.

Limitation and Future Research

This study has several limitations that should be considered when interpreting the findings. First, the study was conducted in a single healthcare organization, namely Klinik Utama Rawat Inap KL. Therefore, the findings may not fully represent other healthcare organizations with different operational characteristics and service systems.

Second, this study applied a cross-sectional research design. Consequently, the research reflects only the conditions during the data collection period and may not fully capture long-term changes in healthcare operational management and patient satisfaction. Changes in healthcare policies, technological developments, and service demand may influence operational efficiency and patient perceptions over time.

Third, patient satisfaction was measured based on respondents' perceptions through self-reported questionnaires. Although the research instruments demonstrated satisfactory validity and reliability, subjective perceptions and variations in patient expectations may still influence the study results.

In addition, this study focused on operational management variables and Activity-Based Costing within cataract surgery services. Other factors that may influence patient satisfaction, such as healthcare digitalization, service innovation, healthcare workforce competency, leadership, and healthcare information systems, were not examined in this study.

Future studies are recommended to involve larger sample sizes and multiple healthcare organizations to improve the generalizability of the findings. Further research may also examine the implementation of Time-Driven Activity-Based Costing (TDABC), digital healthcare systems, and operational sustainability within broader healthcare service contexts.

Future researchers are also encouraged to apply longitudinal research designs to examine long-term relationships among operational management systems, healthcare efficiency, and patient satisfaction within healthcare organizations.

CONCLUSION

This study examined the influence of resource consumption and cost drivers on patient satisfaction in cataract surgery services, with Activity-Based Costing serving as a moderating variable at Klinik Utama Rawat Inap KL.

The findings indicate that resource consumption and cost drivers have positive and significant effects on patient satisfaction. Efficient utilization of healthcare resources, effective operational coordination, and accurate identification of healthcare cost drivers contribute to improved healthcare quality, operational transparency, and enhanced patient experiences during

cataract surgery services.

The results also demonstrate that Activity-Based Costing significantly strengthens the relationship between operational management variables and patient satisfaction. The implementation of Activity-Based Costing enhances operational transparency, cost allocation accuracy, operational efficiency, and healthcare process effectiveness, ultimately contributing to patient-centered healthcare quality.

This study highlights the importance of integrating operational management systems with activity-based cost management approaches within healthcare organizations to improve healthcare service effectiveness and organizational sustainability. Efficient healthcare resource utilization and transparent healthcare cost management are critical factors influencing healthcare competitiveness and patient trust within specialized healthcare services.

From a theoretical perspective, this study contributes to the healthcare management accounting literature by extending the application of Activity-Based Costing in specialized healthcare services and strengthening the understanding of its role in improving operational effectiveness and patient-centered healthcare quality.

From a managerial perspective, the findings suggest that healthcare organizations should continuously improve operational efficiency, healthcare transparency, and workflow coordination through the implementation of Activity-Based Costing and effective operational management systems. These improvements are expected to strengthen healthcare sustainability, improve service quality, and enhance patient satisfaction in cataract surgery services. It is recommended that healthcare regulators consider incorporating Activity-Based Costing-based cost reporting requirements for specialized surgical services to promote transparency and standardization among healthcare providers. Future research should expand the scope to include multiple healthcare facilities, employ longitudinal research designs, and incorporate patient demographic characteristics as control variables to enhance the generalizability and robustness of the findings.

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AUTHOR CONTRIBUTION STATEMENT

Kelvin Alim contributed to the conceptualization, methodology, data collection, data analysis, and manuscript preparation. Siti Syahara Fauziah contributed to research supervision, validation, literature review, and critical revision of the manuscript. Adrie Frans Assa contributed to theoretical development, interpretation of findings, manuscript improvement, and final review. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the research.

