

# Factors Affecting the Performance of Employees in Lean Success: Case Study of a Leading Sri Lankan Apparel Manufacturing Company based on Value Stream Mapping

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## Abstract

This study is an attempt to identify the factors affecting the success of lean for employee performance, by bridging the empirical gap in the apparel industry in Sri Lanka. Following an interpretive research paradigm, this research is based on a case study analysis carried out concerning a lean case factory that is under a leading apparel manufacturing company in Sri Lanka. The primary data was collected through structured interviews conducted with a sample of seven key process owners and the operational details of this factory were gathered as secondary data; and the main factors affecting have been distinguished in qualitative analysis in this research. As per the findings, the key factors that affect the lean performance of employees are involvement and support of top management, lean culture, knowledge of lean tools, lean training, involvement of lean consultants, and integration with supplier and customer processes. Further, this study has developed a theoretical framework that can be implied to the existing case factory as well as new organizations in different industries that seek enhancement of employee performance and thereby the overall factory performance through lean implementation.

**Keywords:** Apparel industry, Employee performance, Lean implementation, Lean success, Value Stream Mapping (VSM)

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## Introduction

In the late 1790s, with the introduction of industrial sewing machines, the apparel industry underwent significant growth and expanded into many regions across the world (Godley, 1997). Due to its highly labor-intensive nature, most developing countries had the opportunity to enter the industry including Sri Lanka. The apparel industry in Sri Lanka is a 50-year-old industry that had many ups and downs with the flow of the central administration of the country but happens to be one of the strengthening pillars of the economy. This industry has been cornered as a conservative industry associated with sewing machines (mostly Juki machines), minimum wage struggles, and difficulties in keeping up with customer expectations (Embaldeniya, 2015). MAS Holding PVT LTD, Brandix Apparel Solutions LTD, and Hidramani PVT LTD are the giant apparel manufacturers in the country having a major share in the apparel export segment (BOI Sri Lanka, 2016).

The nature of this industry has differentiated the apparel industry from other industries. Mainly, the labor-intensive nature of the apparel industry leads to more human errors and more waste levels compared to other industries. Also, the industry heavily relies on labor or employee performance, and it directly affects the organization's overall performance. Hence, to thrive on a competitive edge over their rivals, companies in this sector are trying to adhere to processes to improve their employee performance and reduce waste (Ferdousi & Ahmed, 2009). Hence, one method that apparel manufacturers can use is lean manufacturing initiatives to improve the efficiency of apparel factories (Wickramasinghe & Wickramasinghe, 2011).

Lean is a management philosophy very much popular among manufacturing organizations in the world which targets delivering quality products on time at a low cost (Liker & Meier, 2006). The success of lean depends on employee participation and competence (Mohamed, 2016) as a core concept of lean is based on understanding people and their aspirations. For example, Gamage, Vilasini, Perera and Wijenatha (2012) in their research on leading Sri Lankan apparel manufacturers, have identified that lean manufacturing has a major impact on employee performance by analyzing the KPIs of sewing machine operators before and after lean implementation. Further, Ferdousi and Ahmed (2009) on the Bangladesh garment industry have traced a reduction in the cost of production and defective garments, an improvement in operator efficiency, on-time delivery ratio, and finally overall quality after successful lean implementation. Similarly, Paneru (2011) observed a reduction in operator cycle time, and an improvement in operator efficiency, and operator skill after implementing lean practices in the organization.

Contrasting to the above findings, the case company, one of the leading apparel companies in Sri Lanka, has shown no significant improvement visible in the performance level of shop floor employees in a plant after three years of lean implementation (Case Company Performance Report, 2018). The case company performance report (2018) further alludes that there is no observable improvement in the operator efficiency, operator defects percentage, and operator skill matrix before lean implementation and after total lean rollout; the average defective pieces reported is 3000 (within average production of 77,000) garment pieces per day, is a waste to the case factory; and face delivery delays in shipments and no improvement on factory efficiency even after 3 years

from total lean rollout. Hence, it has resulted in no improvement in the overall plant performance impacting the main KPIs of on-time delivery and plant efficiency.

