
Application of Lean Practices in the Sri Lankan Private Hospital Sector

Wickramathunga, K.G.^{a*}, Patabendige, D.I.K.^b, Dilshan, S.A.S.^c, Udugampola, N.C.^d, Karunarathna, N.^e & Shamila A.K.P.P.^f

a,b,c,d,e,f **SLIIT Business School, Sri Lanka Institute of Information Technology (SLIIT), Malabe, Sri Lanka**

^akasungwickramthunga@gmail.com, ^bDaminduiranga19@gmail.com, ^cSamithd779@gmail.com, ^dudugampolaneranjana@gmail.com, ^eNavodika.k@sliit.lk, ^fPubuddi.s@sliit.lk

Abstract

This paper investigates the availability and application of lean practices in the supply chain function of the private hospital sector in Sri Lanka in order to identify the overall improvement, such as the reduction in medicinal errors, care coordination between departments, and reduction in medication administration errors that can be accomplished through lean practices in the country's private hospital supply chain process. Lean supply chain practices have been shown to be effective in terms of improving the quality of performance, such as patient satisfaction and lack of medication errors in the medical supply chain, but they are challenging to practically implement in the private medical sector in Sri Lanka in order to have an impact. Although studies have been conducted to identify the application and impact of lean practices in the private medical supply chain, there is a lack of research that has been conducted in the Sri Lankan context to gain an in-depth understanding of the current lean applications implemented in the country and their impact on the improvement of supply chain functions in the private medical sector. This research used a qualitative approach to study some of the major private hospitals in Sri Lanka, in-depth interviews with supply chain professionals of the private medical sector in Sri Lanka were conducted and the conclusions were reached after analyzing the data gathered through interviews by thematic analysis. In conclusion, there are four key lean practices implemented in the private medical sector in Sri Lanka, which have a significant impact on the overall performance of the country's private healthcare supply chain.

Keywords: Healthcare, Lean Practices, Lean Supply Chain, and Private Hospitals

* *kasungwickramthunga@gmail.com*

01. Introduction

Organizations use a variety of response strategies to overcome deficiencies and inefficiencies that occur in a variety of special fields, with the lean method becoming one special method that can be used to solve these problems. Due to the country's economic and social problems, the health sector is undergoing massive changes in order to meet the needs of the general public. Wijewardana and Rupasinghe, (2013). In Sri Lanka, the health sector is divided into two parts: government hospitals and private hospitals Wijewardana and Rupasinghe, (2013). The private health sector has been impacted the hardest by inflation, import-export issues, and government policies. Because all of these costs and issues affect consumers directly or indirectly, the private sector must implement strategies to ensure that the organization's service delivery is systematic while providing an affordable price to the consumers. There are over a hundred private hospitals in Sri Lanka, but only a small percentage of them have high-quality facilities. When conducting this research, Sri Lanka's current situation and existing health problems in the country's private-sector hospitals will be considered.

Various techniques have been used in the private medical sector to maximize the efficiency and quality of service provided to their customers. Graban and Toussaint, (2018). In terms of transportation and storage of medical products and equipment, transporting patients and staff members, and purchasing and managing other consumables, such as food, stationery, and sanitary products, the medical supply chain contributes significantly to the country's healthcare process. Failure to manage these functions effectively can be the primary cause of cost overruns and high waste, which can have an impact on final revenue levels and overall industry performance. Graban and Toussaint, (2018).

Machadoa et al. (2015) explained that lean practices are one of the main sets of techniques used by supply chain professionals all over the world to gain an advantage in their organization's process to reduce costs, improve efficiency, improve quality, and become more flexible in their day-to-day operations. These practices have been adopted by health care professionals in order to improve the standards of their services, and there is a lack of knowledge on the subject of applying lean management tools in the supply chain function in the Sri Lankan private medical sector, which can be beneficial towards achieving organizational goals and becoming successful in terms of performance and generating high revenue margins. There is a lack of research conducted regarding lean practices in the private hospital sector; therefore, the purpose of this research is to identify the lean management practices that are currently in use within the supply chain function of the private medical sector in Sri Lanka, as well as to determine whether those lean practices are being used effectively in the industry. Using the most effective lean tools allows organizations to achieve the best possible results by raising their quality standards, eliminating waste, lowering costs, improving efficiency, and becoming more flexible in order to provide services that satisfy their customers.

