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APPLYING THE LEAN HOSPITAL APPROACH TO CONTINUAL IMPROVEMENT OF SERVICE QUALITY IN THE OUTPATIENT PHARMACY AT DR. HAFIZ HOSPITAL

Billi Syufrian[1], Elim Sulfajrin[2]
[1,2] Universitas Prof Dr Hafiz MPH, Indonesia
E-mail: syufrianb13@gmail.com, elimsulfajrin22@gmail.com

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Abstract

The pharmacy serves as a crucial component within hospital medical support infrastructure. Nonetheless, several challenges persist that impact patient satisfaction, including inefficient room layouts, insufficient drug inventories, and suboptimal service times. This study aims to identify key sources of waste and their underlying causes in the outpatient service process at Dr. Hafiz Hospital Pharmacy. Applying both qualitative and quantitative case study methods, the research includes observation of service workflows, distribution of value and waste questionnaires, and interviews. Value stream mapping of the prescription dispensing process revealed a lead time of 24.89 minutes with a Value Added Ratio (VAR) of 63% for general patients, 18.45 minutes and VAR of 67% for BPJS patients, and 14.72 minutes and VAR of 51% for non-dispensing prescriptions among general patients; BPJS non-dispensing prescriptions showed a lead time of 11.61 minutes and VAR of 56%. Transportation waste was identified as the most significant, accounting for 20.2% of total waste. Root causes included distant room layouts, unavailable prescribed medications, and discrepancies between doctors' requests and pharmacy stock.

Keywords: *Critical Waste, Hospital Pharmacy, Lean Hospital, Service Improvement.*

INTRODUCTION

Every individual is entitled to a decent quality of life, particularly regarding personal and family health, which encompasses access to food, clothing, healthcare, and essential social services. Health initiatives are designed to maintain and enhance well-being, with dedicated facilities—referred to as health facilities—serving this purpose. Hospitals represent a critical component in delivering effective, affordable healthcare and contribute significantly to improving community health outcomes. Moreover, hospitals serve as centers for the training of healthcare professionals and for medical research (Depkes RI No 44 Tahun 2009). In pursuit of enhanced service quality, hospitals have expanded their healthcare infrastructure, including pharmacies. The Pharmacy Installation (IFRS) operates as a strategic unit within hospitals such as Dr Hafiz Hospital, providing direct pharmaceutical services to emergency, inpatient, and outpatient populations and maintaining 24-hour readiness. As competition in the healthcare sector intensifies, it is incumbent upon hospital pharmacy installations to continuously elevate their service quality.

Nonetheless, numerous challenges persist within pharmaceutical services that may result in patient and family dissatisfaction. To address these issues, this study applies the Lean Hospital approach—a management system emphasizing service efficiency at IFRS, which has demonstrated efficacy in enhancing hospital service quality by minimizing or eliminating waste, thereby increasing patient satisfaction and safety. Adoption of lean principles is anticipated to improve service delivery and support overall hospital advancement. Lean serves as a comprehensive management philosophy and toolkit capable of redefining organizational structure and management in hospitals. It enables improvements in care quality, error reduction, and decreased waiting times while fostering long-term organizational strength, cost reductions, risk mitigation, and supporting institutional growth. Lean methodology also facilitates interdepartmental collaboration, ultimately benefitting patient care (Graban, 2011). Implementation of lean concepts has been shown to reduce or eliminate non-value-added activities and enhance patient safety (Poksinska, 2010;

Burgess and Radnor, 2013). For instance, King Abdullah University Hospital in Jordan achieved a 45% reduction in medication delivery time within its inpatient pharmacy through lean practices (Al-Araidah et al., 2010). Similarly, Metro Health Hospital in Michigan reduced medication administration time by 33%, medication errors by 40%, and annual inventory costs by $153,000 by streamlining processes (Houghton, 2006). Research at Santa Maria Pemalang Hospital demonstrated a reduction in procurement process steps from 16 to 13, identifying wastes such as over-processing, over-production, human potential, waiting, inventory, motion, transportation, and defects (Prasetya, 2015).