This research streamlines the importance of identifying the factors affecting employee performance in lean success, to rectify the above issues and direct the organization to result in profitability in terms of lean implementation in a case factory of the selected company. Hence, the objectives of this study were four-fold: firstly, to identify the level of lean implementation in the case factory, secondly, to identify the gap between current processes and the ideal state, thirdly, the factors affecting employee performance and finally develop a theoretical framework based on the ideal state.

The remainder of the paper is organized as follows. Firstly, it discusses the existing literature; second, it presents the methodology; next, it records the data analysis and discussion; finally, the conclusion, implications and direction for future research.

## **Review of Literature**

This section discusses the gap in the existing literature and the relationship between variables discuss in the study.

### ***Organizational Performance, KPI, and Employee Performance in Apparel Industry***

The performance of an organization can be defined as the collective effort and results of individual employee performance of the organization (Kanfer, 1990). Therefore, it is evident that the overall performance of an organization depends on the individual performance of every employee in the organization.

The key performance indicators (KPIs) play a vital role in an organization's overall improvement of productivity and evaluation success (Spahija, Shehi, & Guxho, 2012). They have identified that productivity, HR, efficient utilization of raw materials, cost, and quality are the KPIs that should be monitored to improve performance. Further, the balanced scorecard method and key performance metrics (Karabay & Kurumer, 2012); and work in progress (Sampath & Kumar, 2012) are other key performance indicators to monitor the performance of apparel factories. Similarly, Paneru (2011) showed that operator cycle time, operator efficiency, and operator skill in terms of operations are the KPIs that measure employee performance in lean-implemented garment factories.

As per the scholars, the factors affecting employee performance in the apparel industry are team empowerment, safety, technology, management support and knowledge and skills of employees (Pathirage, Jayawardena, & Rajapaksha, 2012); machine and methods, the skill level of team members, financial incentives, leadership practices, and working conditions (Amarasinghe, 2015); technology in terms of systematic approaches (Maia, Alves, & Leão, 2013); employee attitude-related factors such as job satisfaction, job commitment, motivations, and training (Khan, Dongping, & Ghauri, 2014); employee attitude in terms of job satisfaction, job involvement, and organizational commitment (Hettiarachchi & Jayarathne, 2014). Further, Oreg (2017) identified that an employee's resistance to change has a direct impact on the performance of the employee in routine tasks.

Atatsi et al (2019) focused on individual traits; individual learning and team learning can be used to improve employee performance in Africa. Similarly, Diamantidis and Chatzoglou (2019) also focused on employee-related factors which can affect employee performance. Kottawatta (2007) has stated that there are three dimensions to measure employee performance in the apparel industry namely traits, behavior, and results. However, these studies pay limited attention to factors affecting employee performance in lean success.

### ***Lean Manufacturing and Employee Performance in Lean Success***

Lean is a series of solutions or activities to improve the value-added process and eliminate the non-value-added process (Karim & Arif-Uz-Zaman, 2013). Waste elimination is considered one of the primes focuses of the area of lean manufacturing. Excessive inventory, waiting for time, overproduction, excessive transportation, unnecessary motion, inappropriate processing, and waste in defects are the seven wastes in lean manufacturing (Shingo & Dillon, 1992). Lean concepts help organizations to achieve many improvements, especially in the apparel industry (Ferdousi & Ahmed, 2009) while eliminating waste (Nunesca & Amorado, 2015). Hence, lean can improve employee performance, efficiency (Gunarathne & Kumarasiri, 2017; Wijewardana & Rupasinghe, 2016) and the overall performance of a company (Gamage, et al., 2012).