1.1. Research Problem

Sri Lanka is an Asian developing country that has recently faced significant difficulties due to economic and political instability. As a result of that inconvenience, the people of the country faced numerous challenges, including a lack of nutrition, financial stability, and health care. This study focuses on Sri Lanka's private health sector. Many people turned to the private sector due to the inefficiencies of the public health service. Due to recent economic insecurity,

the cost of corporate services has risen dramatically as a result of taxation, inflation, and import and export conditions. As a result, prices for private healthcare services have risen, making access to private healthcare unaffordable for most people due to high costs. Thus, this study seeks to investigate the contribution of lean supply chain management to reduce costs, increase efficiency, and improve service quality, thereby providing a competitive advantage to organizations involved in the private health sector in Sri Lanka. Alemsan et al. (2022) define Lean Supply Chain Management as a critical aspect that can have an impact on the medical and healthcare industries; however, it is unclear whether a study has been conducted to identify the relationship between lean practices and resilience capabilities in the health supply chain. It is crucial to identify existing gaps in the healthcare industry and apply lean management to the medical supply chain.

As a solution to the issue, the main objective of this research is to discuss the application of lean practices in the private hospital sector. Lean supply chain management is the concept of continuous improvement, a long-term method of working that methodically strives to achieve modest, advanced changes in supply processes to improve efficiency and service or product quality, and it is supported by the management approach. Graban and Toussaint, (2018). The main goal of this research is to improve the overall standards using lean methods in the private healthcare sector by reducing wastage and uplifting quality service.

02. Literature Review

2.1. Private Health Care Sector

The private sector of any industry is highly heterogeneous, such as the healthcare sector, which is defined as organizations or individuals that provide healthcare services or products that are directly managed by the government of that country Clarke and Paviza, (2018). According to Wolf and Toebes (2016), private healthcare is required to provide universal health coverage, and organizations such as multinational corporations, nongovernmental organizations, and non-profit entities are directly providing healthcare by providing healthcare facilities, health-related goods, services, and health-related financial assistance to raise the global healthcare industry's standards. Private physicians, pharmacies, and hospitals are the direct service providers of the private healthcare industry, while healthcare-related technological and manufacturing firms are secondary components of the privatized healthcare system. According to Propper and Green (1999) in their working paper state financing in the private healthcare sector increases medical expenditure, raising the cost of private healthcare significantly. However, it leads to higher service quality and lower rates of accessibility, which maintains a country's balanced customer share between the private and public health sectors.

2.2. Private Health Care Sector in Sri Lanka

Sri Lanka is a country that offers free medical healthcare through government medical facilities and infrastructure. Wijewardana and Rupasinghe, (2013). However, the private medical sector has made an impact in the country by providing medical facilities at a significant cost with higher quality and more efficient service delivery. According to the Ministry of Health's medical statistics unit, there are 141 private hospitals in Sri Lanka, with the majority of them located in the country's Western Province. Ministry of Health, (2017). These medical facilities make necessary technical and personal contributions to the country by providing medical-related

services to the general public, thereby reducing the workload and overall cost of the public medical sector. Wijewardana and Rupasinghe, (2013).

