

## Analysis of Factors Affecting the Performance of Medical Laboratory Technologists (MLTs)/Laboratory Analysts in Hospitals: A Scoping Review

Agus Riyanto<sup>1\*</sup>, Ayun Sriyatmi<sup>2</sup>, Cahya Tri Purnami<sup>3</sup>  
Universitas Diponegoro, Indonesia<sup>1,2,3</sup>  
Email: agus717672@gmail.com\*

---

### ABSTRACT

#### **Keywords:**

*employee performance;*  
*laboratory services;*  
*motivation;*  
*leadership; compensation*

The performance of Medical Laboratory Technologists (MLTs) and Laboratory Analysts is essential for maintaining the accuracy and reliability of diagnostic services in hospitals. Suboptimal laboratory performance can negatively affect clinical decision-making and patient outcomes. Many hospitals in Indonesia face challenges such as limited staffing, high workloads, and inadequate career development systems, which may hinder optimal employee performance. This study aims to systematically analyze key factors influencing the performance of Medical Laboratory Technologists and Laboratory Analysts in hospital settings. A systematic review methodology was applied by synthesizing findings from multiple related studies to derive comprehensive conclusions. Literature searches were conducted using Google Scholar and focused on factors associated with employee performance, including compensation, leadership, motivation, work culture, organizational commitment, work environment, salary structures, and career development, with article selection restricted to publications from 2014 to 2024. Articles were screened through title and abstract review, followed by full-text assessment based on eligibility criteria. The review results indicate that compensation, leadership, motivation, and work culture are major determinants of performance, while organizational commitment, work environment, salary structures, and career development also significantly contribute to job satisfaction and productivity. The findings highlight that strengthening both financial and non-financial incentives, providing effective leadership, and fostering supportive organizational cultures can enhance employee performance and improve the efficiency and quality of laboratory services.

---

### INTRODUCTION

The task of a clinical laboratory is to provide laboratory test results to clinicians, which can be used to establish diagnoses and determine follow-up treatment for patients (Kahar, 2020). Health is an investment that supports economic development and plays a crucial role in poverty alleviation efforts. Therefore, national health development is directed toward increasing awareness, willingness, and individuals' ability to lead healthy lives. This aims to achieve the highest possible level of public health, serving as an investment in the development of socially and economically productive human resources (Sudiadnyani et al., 2022).

Specifically, hospitals in Indonesia face intense competition from both private hospitals and government-owned healthcare facilities. Additionally, evolving regulations, such as the implementation of the National Health Insurance (JKN) system and adjustments to minimum service standards, add complexity to hospital management. Rapid advancements in medical

technology serve as a key driver of change, requiring hospitals to effectively integrate technological innovations to enhance service efficiency. Other factors, such as the limited availability of qualified healthcare professionals and the unequal distribution of healthcare facilities, further exacerbate these challenges. Therefore, it is crucial for hospitals to conduct a comprehensive analysis of both internal and external conditions as an initial step in developing sustainable strategies (Yulisa et al., 2024).

In 2018, it was reported that, out of 11 laboratories in Cimahi City, only 6 had implemented quality control and properly processed data (Satrio & Feisal, 2022). Many factors influence employee performance, including workforce capability, work motivation, leadership support, the nature of the work, and employees' relationships with the organization. Leadership plays a highly strategic and essential role in healthcare services (hospitals) as a key determinant in achieving the mission, vision, and organizational goals. Therefore, the challenge in developing a clear service strategy primarily lies in service delivery on the one hand and leadership on the other (Puspitasari & Fidyarningsih, 2023).

Previous research, such as that conducted by Puspitasari and Fidyarningsih (2023), identified that the main factors influencing the performance of hospital employees in Indonesia include compensation, leadership, motivation, and work culture. A study conducted at Al-Irsyad Hospital in Surabaya showed that a shortage of laboratory personnel led to a high workload and a decrease in service quality (Arifin et al., 2021). However, although the study identified factors affecting performance, a more comprehensive approach to analyzing the influence of these factors within the specific Indonesian context remains limited.