In Indonesia, the application of lean methodologies remains predominantly within the manufacturing sector, with limited adoption in healthcare. Despite this, lean principles are broadly applicable across organizational types. Hospitals, characterized by high levels of technology, labor, and capital, require integrated management of these resources to ensure efficient and effective patient services. This is particularly relevant to Dr Hafiz Hospital, where potential challenges may arise across all departments, including the pharmacy under the purview of IFRS. The present study aims to identify stakeholder value from the patient's perspective to systematically reduce or eliminate waste within service processes, thereby enhancing stakeholder experience and operational efficiency.

LITERATURE REVIEW

The lean methodology has been adopted by numerous hospitals and has consistently produced favourable outcomes. Multiple studies indicate that lean practices significantly enhance work and resource efficiency. For example, King Abdullah University Hospital in Jordan reported a 45% decrease in medication delivery times within its inpatient pharmacy unit (Al-Araidah et al., 2010). Similarly, Metro Health Hospital in Michigan reduced the time required to administer medication to patients by 33% through the elimination of five non-value-added steps, decreasing the total process steps from fourteen to nine. This initiative led to a 40% reduction in medication errors and an annual savings of $153,000 in medication supply costs (Houghton, 2006). Research on lean implementation in drug procurement at Santa Maria Pemalang Hospital demonstrated a decrease in process steps from sixteen to thirteen. The identified wastes included overprocessing, overproduction, underutilised human potential, waiting, excess inventory, unnecessary motion, transportation inefficiencies, and defects (Prasetya, 2015).

Lean practices are increasingly crucial in healthcare due to rising service provision costs, while patients and healthcare funders remain reluctant to pay higher fees. This situation necessitates a paradigm shift in hospital management and organisation. Implementing lean concepts can improve the quality of hospital services by minimising rework, reducing patient length of stay, and optimising room utilisation. Such quality enhancements contribute substantially to patient safety, reduce healthcare expenditures, and ultimately increase customer satisfaction (Graban, 2011).

METHOD

This research employs a case study methodology, integrating both qualitative and quantitative approaches. Qualitative data was collected through observation, interviews, questionnaires, and document reviews from the hospital, serving as supporting material for developing improvement proposals aimed at enhancing outpatient service quality at the Dr Hafiz Hospital Pharmacy Installation using the lean hospital framework. The application of the lean hospital concept necessitates a thorough understanding of the challenges faced by patients, their families, and staff members within the pharmacy.

The study sample comprises all pharmaceutical personnel (pharmacists and TTKs) involved in the service process, including the head of the pharmacy, the head of the dispensary, patients, and families utilizing the pharmacy’s services. According to Lameshow's formula (1997), a minimum of 96 respondents was required; therefore, 100 respondents were included to ensure adequate representation. Data collection focused on identifying the service processes for outpatients and families who are at least 17 years old, literate, and have accessed the pharmacy’s services at least once.

Data analysis involves stakeholder value identification based on observational results, with responses calculated as percentages of “Yes” and “No.” Service time analysis utilizes ratios between value

added (VA), non-value added (NVA), and necessary but non-value added (NNVA) activities. Identification of eight categories of waste is conducted using the Borda method, while root cause analysis of critical waste employs the 5 Whys technique to generate actionable improvement suggestions.

RESULTS AND DISCUSSION

Value Stream Mapping (VSM) and Value-Added Assessment (VAA) of Service Processes at the Dr Hafiz Hospital Pharmacy

Based on the results of observations conducted by researchers at the Dr Hafiz Hospital Pharmacy, prescription services are divided into two types: compounded and non-compounded prescriptions. Both types of services are different, so researchers divided them into different value stream mappings to make it easier to identify differences in terms of prescription service time.