Lean production is a conceptual framework built through several principles and techniques (Sanchez & Perez, 2001): Just in Time (JIT) which enables organizations to minimize inventory, improve the quality and reduce the cost of the product (Schroeder & Flynn, 2001) and have a competitive advantage (Arnas et al., 2013); kanban, a system that passes instructions to upstream activities from downstream activities (Gobinath, Elangovan, & Dharmalingan, 2015); Continuous improvement (kaizen) or ongoing processes to improve the quality, reduce the production cost and minimize the lead time of operations (García-Alcaraz, Oropesa-Vento, & Maldonado-Macías, 2017). These principles and techniques are central to achieving required production efficiency and meeting the committed customer delivery date by improving the performed activities and eliminating non-value-adding activities.

Lean concept has related to the Manufacturing, Supply chain and Logistics when considering the lean practices in Sri Lanka (Illangathilake & Wickramarachchi, 2021). Most of the studies based on the Sri Lankan context have focused on the success factors of lean. For example, Pushpasiri and Pushpaumara (2019) identified training the workforce; using lean tools and methods; continuous improvement process; employee behaviour and management adoption as the success factors. Similarly, Illangathilake & Wickramarachchi (2021) identified organizational factors affecting lean marketing readiness in the retail sector in Sri Lanka.

Alefari, Almani and Salonitis (2020) focused on lean manufacturing with leadership and employees in UAE manufacturing small and medium enterprises. In this study, the authors tried to discuss the success factors of employee performance relevant to leadership styles. And the study of Duggan, Cormican and McDermott (2022) also focused on individual-level factors that can affect lean implementation. Mohamed (2016) found that management commitment and support, effective communication, and a clear strategy are the factors that affect the success of lean initiatives on employee performance. Further, Vlachos and Siachou (2018) concluded that employee knowledge of lean tools combined with training has a direct impact on performance. These limited

and mixed results especially based on the Sri Lankan apparel sector and lack of proper theoretical understanding of the factors affecting employee performance in lean success urge systematic investigation, especially in labor-intensive industries like apparel.

## **Methodology**

This study is based on the interpretivism research philosophy and inductive reasoning. Although the research approach is primarily qualitative, secondary data was also used for data analysis. According to Shah and Hussain (2016) employees who are categorized under middle-level management are the people who use lean tools heavily, guide the shop floor employees towards lean manufacturing, and play a vital role in the overall improvement of the factory. Hence, the population of the study was middle-level management of the case factory. In this case factory, there are 13 middle-level managers (seven out of 13 managers are key process owners of different departments in the lean factory namely the planning manager, warehouse manager, operations manager, quality manager, industrial engineering manager, cutting manager and finish good warehouse manager). These seven key process owners have been selected for data collection, as they are the 'invisible arm' behind the lean performance of the rest of the employees. Hence the study purposive sampling was applied.

Both the primary and secondary data (i.e. process performance records to collect secondary data for the financial year 2017-2018) were collected. Primary data collection was based on structured interviews. Kristensen and Israelsen (2014) in their article about the performance effects of lean have recommended that structured interviews are the best way to gather primary data related to employee performance and the lean concept. Data analysis is based on value stream mapping and thematic analysis. The lean implementation status assessment model was identified through literature and was used to decide the implementation level, with data analysis.

All seven interviews were based on open-ended questions raised under four main categories as general demographics, initial lean adoption, lean journey, individual lean perception, and organizational culture. Seven themes namely discovery, people, tools, implementation, training, culture, barriers, and future were identified as the most relevant for data analysis in the case company, considering the responses of the interviewees together with empirical discussions (Gamage et al, 2012; Hettiarachchi and Jayarathne, 2014; Shah and Hussain, 2016). Value stream mapping (VSM) was used to identify the current state and the process gap between the current and its ideal state. The VSM has been identified as an applicable technique to use to compare current and future states and to identify unnecessary and/or non-value-adding activities (Silva, 2012; Kumar & Thavaraj, 2015). Thematic analysis was used to analyze the data and to identify the factors that affect the success of lean on the performance of employees. Further, these factors were used to suggest recommendations to the case factory to improve their employee performance through effective lean implementation.