2.3. Lean Supply Chain Management in Health Care Sector

Borges et al. (2019) explore the lean practices applied in the supply chain of the healthcare industry which is already in use by different healthcare providers. They also identified the existing barriers and challenges which take place when applying those lean practices in practical scenarios, specifically regarding the costs of the healthcare processes related to product and information flows. By identifying those barriers an organization can choose the suitable lean management principles to be adopted to function the supply chain process according to their requirements. Khorasani et al. (2020) identified several factors that can influence the selection of various lean supply chain applications that are appropriate for the healthcare supply chain system's target areas. It is critical to ensure that the applied lean management tools have the expected positive impact on the organization, and to do so, a scientific analysis should be performed to assess the impact of the organization's adopted lean management tools. Machado et al. (2013) conducted research on the differences in outcomes achieved by various healthcare organizations in 15 different countries to demonstrate the impact of the adopted lean techniques on the overall performance of those healthcare facilities using scientific measurements. Machadoda et al. (2015) published a study that discussed the benefits of using lean management to improve the healthcare system and reduce cost and time waste when performing services. According to the researchers, lean management tools and lean supply chain provides higher service quality, efficiency, safety, customer satisfaction, and staff satisfaction. The healthcare system can achieve outcomes, such as improved performance and higher employee and customer satisfaction, by implementing lean methodologies.

The study of Wijewardana and Rupasinghe, (2013) clearly identified practical barriers that can arise when applying the lean concept to the healthcare system, such as difficulties for employees to adapt to new theories, a lack of qualified staff, a lack of a clear focus on customers, and the complexity of the healthcare organizational structure.

03. Methods and Data Analysis

Researchers used this study to investigate the application of lean practices in private hospitals, which entails gathering and analyzing qualitative data for the study. To collect qualitative data, twelve in-depth interviews with supply chain experts in the private medical industry were conducted. The study concentrated on private hospitals in Sri Lanka, which are registered under the Ministry of Health. The intended respondents were supply chain professionals in the private hospital industry in the country. Based on the inductive method, the availability of lean methodologies in Sri Lanka's private healthcare sector and their impact on the competitive advantage of private hospitals were investigated. Data was collected and then qualitatively analyzed using thematic analysis to determine the critical effect of lean practices on competitive advantage in the private hospital sector. Thematic analysis is a method for identifying, analyzing, summarizing, and interpreting qualitative data. In this process, data familiarization entails understanding the data while reading it several times. Machadoda et al. (2015). This research employed data coding, which entails developing initial codes through data coding and involving meaningful information. The identified themes are combined with the collected data, and the results are then explained.

04. Results and Discussion

According to the information gained from the supply chain professionals in the private hospital sector, researchers identified the following lean tools which are applied in the healthcare sector in Sri Lanka. 5S, Kanban, Kaizen, and Just in Time are the main lean management tools used by supply chain professionals not only in their working process but also in the operation process of the entire hospital facilities.

4.1. Application of 5s

The 5S lean application method is a Japanese-inspired process that consists of five main concepts that are combined to improve cleanliness, create a comfortable working environment, and ensure the safety of employees in the workplace Singh & Ahuja, (2015). The sorting concept, which is used to maintain the cleanliness and correct order of medical products, documents, and equipment while using 5S to manage hospital inventories, patient wards, rooms, and office areas, is the most common application of 5S in the private medical sector. The majority of private hospitals use the technique of labeling medicinal drugs according to their purpose, date of arrival in the inventory, and the essential factor of those medicines as a basic application. These will drastically reduce the time it takes to find a specific medicine in an emergency, and it will be important to save even a couple of seconds because the medical sector is concerned with the health and safety of patients or customers. To maintain a consolidated database for use in daily operations in the private medical sector a well-organized documentation process must be maintained. 5S offers unique support by sorting out relevant documents and eliminating unnecessary documentation from the database for increasing efficiency. Labeling documentation improves transparency and the ability to access relevant data in less time and with greater accuracy. One of the interviewees mentioned that "Labeling medicine and categorizing it according to the priorities can be helpful when an emergency case has occurred in the hospital mainly in the ETU (Emergency Treatment Unit)". Another interviewee suggested that "Proper documentation using the 5S approach helps the department when delivering reports and other medical-related documents to the patients".