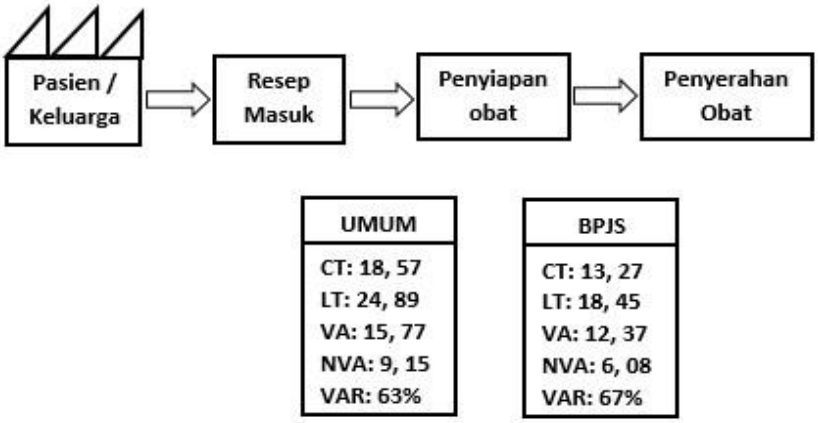

Figure 1. Value Stream Mapping of Compounded Prescription Services

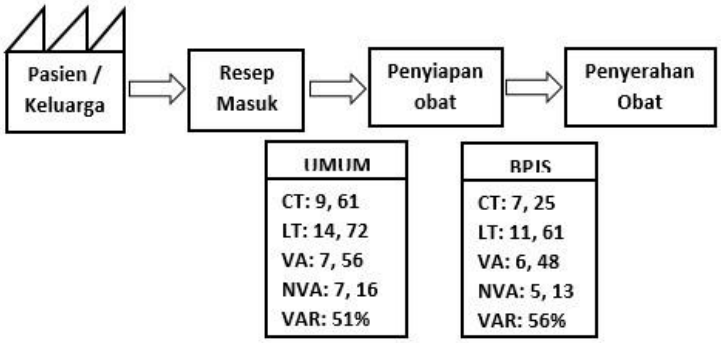

Figure 2. Value Stream Mapping of Non-Compounded Prescription Services

Observations of time and service activities were conducted over six days on 48 prescriptions, comprising 24 compounded prescriptions (12 for general patients and 12 for BPJS patients) and 24 non-compounded prescriptions (12 for general patients and 12 for BPJS patients). Both compounded and non-compounded prescriptions were observed during peak and off-peak hours each day as research samples between June and July 2025. The analysis indicated that the activities contributing most significantly to patient waiting times included medication retrieval, compounding, packaging, bill preparation, label writing, and prescription copy writing, as detailed in Appendices 11A and 11B. These inefficiencies resulted in delays (patients waiting), unnecessary transportation (patients moving between administration and external pharmacies), and inventory waste (frequent drug shortages).

Dispensing services for both general and BPJS patients, illustrated in Figure 1, recorded a lead time of 24.89 minutes for general patients with a value-added to non-value-added activity ratio of 15.77:9.15 and a VAR (Value Added Ratio) of 63%. For BPJS patients, the lead time was 18.45 minutes, with a ratio of 12.37:6.08 and a VAR of 67%. In non-compounded prescription services depicted in Figure 2, general patients experienced a lead time of 14.72 minutes and a ratio of 7.56:7.16 with a VAR of 51%, whereas

BPJS patients had an 11.61-minute lead time, a ratio of 6.48:5.13, and a VAR of 56%. According to Gasperz (2011), a company is considered "lean" if the waste ratio (VAR) against total minimum activity surpasses 30%. This suggests that the measurements taken for compounded and non-compounded prescriptions at the Pharmacy Department of Dr Hafiz Hospital in June-July 2025 reflect lean operations, as all VAR values exceeded the threshold—63% and 67% for compounded prescriptions and 51% and 56% for non-compounded prescriptions among general and BPJS patients, respectively.