This study aims to systematically analyze the factors affecting ATLM performance by integrating various variables, including compensation, leadership, motivation, work culture, organizational commitment, work environment, and career development, using a systematic review method. Through this study, it is expected to provide deeper insights into the causes of suboptimal ATLM performance and offer recommendations to improve the quality of hospital laboratory services in Indonesia.

## **METHOD**

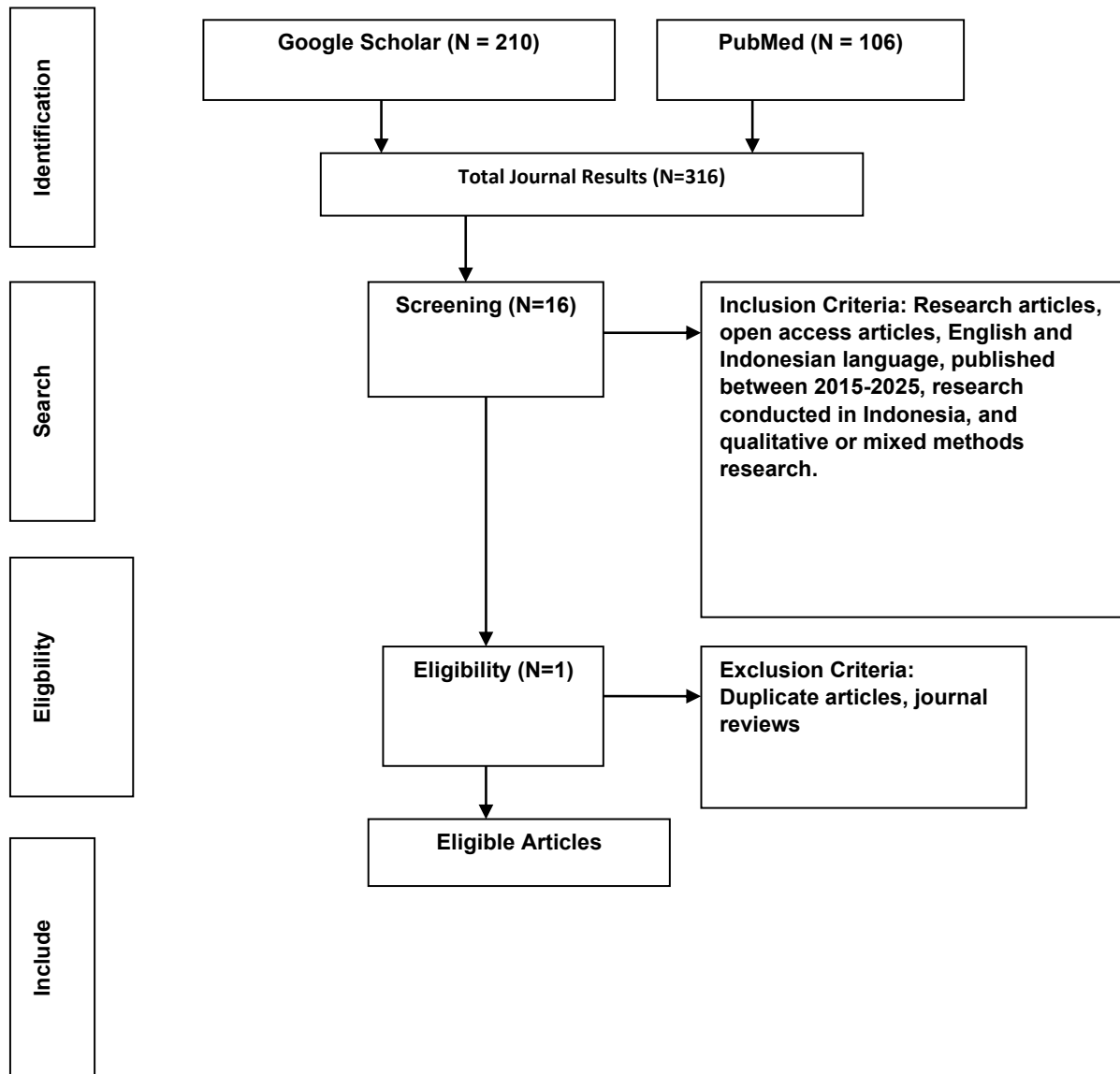
This research employed a systematic review method to analyze the key factors influencing the performance of Medical Laboratory Technologists and Laboratory Analysts in hospital settings. The study was conducted between January and October 2024. The research location was based on literature data collected from hospitals across Indonesia through secondary sources available in digital academic databases. The primary tools and materials used in this study included online literature databases, laptops, and reference management software to organize and review publications. The literature search was carried out through Google Scholar using a combination of keywords related to hospital employee performance factors, such as compensation, leadership, motivation, work culture, commitment, work environment, salary provision, and career development. The scope of publication selection was limited to articles published from 2014 to 2024 to ensure relevance and currency. The research procedure included several stages, beginning with identifying relevant studies, screening based on titles and abstracts, and evaluating full-text availability according to predetermined inclusion and exclusion criteria. Articles were included if they examined employee performance in Indonesian hospital settings and provided solutions to performance-related issues, while studies