Private hospitals in Sri Lanka use the 5S lean tool to effectively manage cleanliness and hygiene on hospital premises. They are following the rule of sorting waste generated in the hospital and achieving sustainable operation goals by directing that waste into the disposal and recycling processes. "We are separating the waste matter into different categories such as kitchen waste, biodegradable waste, polyethylene and plastics, and medical waste," said one of the supply chain professionals who contributed to this study. When arranging hospital layouts by labeling all the important departments and rooms or areas to be easily identified, direction maps and visual images have been placed to provide guidance and directions to customers to have a positive and easy approach when enjoying services from these hospitals by using 5S. Patient rooms and wards have been properly numbered or labeled, and special service areas, such as laboratories, ETU, ICU (Intensive Care Unit), OPD (Out Patient Department), and X-Ray scans have been properly labeled. Many hospital kitchens use color coding systems to sort purchase items based on purchase dates, and in-house patients are tagged with identification tags to be used in the case of an emergency and to retrieve required data as soon as possible.

4.2. Application of Kanban

Kanban is a lean management concept introduced by Toyota in the 1950s to improve efficiency and lower costs by managing the material flow and coordinating organizational processes. Kanban is a visualization tool that identifies potential bottlenecks in organizational processes and optimizes them for lower costs and higher efficiency. Kanban assists in the integration of all supply chain parties for effective information flow and the reduction of unnecessary expenses Gawande and Karajikar, (2018).

Kanban is primarily used in these hospitals to manage real-time data flow chains in both inbound and outbound processes. There is integration between hospital departments that uses different ERP (Enterprise Resource Planning) systems to transfer messages about the organizational process. Different hospital suppliers receive updates on hospital inventory via ERP systems, such as HOP (Hospital Operation System), VMS (Vendor Management System), and IMS (Inventory Management System), to identify any inventory shortages. During the interviews, one of the supply chain professionals working with a private hospital in Sri Lanka stated, "Ordered medical supplies take a long time because the majority of them are exported items." SPC (State Pharmaceuticals Corporation) of Sri Lanka manufactures only a small amount of medicine locally. Customers have the option of reserving time slots and booking appointments with relevant doctors via e-channeling services. When a customer receives a time slot or a number to meet a doctor, that information is directed to the marketing and financial departments to conduct financial activities regarding the channeling service, and when the customer visits the hospital, both the customer and the reception or financial officers can complete transactions without difficulty. After booking a number, every patient will receive a text message as confirmation of a successful e-channeling process, and after that, every customer will be updated with real-time data, such as the arrival of relevant doctors to the hospital, any delays in the arrival of doctors, and the number of the patient who is currently with the doctor. If a medical emergency occurs and a request for ambulance services from hospitals is made, the message is sent to all relevant parties to be prepared to face any situation without delaying the victims' or patients' treatment. During the time that ambulances are transporting patients, the medical staff, as well as other supporting groups, such as laboratory staff, radiology department, minor staff, and cleaning staff, focus on responding quickly. If any critical medical approaches, such as surgeries, are required, every relevant department can act quickly to provide the necessary equipment, medicine, and personnel to carry out those surgeries without wasting time.

4.3. Application of Kaizen

Kaizen is defined as a systematic approach that occurs within an organization involving every employee, from top management to minor staff, to achieve small improvements or propose various types of suggestions that can lead to continuous improvements in organizational performance on a regular basis. It may include factors, such as innovation, organizational process efficiency, waste reduction, and cost reduction, all of which can benefit the entire organization Rahmanian and Rahmatinejad, (2013). In terms of technology, in-house patient capacity, and other medical-related functions, such as laboratory facilities, radiology facilities, and pharmacies, the Sri Lankan private medical sector has seen significant improvement. They have added services like e-channeling, ambulance services, ICU/ETU units, and technically advanced medical procedures like MRI (Magnetic resonance imaging) scans. An industry must