This study followed a systematic data gathering and analysing process. The coded data analysis was based on the data collected from interviews. The participants were selected from different locations on various dates and times, using the same interview questions for triangulation purposes. The selected sample for the data collection consists of the seven process owners who are directly involved with lean implementation. Further, the use of two data sources namely the

participants' experiences with interviews and literature reviews to establish consistency for the materials. Next, the interviews were recorded with the permission of the participants and then get their consent to the content of the write-up. In addition, the study was presented to the group of academic and industry representatives three times as a proposal, progress, and final study, to have the peer briefing. Hence, the trustworthiness of the study ensured minimizing the biases (Shenton, 2004).

## **Data Analysis and Discussion**

According to the first objective of this study, the level of lean implementation of the case factory was assessed with the utilization of the lean assessment model. Out of several lean assessment models, the author utilized the 'LEAST model' (Lesat, 2001) to identify the current level of lean implementation in the case factory. As per the findings, the case factory is in Level 2 where general awareness of lean has been created and lean has been deployed informally in a few areas in the case factory. However, the effectiveness and sustainability of this deployment are quite questionable.

The initially developed VSM for the case factory was revised to match the existing processes and compared against the future state value stream of the factory and the unnecessary steps in the current value stream map have been highlighted through a cross-demarcating of the unnecessary steps followed in the lean apparel manufacturing process. When comparing the current VSM of the case factory against the future value stream map, the author observed that the factory employees still follow the non-value-adding processes (refer to Appendix III). This concern was raised during the interviews to identify the underpinning reasons from the relevant process owners hence the second objective was satisfied.

Process KPI analysis was conducted to identify the performance level of the factory employees. This analysis was performed using the secondary data of the case factory that is related to the financial year 2017-2018 (refer to Appendix I). Further, these data have been used for the interviews with each process owner to identify the reasons behind the gap between targeted vs achieved KPI levels. It was evident that factory employees have failed to achieve the targeted KPI levels.

The qualitative analysis based on thematic analysis was conducted on the data collected through face-to-face structured interviews with seven key process heads who lead respective lean departments in the case study plant. This analysis enables the identification of the factors that affect achieving the desired level of process KPIs with the implementation of lean practices, thereby, proposing a framework to improve the performance of the factory employees through effective lean implementation. As per the research objectives, the qualitative analysis of this study concentrated on recognizing the level of lean implementation and the gap between the existing lean functions compared to its value stream mapping in the lean factory of the case study.

The next section presents the findings about the factors affecting employee performance to achieve the third objective of the study. The data was gathered and recorded under seven headings – Lean discovery, People, Lean tools, Lean implementation, Lean training, Organizational culture, and Lean future.

Firstly, the organizational culture itself is one of a factor that has an impact on the performance of employees in a lean environment. The responses claimed by the interviewees regarding this relationship were highlighted under the theme of 'Organization culture'. Changing the prevailing organizational culture to a lean culture involves a lot of time, employees' commitment, collaborative effort, and involvement of the top management. Gamage et al. (2012) also produced the same results using Sri Lankan apparel factories and also, Pakdil and Leonard (2015) and Alkhoraif and McLaughlin (2016) as well.

In addition, top management support is a vital factor that can affect employee performance in a lean factory. This was mainly highlighted by all seven interviewees under five themes out of seven - 'Organization culture', 'People', 'Lean implementation', 'Lean discovery', and 'Lean training'. Further, the results were evidenced the top management of the organization was seeking a way to change the organization's culture in a way that enhances the efficiency of the people and thereby the overall performance of the factory. Hence, there was high interest and involvement of the Board of Directors, CEO and all levels of management at the initial lean adoption stage. Similarly, Mohamed (2016) and Alefari, Salonitis, and Xu (2017) stated that sponsoring and motivation from the top management can enhance the effectiveness of lean implementation while improving overall employee performance. Further, Ferdousi and Ahmed (2009) traced that commitment of top management plays a vital role in the overall success of lean implementation in a garment factory.