without full-text access or containing duplicate publication data were excluded. After screening and evaluation, relevant studies were reviewed and synthesized to obtain comprehensive conclusions regarding the factors influencing Medical Laboratory Technologists' and Laboratory Analysts' performance.

## **RESULT AND DISCUSSION**

The main focus of this systematic review is to identify the factors affecting performance in hospitals, specifically for Medical Laboratory Technologists (MLTs)/Laboratory Analysts. By analyzing multiple studies, this review aims to determine key influences on employee performance, such as compensation, leadership, motivation, work culture, commitment, work environment, salary provision, and career development. The findings will contribute to a deeper understanding of performance determinants and provide insights for improving hospital workforce management.

Based on the literature review conducted, a total of 16 relevant articles were identified, with the selection process outlined in Figure 1. The process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, encompassing four main stages. In the Identification stage, articles were searched using specific keywords across scholarly databases such as Google Scholar and PubMed to collect as many relevant discussions as possible. The Screening stage involved an initial review of titles and abstracts to remove duplicates, irrelevant content, and articles unrelated to early detection or students facing bullying, retaining only those focusing on mental health detection interventions and their impacts. During the Eligibility stage, a detailed assessment of the articles passing the screening was conducted through full-text reviews based on established inclusion and exclusion criteria. Studies with differing contexts or those not evaluating early detection effects were excluded at this stage. Finally, in the Inclusion stage, articles meeting all criteria were selected for the final analysis, enabling a qualitative examination of patterns, research gaps, and the most effective methods for early detection to prevent emotional mental disorders caused by bullying. This meticulous selection process ensured that only relevant and high-quality articles were analyzed, providing a comprehensive understanding of the topic.



**Figure 1. Stages of Article Search and Selection Leading to Reviewed Articles**

Source: Compiled by the Author based on the guidelines of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)

**Table 1. Analysis of Factors Affecting the Performance of Medical Laboratory Technologists (MITS)/Laboratory Analysts in Hospitals : A Scoping Review**