undergo some changes in order to improve performance and increase customer satisfaction. One of the most important strategies used by supply chain professionals in the private medical industry in Sri Lanka to achieve continuous improvement in their functions is to integrate different divisions of the organization to simplify the information-moving process through the use of an ERP system. According to one of the supply chain professionals, "Different technologies have been made to improve the hospital's service quality, such as blood analyzing machines, which provide the luxury of conducting all types of blood tests and providing results within a day, which can improve organizational efficiency and contribute for improving customer satisfaction." By implementing inventory management techniques such as FIFO (first in, first out), the private hospital sector in Sri Lanka has improved its overall supply chain process by reducing lead time and inventory wastage. Some private hospitals hold a special event called "Kaizen Day" to educate their employees about the benefits of achieving continuous improvement through training programs, lectures, and workshops to improve their employees' knowledge, which can positively impact overall organizational performance. "We hold a Kaizen Day every month, and every employee in every department of the hospital is educated on Kaizen practices. One of the interviewees stated, "We use presentations and real-world examples to demonstrate how to use Kaizen effectively for organizational continuous improvement as well as employee personal development." Some of the country's private medical service providers have established specific departments to improve the overall quality of the organization which report to quality leaders, who are in charge of implementing and socializing Kaizen practices throughout the organization. When it comes to supply chain functions, Kaizen has been used to identify gaps in the organization's supply chain processes, such as purchasing, procurement, transportation, and inventory management. Such measures assist the organization in achieving continuous progress while minimizing costs, improving efficiency, and reducing waste in the overall organizational process, as well as developing the skills and knowledge of the employees about Kaizen to assist them in improving as individuals to contribute more to the advancement of the organization.

4.4. Application of Just in Time

Just in Time is a lean practice used by supply chain professionals to eliminate inventory and production waste by purchasing raw materials or supplies in the appropriate quantity and delivering them to the appropriate location at the appropriate time. Adopting such practices in organizational functions helps to ensure the organization's long-term development and provides a competitive advantage in a volatile business environment by reducing inventory costs and wastage while increasing organizational productivity and efficiency. Dange et al, (2016). According to the researchers' findings from in-depth interviews, three types of inventory are available in the majority of private hospitals in Sri Lanka. One of the supply chain professionals interviewed stated, "There are three inventories in our hospital based on their end-use." The first inventory is drugs and medicine, the second consumables, and the last for the kitchen." When inventory is identified and sorted according to its purpose, it is easier to identify the correct amount of reorder quantities and manage inventory.

The kitchen inventory is the only one that uses the Just in Time method because the food items must be prepared fresh for the consumption of in-house patients and hospital staff, and bulk purchases are rare in the kitchen inventory. "All items in the inventory are re-arranged according to the effective time duration of usage, such as short expired and long expired, to identify items that required regular attention and re-ordering to match the hospital requirements," said one of the inventory managers. It is best to order expensive and non-

essential drugs only if a need arises in the hospital. Consumables, such as laundry, surgical equipment, and other non-medical items are purchased using the Just in Time method to avoid high inventory levels, reduce inventory holding costs, and minimize wastage caused by expiration or failure to meet required quality standards.

05. Conclusion

When this set of lean tools is considered as a whole, some benefits can be identified that help to improve the overall standards of the private medical sector in Sri Lanka. One of the major benefits of applying lean practices to the supply chain function of the private medical sector in Sri Lanka is the reduction of operating costs. "We use lean practices to manage our transportation and warehousing functions," one interviewee said. "We were able to cut costs by eliminating unnecessary transportation steps, implementing our transport service, combining different inventory batches into one, and reducing the number of trips required to complete the task." This statement implies that applying lean practices in the organizational functions of the private medical sector in Sri Lanka helps to reduce overall costs, while also increasing profit margins. Lean tools are used by private medical service providers to minimize wastage and manage inventory with maximum efficiency. They also help to improve their appearance by enhancing visual management and reducing the risk levels of the working environment. Additionally, they help to maintain effective communication and cooperation among employees, reducing conflicts and misunderstandings, and avoiding mistakes and errors. This helps to improve the overall organization's performance by avoiding mistakes, reducing costs, and providing services of higher quality.