Next, the results evidenced that the knowledge and training employees have on lean is another factor that affects employee performance in a lean plant. Similarly, Pearce, Pons, and Neitzert (2018) and Vlachos and Siachou (2018) identified that employee knowledge of lean tools combined with training can have a direct impact on employee performance. Further, Stanica and Pedro (2016) stated that employees' knowledge of lean tools and practical implications play a dynamic role in building a lean culture in the organization.

According to the responses of the interviewees highlighted, it is obvious that lean consultants play the main role in successful lean implementation by enhancing employee performance through conducting proper lean training. Similarly, Elshennawy and Sisson (2015) identified that the knowledge transfers between lean experts and employees have an impact on the sustainability of lean initiatives. Further, Holmemo, Ingvaldsen, and Rolfsen (2016) stated the importance of lean consultants when implementing lean tools in a manufacturing environment. Lean training is another important factor that goes hand in hand with lean consultants and lean tools which leads to employee performance as well as the overall performance of an organization (Israelsen, 2014).

The lean implementation strategy of the organization was another important factor that affects the success of lean implementation in an organization. Lack of investments in technological advancements, employees' negative attitudes and resistance towards teamwork sharing knowledge, embracing new changes, the delegation of work, etc. were identified as hindrances to a successful lean implementation strategy. Nunesca and Amorado (2015) on an apparel lean factory in the Philippines which produces infant clothes also identified the importance of having a proper lean implementation strategy as it drives the organization to enhance its overall performance. Coetzee, Van der Merwe and Van Dyk (2016) also stated that the implementation strategy of lean tools

affects the achievement of desired results and sustainability of lean tools. Similarly, Pearce and Pons (2013) identified that implementation strategy in terms of the correct way of implementing lean tools enables organizations to handle the employees who show resistance to change.

The inability to align the supplier and customer process flows hinders employee performance which in turn hurts the overall performance of the factory. This was highlighted by most of the interviews, under two themes namely 'Lean future' and 'Lean implementation'. The incompatibilities in the processes between the supplier and customer and the case factory have caused issues related to lead time, on-time delivery, quality, etc. which result negatively on the KPIs related to employees as well as the factory. This urges the importance of having a lean culture in both organizations of the customer and supplier. Further, it enhances the flexibility of the overall supply chain by creating benefits for all stakeholders. Although this factor plays a major role in the success of lean initiatives in an organization, it has not been discussed in the previous research studies as per the author's knowledge.

Further, Gobinath et al. (2015) found two different factors that have an impact on the effectiveness of lean performance of employees, namely management strategies and financial investments of the organization. However, those factors were not highlighted in this study, as the case company is a reputed leading organization in the apparel sector in terms of its financial stability and management strategies. Further, the case factory invested heavily in lean initiatives during the early lean implementation stage. In addition, the case factory has a lucrative rewarding scheme for employees who reflect high performance irrespective of the lean culture in the organization. Hence, the interviewees have not raised any concerns in terms of management strategies and financial investments in the present study.

### **Recommended Framework**

The research recommends a framework to enhance the performance of factory employees through effective lean implementation (refer to Appendix II). This framework describes the three-phase approach which can be used to become a lean success organization. Phase 1 which is the conceptual phase of this framework describes the groundwork which needs to be done to lay the foundation of the lean implementation. Defining goals and objectives, assigning a new lean champion and team, providing practical training on lean tools, establishing proper communication methods, defining a lean assessment model, and establishing lean performance metrics are the initiatives that this case factory should consider in Phase 1. Phase 2 of this framework is mainly about execution. In this phase, the factory should consider performing structural changes that are required for proper lean implementation. Further, providing basic lean training to all levels of employees and streamlining the processes with suppliers and customers are key tasks in this phase. Phase 3 is about making a lean culture in the factory environment. Stabilizing the lean tools, continuous improvement, and standardizing the practices are the main tasks that factories should perform in this phase. Hence, the final objective of the study was satisfied.