Researcher(s), Year	Objective	Population	Methodology	Findings
(Puspitasari & Fidyarningsih, 2023)	To review factors influencing employee performance in hospitals in Indonesia	Hospital employees in Indonesia	Systematic review using Google Scholar database; selection based on inclusion and exclusion criteria	Identified 12 significant factors affecting hospital employee performance: leadership, work culture, work discipline, training, motivation, work environment, work organizational culture,

				commitment, competence, supervision, salary provision, and career development
(Satrio & Feisal, 2022)	To identify factors related to the implementation of Quality Control (QC) in laboratories	30 laboratories in Bandung	Survey using questionnaires; univariate analysis for QC implementation description and bivariate (chi-square) analysis for factor relationships	72% of laboratories had not implemented QC. The most significant factor influencing QC implementation was management policy (sig 0.024), while facilities (sig 0.642) and MLTs' knowledge of QC (sig 0.561) were not significantly related to QC implementation.
(Sudiadnyani et al., 2022)	To determine factors affecting the performance of health practitioners at Pertamina Bintang Amin Hospital, Bandar Lampung	269 health practitioners, sample size of 174	Quantitative study with cross-sectional design, Cluster Sampling, and logistic regression analysis	<b>Key Findings:</b> 58% of health practitioners had good performance. Factors significantly related to performance: <b>Motivation (p=0.0001, OR: 11.459), Supervision (p=0.000, OR: 9.516), Salary (p=0.000, OR: 9.382), Career Development (p=0.000, OR: 5.328).</b> The dominant factor was <b>motivation (p=0.000, OR: 9.297).</b> <b>Recommendations:</b> Implement structured performance appraisals, provide rewards, enhance career development opportunities, and improve supervision.
(Hutagalung, 2022)	To analyze the influence of <b>competence, motivation, and work environment</b> on employee performance	Literature review of Human Resource Management studies	Systematic Literature Review	<b>Findings:</b> (1) <b>Competence</b> influences employee performance, (2) <b>Motivation</b> influences employee performance, (3) <b>Work environment</b> influences employee performance. The

				study reinforces the theoretical relationship between these variables and performance.
(Wijayanti et al., 2022)	To analyze factors affecting internal quality control in laboratories	15 respondents, 40 urine samples	Quantitative research with cross-sectional design	Findings: (1) Human Resources scored 97.91 (Very Good), (2) Quality Control Implementation scored 60.6 (Poor), (3) Facilities and Infrastructure scored 100 (Very Good), (4) SOP Compliance scored 58.3 (Poor). The study highlights weaknesses in quality control implementation and SOP adherence.
(Dihan Bahar et al., 2023)	To determine patient satisfaction levels regarding inpatient waiting time in the Emergency Department (ED) of RSUD Cengkareng	Patients visiting the ED in Semester I of 2022, with a sample of 210 respondents (accidental sampling, Slovin formula, 7% margin of error)	Quantitative applied research, Cross-Sectional Study	Findings: (1) Factor analysis confirmed reliability (KMO MSA = 0.957, Bartlett's Test $p < 0.05$ ). (2) Positive correlation found between patient satisfaction and service quality dimensions (reliability, responsiveness, assurance, tangibles, empathy), with empathy having the highest influence (67.5%). (3) No significant correlation between inpatient waiting time and patient satisfaction ( $p = 0.775$ ). Conclusion: Service quality dimensions significantly impact patient satisfaction, but waiting time does not. Hospitals should enhance service quality to improve patient satisfaction.

(Laela Ardhana et al., 2023)	To analyze the impact of leverage, liquidity, capital structure, and company size on financial performance	Manufacturing business entities in the consumer goods industry sector listed on the Indonesia Stock Exchange (IDX) from 2019-2022	Purposive sampling method with 35 business entities, analyzed using multiple linear regression (SPSS 21)	Findings: (1) Leverage, capital structure, and company size significantly impact financial performance. (2) Liquidity does not have a significant impact on financial performance. Recommendations: Future studies should expand the population scope, extend the research period, and incorporate additional variables influencing financial performance.
(Deli et al., 2020)	To identify factors influencing length of stay (LOS) of pediatric patients in the Emergency Department (ED)	Pediatric patients in ED from January to September 2018, with 196 samples obtained through non-probability sampling	Observational analytic study with a retrospective cohort approach using secondary data from medical records; Chi-square and logistic regression analysis	Findings: (1) Arrival method, specialist consultation, diagnostic and laboratory tests, and final disposition significantly impact LOS (p-value < 0.05). (2) Referred patients have 2.544 times higher probability of prolonged LOS than self-referred patients. Recommendations: Findings should be used to develop hospital protocols and policies to improve service quality.
(Yuansyah et al., 2021)	To analyze factors influencing laboratory test turnaround time at RSUD Dr. RM Djoelham, Kota Binjai	All clinical laboratory staff (32 individuals, entire population sampled) + 3 qualitative informants	Mixed-method (quantitative & qualitative); Data collection via questionnaires & in-depth interviews; Univariate, bivariate, and multivariate analysis	Findings: (1) Facilities & equipment, specimen transportation, and electrical stability significantly impact turnaround time (p < 0.05). (2) Staff qualifications and pre-analytical, analytical, and post-analytical issues do not have a significant impact (p > 0.05). Recommendations: Improve training programs, reorganize laboratory