References

- Alemsan, N., Tortorella, G., Taboada Rodriguez, C. M., Balouei Jamkhaneh, H., & Lima, R. M. (2022). Lean and resilience in the healthcare supply chain – a scoping review. *International Journal of Lean Six Sigma*, 13(5), 1058-1078. <https://doi.org/10.1108/ijlss-07-2021-0129>
- Borges, G. A., Tortorella, G., Rossini, M., & Portioli-Staudacher, A. (2019). Lean implementation in healthcare supply chain: a scoping review. *J Health Organ Manag*, 33(3), 304-322. <https://doi.org/10.1108/JHOM-06-2018-0176>
- Clarke and Paviza. (2018). *The private sector, universal health coverage and primary health care* (Technical Series on Primary Health Care, World Health Organization).
- Dange et al. (2016). A Systematic Review on Just in Time (JIT) *International Journal of Scientific Development and Research*, 1(3), 77 - 81. <https://www.ijedr.org/papers/IJSDR1603014.pdf>
- Gawande and Karajgikar. (2018, July 26-27, 2018). *Implementation of Kanban, a Lean tool, In Switchgear Manufacturing Industry – A Case Study* International Conference on Industrial Engineering and Operations Management, Paris, France. <http://www.ieomsociety.org/paris2018/papers/437.pdf>
- Graban, M. & Toussaint, J. (2018) A Vision for a Lean Hospital and Health System. *Lean Hospitals* [online], pp. 305-313. doi: 10.4324/9781315380827-13
- Khorasani, S. T., Cross, J., & Maghazei, O. (2020). Lean supply chain management in healthcare: a systematic review and meta-study. *International Journal of Lean Six Sigma*, 11(1), 1-34. <https://doi.org/10.1108/ijlss-07-2018-0069>

- Machado et al. (2013). Strategic outsourcing: a lean tool of healthcare supply chain management. *Strategic Outsourcing: An International Journal*, 6(2), 138-166. <https://doi.org/10.1108/so-11-2011-0035>
- Machadoa, B., Scavarda, A., Vaccaro, G., Kipper, L.M. and Khan, M.S. (2015). Knowledge about lean management: a study in hospitals. The 23rd International Conference on Production Research, Manila, Philippines.
- Ministry of Health. (2017). *Basement Report of the Institution Frame of Private Sector of Western Medicine and State Indigenous Medicine Sector*. M. S. Unit & M. o. Health.
- Propper and Green. (1999). *A Larger Role for the Private Sector in Health Care? A Review of the Arguments* (009). https://www.researchgate.net/publication/228536427_A_larger_role_for_the_private_sector_in_health_care_A_review_of_the_arguments
- Rahmanian, F. & Rahmatinejad, Z.(2013). Impact of Kaizen implementation on performance of manufacturing companies' staff. *European Online Journal of Natural and Social Sciences*, 2(3), 1094-1103.
- Singh, A., & Ahuja, I. S. (2015). Review of 5S methodology and its contributions towards manufacturing performance. *International Journal of Process Management and Benchmarking*, 5(4). <https://doi.org/10.1504/ijpmb.2015.072320>
- Wijewardana, R.L. and Rupasinghe, T. (2013) Applicability of Lean Healthcare in Sri Lankan Healthcare Supply Chains. *International Journal of Supply Chain Management* [online],v.2(4), pp.42-49.
- de Wolf, A.H. & Toebes, B. (2016). Assessing Private Sector Involvement in Health Care and Universal Health Coverage in Light of the Right to Health. *Health and Human Rights Journal* 18(2), 79-92.