REFERENCES

- Andaleeb, S. S. (2001). Service quality perceptions and patient satisfaction: a study of hospitals in a developing country. *Social Science & Medicine*, 52(9), 1359–1370. [https://doi.org/10.1016/S0277-9536\(00\)00235-5](https://doi.org/10.1016/S0277-9536(00)00235-5)
- Conceição, A., Major, M., & Clegg, S. (2023). Project ABC: Unanticipated affinities and affect in hospital health care. *Financial Accountability and Management*, 39(3). <https://doi.org/10.1111/faam.12366>
- Cost & effect: using integrated cost systems to drive profitability and performance. (1998). *Choice Reviews Online*, 35(10). <https://doi.org/10.5860/choice.35-5748>
- Donabedian, A. (1988). The Quality of Care: How Can It Be Assessed? *JAMA: The Journal of the American Medical Association*, 260(12). <https://doi.org/10.1001/jama.1988.03410120089033>
- Dural Selcuk, G., & Vasilakis, C. (2023). Evaluating the sustainability of complex health system transformation in the context of population ageing: An empirical system dynamics study.

- Journal of the Operational Research Society*, 74(1).
<https://doi.org/10.1080/01605682.2021.1992307>
- Edward, J. B. (2019). Cost Management A Strategic Emphasis 8e. In *Angewandte Chemie International Edition*, 6(11), 32-37.
- Haizer, J., Render, B., Munson, C. (2020). Operations Management: Sustainability and Supply Chain Management. *Sustainability (Switzerland)*, 11(1).
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>.
- Kaplan, R. S., & Anderson, S. R. (2007). Time-driven activity-based costing: a simpler and more powerful path to higher profits. *Harvard Business School Press Books*, 82.
- Kaplan, R. S., & Porter, M. E. (2011). How to solve the cost crisis in health care. *Harvard Business Review*, 89(9).
- Kementerian Kesehatan Republik Indonesia. (2023). *Profil kesehatan Indonesia 2022*. Kemenkes RI.
- Li, S. A., Jeffs, L., Barwick, M., & Stevens, B. (2018). Organizational contextual features that influence the implementation of evidence-based practices across healthcare settings: A systematic integrative review. *Systematic Reviews*, 7(1). <https://doi.org/10.1186/s13643-018-0734-5>
- Mosadeghrad, A. M. (2014). Factors influencing healthcare service quality. *International Journal of Health Policy and Management*, 3(2). <https://doi.org/10.15171/ijhpm.2014.65>
- Najjar, P. A., Strickland, M., & Kaplan, R. S. (2017). Time-driven activity-based costing for surgical episodes. In *JAMA Surgery* (Vol. 152, Number 1). <https://doi.org/10.1001/jamasurg.2016.3356>
- Niñerola, A., Hernández-Lara, A., & Sánchez-Rebull, M. (2021). Improving healthcare performance through Activity-Based Costing and Time-Driven Activity-Based Costing. *The International Journal of Health Planning and Management*, 36(6), 2079–2093. <https://doi.org/10.1002/hpm.3304>
- Oliver, R. L. (2014). Satisfaction: A behavioral perspective on the consumer, Second edition. In *Satisfaction: A Behavioral Perspective on the Consumer, Second Edition*. <https://doi.org/10.4324/9781315700892>
- Parasuraman, A., Zeithaml, V. A., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. 1988, 64(1), 12–40.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (2020). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*, 64(1), 12–40. [https://doi.org/10.1016/S0022-4359\(99\)80006-3](https://doi.org/10.1016/S0022-4359(99)80006-3)
- Quesado, P., & Silva, R. (2021). Activity-based costing (ABC) and its implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1). <https://doi.org/10.3390/joitmc7010041>
- Rasisi, M. T., Reynolds, A., & Munkuli, C. (2026). Evaluating the effectiveness of activity-based costing in improving cost efficiency in listed South African retailers. *International Journal of Research in Business and Social Science* (2147- 4478), 15(2), 148–160. <https://doi.org/10.20525/ijrbs.v15i2.4876>
- Tahir, A., Auliyah, I., Lande, A., & Basannang, S. M. (2025). Optimizing Production Cost through Activity-Based Costing Approach as a Strategy to Increase Company Profit. *Jurnal Economic Resource*, 9(1). <https://doi.org/10.57178/jer.v9i1.1959>
- World Health Organization. (2018). Health system efficiency: Policy options. WHO Press.
- Yang, C. H., Lee, H. L., Tsai, W. H., & Chuang, S. (2020). Sustainable smart healthcare information portfolio strategy evaluation: An integrated activity-based costing decision model. *Sustainability (Switzerland)*, 12(24). <https://doi.org/10.3390/su122410662>