				infrastructure (e.g., satellite labs near ED), and evaluate laboratory equipment feasibility.
(Harlan et al., 2020)	To examine factors related to PPE usage behavior among laboratory workers at PHC Surabaya Hospital	All laboratory workers (medical/health analysts) at PHC Surabaya Hospital in June 2014	Descriptive observational study with cross-sectional design; Data collected via questionnaires, observation, and interviews; Independent variables: predisposing factors (age, sex, experience, education, knowledge, attitude), enabling factor (PPE availability), reinforcing factors (policy, socialization, monitoring, reward & punishment)	Findings: (1) 53.3% were <31 years, 73.3% were women, and 80% had a diploma. (2) 86.7% had good knowledge, 53.3% had a good attitude. (3) Availability of PPE (60%) included coats, gloves, and masks. (4) 86.7% received socialization, 73.3% had monitoring, but 80% had no punishment system. (5) Better PPE usage behavior was associated with younger age, less experience, and complete PPE availability. Recommendations: Strengthen reward & punishment mechanisms and assign non-laboratory personnel for neutral PPE monitoring.
(Jayanti et al., 2024)	To examine the influence of work motivation and professionalism on employee performance in the Laboratory Section of Tk II Hospital 03.05.01 Dustira, Cimahi City	52 employees in the Laboratory Section of Tk II Hospital 03.05.01 Dustira	Descriptive analytical research with a quantitative approach; Two independent variables (Work Motivation – based on Maslow’s theory in Robbins (2010:209), and Professionalism – based on Siagian (2014:163)) and one dependent variable (Employee Performance – based on	Findings: (1) Work Motivation: 78% (good category), Professionalism: 75% (good category), Employee Performance: 69% (good category). (2) Correlation analysis shows a strong relationship ( $r = 0.5$ ) between independent (X) and dependent (Y) variables. (3) Determination analysis: Adjusted $R^2 = 0.762$ (76.2% of Employee Performance explained by Work Motivation &

			Mangkunegara (2017:75)). Data collected using questionnaires (Likert scale, Sugiono, 2014) and saturated sampling technique.	Professionalism, while 23.8% influenced by other untested factors). (4) H0 rejected, H1 accepted, confirming a significant influence of Work Motivation & Professionalism on Employee Performance. Recommendations: Enhance work motivation and professionalism to improve employee performance in the laboratory section.
(Arifin et al., 2021)	To analyze the optimal staffing needs of medical laboratory technologists at Al-Irsyad Hospital Surabaya based on workload using the Workload Indicator Staffing Need (WISN) method	Total population: 13 medical laboratory technologists at Al-Irsyad Hospital Surabaya	Descriptive observational research with a quantitative approach. Data collection techniques: daily log method (self-recorded workload tracking) and activity time questionnaire (to determine standard work activities)	Findings: (1) The laboratory unit faces challenges such as high subjective workload, limited staff, overlapping tasks, and uncertainty during the COVID-19 pandemic. (2) Based on WISN calculations, the laboratory unit requires a total of 15 medical laboratory technologists, but currently only has 13, indicating a shortage of 2 staff members. Recommendation: Additional recruitment of 2 laboratory technologists to improve service quality and reduce workload.
(Kahar, 2020)	To analyze the factors affecting clinical laboratory quality assurance, focusing on pre-analytic, analytic, and post-analytic processes, reagent types,	Not specified	Descriptive analysis based on the Quality Management System (QMS) or Five Q's model, which includes Quality Planning, Laboratory Practice, Control, Assurance, and	Findings: (1) The quality of clinical laboratory examinations is determined by accuracy and precision. (2) Key influencing factors include the pre-analytic, analytic, and post-analytic processes, reagent