Nonetheless, several areas require improvement to further enhance the effectiveness and efficiency of services at IFRS. Notably, reducing the prescription copy-writing process could reduce service times and boost patient satisfaction, alongside ensuring sufficient drug availability to prevent unnecessary patient activities. The average waiting times for both compounded and non-compounded prescriptions have complied with the standard prescription service times stipulated in Indonesian Minister of Health Decree No. 129/Menkes/SK/II/2008, which set a 60-minute benchmark for compounded and a 30-minute benchmark for non-compounded prescriptions. The observed average dispensing times were 24.89 minutes (general patients) and 18.45 minutes (BPJS patients) for compounded medications, and 14.72 minutes (general patients) and 11.61 minutes (BPJS patients) for non-compounded medications.

Identification of Stakeholder Value Based on the Patient's Perspective Towards Staff at the Dr Hafiz Hospital Pharmacy

The stakeholder value identified based on the lean concept in the service process at the Dr Hafiz Hospital Pharmacy is outpatients and their families.

Table 1. Results of Outpatient Value Identification at Dr Hafiz Hospital

Category	No	Statement	Yes	(%)	No	(%)	Description (Respondents who answered No)
Product Value	1	Quality of medicines and medical devices	100	100%	0	0%	-
	2	Accuracy of medicines and medical devices	100	100%	0	0%	-
	3	Completeness of medicines and medical devices	100	100%	0	0%	-
	4	Brands of medicines and medical devices	82	82%	18	18%	9, 11, 17, 18, 21, 25, 27, 30, 36, 43, 45, 47, 60, 66, 69, 82, 83, 94
	5	Labels/stickers on medicines	98	98%	2	2%	54, 75
	6	Packaging of medicines and medical devices	100	100%	0	0%	-
Service Value	1	Speed of receiving medicines and medical devices	100	100%	0	0%	-
	2	Proficiency of pharmacists and TTK inanswering questions about medicines	100	100%	0	0%	-
	3	Speed of staff in responding to patient needs	100	100%	0	0%	-
	4	Accuracy of information about medicines and medical devices	100	100%	0	0%	-
	5	Completeness of information about medicines and medical devices	100	100%	0	0%	-
	6	IFRS facilities and room areas	100	100%	0	0%	-
Patient Relationship & IFRS Value	1	Friendliness of pharmacists and TTKs in service	100	100%	0	0%	-
	2	Appearance of pharmacists and TTKs in service	94	94%	6	6%	9, 11, 81, 83, 90, 91
	3	Pharmacy understands the condition and needs of patients	91	91%	9	9%	9, 18, 37, 40, 49, 60, 67, 97, 98
	4	Ease of communication with pharmacists and TTKs	96	96%	4	4%	9, 11, 17, 18

Table 1 presents patient perspectives on value identification from a survey of 100 respondents. For product value, four out of six statements received 100% "Yes" responses; statement 4 had 18% "No" answers due to expectations regarding brand, while statement 5 had 2% "No" because some patients felt drug labeling was unnecessary. All service value statements were rated as important, earning unanimous "Yes" responses. In patient-IFRS relationship values, only statement 1 received 100% "Yes"; statement 2 had 6% "No" due to staff appearance preferences, statement 3 had 9% "No" citing pharmacy's lack of understanding of patient needs, and statement 4 had 6% "No" referring to communication issues with pharmacy staff. Overall, patient feedback indicated unmet medicine demand, inefficient layouts, inadequate facilities, slow prescription services, and insufficient friendliness contributed to dissatisfaction.

Waste Questionnaire Mapping Analysis at the Dr Hafiz Hospital Pharmacy

The researchers conducted an analysis using the Borda method, in which each type of waste was weighted by adding up each rank multiplied by its respective weight. Rank 1 had the highest weight, namely (n-1) or (8-1), so the weight for rank 1 was 7, while rank 8 had the lowest weight, namely 0. The highest result from the waste weighting was determined to be critical waste. The results of the waste questionnaire and weighting using the Borda method can be seen in Table 2.