	methods, and laboratory personnel performance		Quality Improvement	selection, laboratory methods, and personnel performance. (3) Implementing a strong QMS framework enhances laboratory examination reliability and quality assurance.
(Wardani et al., 2023)	To analyze the implementation of Lean Hospital approach in optimizing hospital laboratory services and compare conditions before and after lean implementation	Laboratory units at RS A Kota Cimahi and RS B Kota Bandung	Qualitative research with Lean analysis; informants selected through purposive sampling	Findings: (1) The value-added activity ratio in both hospitals was less than 30%, indicating inefficiency. (2) Identified waste included long waiting times, unclear laboratory directions, lack of integrated hospital information systems (SIMRS), and non-compliance with SOPs. (3) Recommendations included reducing waiting times, improving guidance systems, integrating SIMRS, and enforcing SOP adherence. (4) Conclusion: Both hospitals were not yet lean, with inefficiencies due to manpower, methods, machines, and environmental factors affecting laboratory processes.
(Riwu et al., 2023)	To analyze the use of Balanced Scorecard (BSC) in hospitals worldwide and assess its applicability in Indonesian hospitals	Hospitals worldwide	Systematic review of investigative articles from ProQuest, EBSCO, SpringerLink, ScienceDirect, Scopus, Google Scholar, Garuda Ristekbrin	Findings: (1) BSC is beneficial for evaluating strategic plans, balancing financial and non-financial performance, aligning vision and mission, and improving the hospital work environment. (2) Challenges in adopting BSC in Indonesia include the complexity of implementation,

					requiring gradual adoption on a broader scale. (3)
					Recommendation: Healthcare institutions, including hospitals in Indonesia, should consider implementing BSC for comprehensive performance measurement.
(Parmita, 2023)	To analyze hospital performance using the Balanced Scorecard (BSC) from four perspectives: customer, financial, internal business, and learning & growth	- Customer perspective: 97 patients/family members - Internal business & learning and growth perspective: 82 employees of Regional Hospital Madani	- Proportional random sampling - Financial ratio analysis (for financial perspective) - Frequency distribution analysis (for customer, internal business, and learning & growth perspectives)	- Overall BSC performance score: 0.8, classified as good - However, performance in each perspective was not fully optimized - Encourages BSC adoption for more comprehensive hospital performance measurement	

Source: Puspitasari & Fidyaningsih (2023); Satrio & Feisal (2022); Sudiadnyani et al. (2022); Hutagalung (2022); Wardani et al. (2023)

The performance of Medical Laboratory Technologists (ATLM) in hospitals is influenced by various factors, including workforce aspects, quality management, operational efficiency, and performance evaluation methods. In terms of workforce, a study at RS Al-Irsyad Surabaya revealed that the number of laboratory personnel remains insufficient, leading to a high workload and a decline in service quality. Additionally, ATLMs often handle multiple tasks, increasing the risk of errors and fatigue. From a quality management perspective, laboratory performance heavily depends on the accuracy of test results, which is influenced by pre-analytical, analytical, and post-analytical processes, as well as reagent quality, examination methods, and the implementation of a Quality Management System (QMS). Accuracy and precision are key indicators in determining the quality of laboratory results, making strict adherence to quality systems essential.

From an operational efficiency perspective, studies on Lean Hospital implementation at RS A in Cimahi City and RS B in Bandung City found that value-added activities in laboratories account for less than 30%, indicating significant workflow inefficiencies. The primary causes of inefficiencies include patient waiting times, suboptimal processes, inefficient sample transportation, and ineffective workforce movement. The root causes of these problems stem from human factors, work methods, machines, and the work environment. Therefore, improving efficiency can be achieved through the implementation of a Hospital Management Information System (SIMRS), adherence to Standard Operating Procedures (SOPs), and workflow optimization in laboratories.

From a performance measurement perspective, the Balanced Scorecard (BSC) approach provides a more comprehensive evaluation of laboratory performance by considering four key perspectives: financial, customer, internal processes, and learning and growth. A study

at Regional Hospital Madani found that the overall laboratory performance score reached 0.8, which falls under the "good" category, although there is still room for improvement in each perspective. Implementing BSC in hospitals can help align organizational vision, mission, and objectives, while also providing a more holistic performance assessment compared to conventional evaluation methods that focus solely on financial aspects.

Overall, enhancing the performance of ATLMs and hospital laboratories can be achieved through adjusting workforce numbers based on workload, optimizing operational efficiency through a lean hospital approach, implementing an integrated information system, and strengthening quality management standards and staff training. With these strategic measures, hospital laboratories can deliver higher-quality, timely, and efficient services for both patients and healthcare professionals.

## CONCLUSION

The performance of Medical Laboratory Technologists in hospitals is determined by multiple interrelated factors, including workforce capacity, quality management, operational efficiency, and performance evaluation methods. Optimizing laboratory performance requires aligning workforce numbers with workload demands, strengthening quality management systems, improving operational efficiency through process optimization, and implementing integrated hospital management information systems. Continuous staff training and comprehensive performance evaluation using approaches such as the Balanced Scorecard contribute to maintaining high standards of laboratory services. By addressing these factors, hospitals can enhance the accuracy, timeliness, and overall quality of diagnostic services. Future research may focus on evaluating the long-term impact of Lean Hospital implementation and digital management systems on laboratory performance across diverse hospital settings.

## REFERENCES

- Arifin, S. A., Salma Pangestika, A., & Rochmah, T. N. (2021). *Analisis kebutuhan tenaga ahli teknologi laboratorium medik berdasarkan beban kerja dengan wisn.*
- Deli, H., Hasanah, O., Novayelinda, R., & Purwanti, E. (2020). Analisis Faktor-Faktor Yang Mempengaruhi Length Of Stay (Los) Pasien Anak Di Instalasi Gawat Darurat (IGD). *LINK*, 16(1), 59–65. <https://doi.org/10.31983/link.v16i1.5719>
- Dihan Bahar, F., Windiyarningsih, C., & Trigono, A. (2023). *Analisis Waktu Tunggu Pasien Rawat Inap Di IGD Rumah Sakit Umum Daerah Cengkareng.* 7(1). <http://ejournal.urindo.ac.id/index.php/MARSI>
- Harlan, A. N., Paskarini, I., Keselamatan, D., Kerja, K., & Kesehatan, F. (2020). *Faktor Yang Berhubungan Dengan Perilaku Penggunaan Apd Pada Petugas Laboratorium Rumah Sakit Phc Surabaya.*
- Hutagalung, B. A. (2022). *Analisa Faktor-Faktor Yang Mempengaruhi Kinerja Pegawai: Kompetensi, Motivasi Dan Lingkungan Kerja (Penelitian Literature Review Manajemen Sumber Daya Manusia).* 3(1), 2022. <https://doi.org/10.38035/jmpis.v3i1>
- Jayanti, E., Avianti, W., & Jusdijachlan, R. (2024). *Pengaruh Motivasi Kerja dan Profesionalisme Terhadap Kinerja Karyawan Ahli Teknologi Laboratorium Medis (Atlm) di Bidang Laboratorium Rumah Sakit TK II Tahun 03.05.01 Dustira Kota Cimahi.* 2(2). <https://doi.org/10.38035/jkis.v2i2>
- Kahar, H. (2020). *Manajemen Laboratorium Peningkatan Mutu Pemeriksaan Di Laboratorium Klinik Rumah Sakit.*