Table 2. Results of Waste Questionnaire Analysis using the Borda Method

Waste Type / Rank	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Value**	**Weight**
Defects	0	0	2	1	3	2	2	3	29	0,080
Overproduction	0	0	2	3	1	2	3	2	32	0,088
Transportation	3	7	1	1	0	0	1	0	73	0,202
Waiting	3	2	4	2	1	0	1	0	65	0,180
Inventory	6	2	2	1	0	2	0	0	72	0,199
Motion	0	0	2	1	2	3	3	2	29	0,080
Overprocessing	0	1	1	2	4	1	3	1	36	0,099
Human Potential	1	1	0	1	1	2	1	6	25	0,088
Weight	7	6	5	4	3	2	1	0	361	
Total										

Source: Processed primary data from 2025

Based on the results of the waste questionnaire calculations, the researchers first calculated the number of respondents who ranked each type. For example, in Table 6, there were two people who chose waste defect at rank 3 and one person at rank 4, and so on. Then, multiply the numbers in the rank column and multiply the numbers by the lowest weight and add the results of the multiplication for the same type until all are complete. Then, the results of the calculation are entered in the ranking column according to the type of waste. For example, in Table 5, the waste defect type (0x7) + (0x6) + (2x5) + (1x4) + (3x3) + (2x2) + (2x1) + (3x0) = 29. The next step is to add up the results of each type of waste to obtain a total value of 361. To determine the weight of each waste, divide the value by the total value. Based on the results of the waste questionnaire analysis using the Borda method, waste defects were found to be 8%, waste overproduction 8.8%, waste transportation 20.2%, waste waiting 18%, waste inventory 19.9%, waste motion 8%, waste overprocessing 9.9%, and waste human potential 6.9%. Therefore, it can be concluded that the most critical waste that often occurs in the Pharmacy Installation of Dr Hafiz Hospital is transportation waste with a percentage of 20.2%. The critical waste ranking can be seen in Table 3

Table 3. Critical Waste Levels in the Pharmacy Installation of Dr Hafiz Hospital

Ranking	Type of Waste	Percentage (%)
1	*Transportation*	20,2%
2	*Inventory*	19,9%
3	*Waiting*	18%
4	*Overprocessing*	9,9%
5	*Overproduction*	8,8%
6	*Defect*	8%
7	*Motion*	8%
8	*Human Potential*	6,9%
	Total	**100%**

Table 3 shows that waste transportation ranks first among types of waste. Waste transportation is waste that occurs due to excessive activities that do not add value, such as staff and patients going back and forth to get medicine because the prescribed medicine is not available at the pharmacy, obtaining health insurance, paying at the administration desk, and inefficient room layout. For further details, see Appendix 11, which explains that waste transportation occurs because patients always receive a copy of their prescription.

Analysis of the Root Causes of Critical Waste in the Service Process at the Dr Hospital Pharmacy

The stage of identifying the root causes of waste transportation problems was carried out through in-depth interviews with the head of the pharmacy and some of the staff directly involved in the service process using the 5 Whys method.

Table 4. Root Causes of Transportation Waste in the Pharmacy Service Process at Dr Hafiz Hospital

Why Level	Problem / Question	Root Cause Explanation
1	Why do patients have to repeatedly go back and forth to obtain medicines, health insurance cards, and other administrative requirements?	The administrative office, outpatient clinic (polyclinic), and pharmacy are located far apart. Patients also frequently need to purchase medicines outside the hospital because certain medications are unavailable in the hospital pharmacy. In addition, some patients forget or leave their health insurance cards at the polyclinic.
2	Why are the administrative section, outpatient clinic, and pharmacy located far apart?	Due to limited physical space in the hospital, management utilizes available areas without an integrated service layout.
	Why do patients often buy medicines outside the hospital?	Some medications prescribed by doctors are not available or are out of stock in the hospital pharmacy.
3	Why is hospital space limited?	Expansion of facilities and infrastructure requires significant financial resources and time, making spatial restructuring difficult.
	Why are prescribed medicines frequently unavailable or out of stock?	Medication shortages occur due to increased patient demand. Additionally, the procurement process takes a long time because the hospital is located in an island region, causing logistical constraints.
4	Why do doctors prescribe medicines that are not available in the pharmacy?	Doctors' prescriptions sometimes do not align with the medication inventory available in the pharmacy.
	Why do doctors' prescriptions not match the pharmacy inventory?	Coordination between hospital management, doctors, and the pharmacy unit regarding medication planning and procurement is not fully synchronized. The pharmacy plans medication needs, but procurement decisions are handled by the hospital administration, resulting in mismatches between prescriptions and available stock.
5	Why has the hospital not fully synchronized doctors' prescriptions with pharmacy inventory?	Most doctors at Dr Hafiz Hospital are contract-based physicians. Frequent turnover makes it difficult to standardize prescribing practices with the pharmacy's formulary and procurement planning. As a result, procurement of medicines and medical devices remains limited and primarily reactive to immediate needs.

Table 4 indicates that the main causes of critical transportation waste in Dr Hafiz Hospital Pharmacy Installation include the distant layout of rooms, unavailability of prescribed drugs in the pharmacy, and doctor requests that do not align with the pharmacy's inventory. These issues contribute to patient dissatisfaction with pharmacy services at Dr Hafiz Hospital. This finding is consistent with (Yolla et al., 2014), who reported similar transportation waste at Unisma Malang Islamic Hospital due to long distances between departments, payment counters, examination areas, and the pharmacy itself, as well as patients sometimes entering incorrect rooms because of unclear directions.

Ideas and Suggestions for Improving Service Processes at Dr Hafiz Hospital Pharmacy

The presence of waste in the pharmacy service process highlights that the hospital has not yet achieved full lean operation. Therefore, there is a need for methods to reduce or eliminate waste within the IFRS. Any improvement plan must consider hospital policies, regulations, budget, and related stakeholders. Prescription services involve multiple activities—such as waiting times, prescription duplication, and billing—that need to be minimized to enhance service quality. These steps are often inconvenient for patients and require focused intervention from the pharmacy team.

Survey results from IFRS staff identify transportation waste, mainly caused by inefficient room layouts, as a key area for improvement. Long walking distances lower staff efficiency and lead to patient dissatisfaction. Therefore, it is essential to redesign the room arrangement and streamline service processes from patient arrival to departure to ensure smooth and optimal service. Another contributing factor is drug availability; mismatched stock levels can result in shortages or excess, reflecting suboptimal inventory management (Fahrudin, 2006). To address this, strict control and supply management should be implemented to prevent disruptions in patient care.

Interviews with facility leadership and involved staff led to the proposal of dividing tasks among team members across each stage—from prescription entry to final delivery—and assigning queue numbers to patients to minimize errors. This approach is expected to reduce patient wait times, classified as wasteful delays. Based on these ideas, a set of proposals has been developed to improve pharmacy services:

1) Implement the 5S method (seiri, seiton, seiso, seiketsu, shitsuke) as a lean strategy to eliminate waste by creating a core team dedicated to daily 5S activities.
2) Add visual management tools, such as information boards, to reduce workplace information gaps and repetitive patient queries.
3) Standardize doctors' practice hours, ensuring they start punctually at 8:00 a.m.; revise staff schedules for timeliness and balanced workloads, addressing any staffing shortages in the prescription process, and fostering creativity by better utilizing staff potential.
4) Redesign the IFRS service workflow by allocating duties from prescription entry to drug delivery, optimizing existing human resources, and refining the physical layout for greater efficiency.
5) Introduce a queue number system for prescription services to streamline medicine sorting, shorten service times, and minimize patient complaints about waiting.
6) Reorganize the overall patient service flow—bringing together reception, registration, cashier, insurance verification, clinics, and pharmacy—to minimize patient movement and effort.
7) Align procurement planning for medicines and medical supplies to match IFRS needs and doctor requests, preventing delays, shortages, and unnecessary surplus stock that may expire unused.
8) Establish procedures for ongoing discussion between doctors and pharmacy regarding formulary alignment, minimizing rework and reducing instances of prescriptions that cannot be fulfilled immediately; conduct drug planning studies based on previous usage patterns to balance inventory levels and promote rational drug use.
9) Provide an additional computer for staff to handle labeling, payments, and patient queue entries, eliminating delays caused by manual systems and enhancing overall pharmacy efficiency.