- Laela Ardhana, R., Kuriniati, S., Ekonomi, F., & Islam Batik Surakarta, U. (2023). *Analysis Of Factors Affecting Financial Performance Analisis Faktor-Faktor Yang Mempengaruhi Kinerja Keuangan*.
- Parmita, R. (2022). *Analisis Pengukuran Kinerja Rumah Sakit Dengan Pendekatan Balanced Scorecard Pada Rumah Sakit Daerah Madani Palu*.
- Puspitasari, S. C., & Fidyarningsih, R. (2023). *Jka (Jurnal Kesehatan Arrahma) Faktor-Faktor Yang Mempengaruhi Kinerja Pegawai Di Rumah Sakit (Systematic Review)* (Vol. 1, Issue 1). <https://journal.stikesami.ac.id/index.php/jka>
- Riwu, S. L., Wibowo, A., & Budiyatno, K. C. (2023). *Penilaian Kinerja Rumah Sakit Dengan Menggunakan Pendekatan Balanced Scorecard: Systematic Review Assessment of Hospital Performance Using Balanced Scorecard Approach: Systematic Review*. <https://remote-lib.ui.ac.id>,
- Satrio, M., & Feisal, S. (2022). *Analisa Faktor-Faktor Yang Mempengaruhi Pelaksanaan Quality Control Di Laboratorium*.
- Sudiadnyani, N., Sary, L., Muhani, N., Amirus, K., Fitriyani Hasbie, N., Studi Magister Kesehatan Masyarakat, P., Ilmu Kesehatan, F., & Yang Mempengaruhi Kinerja Tenaga Kesehatan Di, F.-F. (2022). *Faktor-Faktor Yang Mempengaruhi Kinerja Tenaga Kesehatan Di Rumah Sakit Pertamina Bintang Amin Bandar Lampung Tahun 2020*. In *Jurnal Ilmu Kedokteran dan Kesehatan* (Vol. 9, Issue 3). <http://ejournalmalahayati.ac.id/index.php/kesehatan>
- Wardani, L., Muhardi, M., & Hendarta, A. (2023). *Pendekatan Lean Hospital dalam Mengoptimalkan Pelayanan Laboratorium Rumah Sakit*. *Jurnal Integrasi Kesehatan & Sains*, 5(1), 7–13. <https://doi.org/10.29313/jiks.v5i1.10608>
- Wijayanti, H. N., Yansen, A., & Nurcahyanti, O. (2022). *Analisis Faktor-Faktor Yang Mempengaruhi Pemantapan Mutu Internal Pada Pemeriksaan Urin Rutin Di Laboratorium Rsud Kota Depok*.
- Yuansyah, R., Harahap, J., & Suroyo, R. B. (2021). *Analisis Faktor-Faktor Yang Mempengaruhi Waktu Tunggu Hasil Pemeriksaan Laboratorium Klinik Di Rsud Dr Rm 'Djoelham Kota Binjaitahun 2020 Analysis of Factors Affecting Waiting Time For Clinical Laboratory Examination Results at RSUD Dr RM Djoelham, Binjai City in 2020*. In *Journal of Healthcare Technology and Medicine* (Vol. 7, Issue 2).
- Yulisa, D., Erdiansyah, I. B., Septiawan, F. D., Sugiri, S. Q., & Budiarti, L. (2024). *Analisa Lingkungan Internal dan Eksternal. COMSERVA : Jurnal Penelitian Dan Pengabdian Masyarakat*, 4(6), 1752–1760. <https://doi.org/10.59141/comserva.v4i6.2496>