CONCLUSION

Value stream mapping at the Dr Hafiz Hospital Pharmacy revealed that VA, NVA, and NNVA activities had a waste ratio (VAR) exceeding 30% of total minimum activity. Stakeholder value identification from the patient's perspective found that patients and their families considered product value, service value, and the relationship between patient and IFRS important. Critical waste analysis using the Borda method highlighted transportation waste as the most frequent, accounting for 20.2%.

Contributing factors include widely separated room layouts, unavailable prescribed drugs, and doctor requests that don't match the pharmacy's inventory. These issues affect patient satisfaction with pharmacy services. To address these problems, proposed improvements include implementing the 5S method, adding visual management tools, optimizing staffing, revising the prescription workflow for better efficiency, balancing doctors' working hours to ensure timely practice, adjusting staff shifts, switching to a queue number system for prescriptions, planning medications to meet IFRS and doctor requirements, and providing an additional computer to assist IFRS staff with data entry, prescriptions, labeling, and related tasks.

REFERENCES

Al-Araidah O, Momani A, Khasawneh M, Momani M. 2010. Lead-Time Reduction Utilizing Lean Tools Applied to Healthcare. The Inpatient Pharmacy at a Local Hospital. *Journal for Healthcare Quality*.

Bouyssou D, Marchant T, Pirlot M, Tsoukias A, Incke P. 2006. *Evaluation and Decision Models With Multiple Criteria.* Springer-Verlag, Inc., New York.

Burgess N, Radnor Z. 2013. Evaluating Lean in Healthcare. *International Journal of Healthcare Quality Assurance*. Charron R, Harrington HJ, Voehl F, Wiggin H. 2015. The Lean Management System Handbook, Boca Raton: CRC Press.

Cording M, Harrison JS, Hoskisson RE, Jonsen K. 2014. Walking the talk: A multi-stakeholder exploration of organizational authenticity, employee productivity and postmerger performance. Academy of Management Perspectives.

De Luque MS, Washburn N, Waldman DA, House RJ. 2008. Unrequited profit: How stakeholder and economic values relate to subordinate perceptions of leadership and firm performance. Administrative Science Quarterly.

Fachrudin H.P. 2006. Analisis Sistem Pengendalian Obat dan Alkes Kebutuhan Dasar Ruangan Rawat Inap di Instalasi Farmasi RSD Ciawi Kabupaten Bogor Tahun 2006. *Tesis*. Program Pascasarjana Fakultas Kesehatan Masyarakat Universitas Indonesia,

Gaspersz V. 2006. *Sistem Kinerja Terintegrasi Balanced Scorecard dengan Six Sigma untuk Organisasi Bisnis dan Pemerintah*. PT Gramedia Pustaka Utama, Jakarta.

Hadi N. 2014. *Corporate Social Responsibility*. Yogyakarta: Graha Ilmu.

Harrison JS, Bosse DA, Phillips RA. 2010. Managing for stakeholders, stakeholder utility functions and competitive advantage. *Strategic Management Journal.*

Joosten T, Bongers I, Janssen R. 2009. Application of Lean Thinking to Healthcare: Issues and Observations. *International Journal for Quality in Healthcare.*

Nancy. 2014. Pendekatan Lean Hospital Untuk Perbaikan Berkelajutan (Continuous Improvement) Proses Pelayanan Instalasi Farmasi RS Bethesda Yogyakarta. *Tesis.* Fakultas Ilmu Farmasi. Universitas Gadjah Mada Yogyakarta.

Prasetya TL, Kristin E, Lestari T. 2015. Waste in Drug Procurement Process in Pharmacy Departement Santa Maria Hospital Pemalang, Indonesia. *International Journal of Pharmaceutical Sciences Review and Research.*

Surapranata, Sumarna. 2006. *Analisis, Validitas, Reliabilitas dan Interpretasi Hasil Tes Implementasi Kurikulum 2004*. Bandung: Remaja Rosdakarya.