### **Conclusion, Implications and Future Research**

This study aimed to identify the factors affecting employee performance in lean success. The data was gathered using structured interviews. The results evidenced that a lack of employee-



related factors can reduce employee performance in lean culture. Hence, organizations need to pay attention. The findings of this study provide the following practical and theoretical implications.

### **Theoretical Implications**

The framework developed (Appendix II) in the research blends seven key factors affecting employee performance in lean, which advances knowledge related to lean and its implementation concerns. This reveals the effects of people, process, and technology-related factors in lean and employee performance, which highlights the multi-disciplinary nature of the knowledge produced with the research. Hence, this framework will help scholars to understand how to enhance the performance of factory employees through effective lean implementation and provide a sound theoretical foundation for future analysis.

### **Practical Implications**

Although the research was carried out concerning the apparel industry, the outcome of the research can be applied to any manufacturing organization to enhance the performance of lean implementation thereby the overall performance of the organization, through its employees. The developed framework (Appendix II) can use not only to assess and advance the performance of the employees in the lean implementation but also to plan for achieving an expected level of performance in articulating value in a business with lean. Importantly, organizations that want to increase employee performance in lean need to be aware of the consultants they are hiring as their knowledge, skills and attitude can directly impact employee performance. Further, such companies need to seek the supplier's support and awareness in lean success as it is another vital factor determining the level of employee performance.

### **Limitations and Future Research**

Though the findings of this study contributed practically and theoretically, this study has some limitations.

Due to the qualitative nature and limited resources, this study was limited to a small sample. Hence, future studies can increase the sample which increases feedback that could have been gathered and would enhance the accuracy of the outcomes of the study. Further, it could have been more effective if the research can be conducted in a mixed approach, as the approach offsets the weaknesses inherent to each approach while paving the path for the author to gain a deeper corroboration of the research findings. In addition, future research can conduct a similar study to other apparel manufacturing companies and other industries and increase focus on the supplier and customer involvement in enhancing the lean performance of the employees and thereby the overall performance of the organization.

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## Appendix I: KPI Analysis

Process	KPI	Definition	Measurement	Target	Actual (2017 - 2018)
Planning	Production plan changes	Production plan changes against freeze plan	Number of style changes against freeze plan	0	240
Planning	PP hit rate	Conduct PP meeting 3 days prior to PSD	$(\text{No of PP meeting on time} / \text{total number of PP meeting}) \times 100$	100%	81%
Planning	Pilot hit rate	Facilitate pilot T&A from loading plan	$(\text{Number of possible pilot process} / \text{total number of style changes}) \times 100$	100%	91%
Planning	SAH budget vs plan	Filling budget SAH to loading plan	$(\text{Plan SAH} / \text{budget SAH}) \times 100$	100%	96%
Warehouse	RM inspection	No of defect identified in unit area of material	$(\text{No of batches more than PTS limit} / \text{total no of batches}) \times 100$	5%	6%
Warehouse	Correct material issuing	Actual material issued against material BOM	No of correct issuances / total number of issues	100%	92%
Warehouse	On time RM issuing in system	Material issuing for demand	$(\text{Daily issue qty} / \text{daily sewing demand}) \times 100$	100%	93%
Warehouse	Inventory days	Waiting time in warehouse	$(\text{Total material stock} / \text{daily planning demand})$	15	25
Warehouse	Lost time	Unscheduled down time occurred due to warehouse	Sum of hours line shut down	0	2500

Cutting	Cutting audit	Evaluate cutting against standard audit	No of audit pass / total number of audits	100%	91%
Cutting	Cut plan achievement	Meeting sewing demand	(Daily cut qty / daily sewing demand) x 100	100%	89%
Cutting	Inventory days	Waiting time in cutting	(Total cutting stock / daily paining demand)	1.5	1
Cutting	Lost time	Unscheduled down time occurred due to cutting	Sum of hours line shut down	0	4980
Quality	End line quality	Right first time sewing	1- (no of rework occurrences / total number of pcs produced)	2%	4%
Quality	End line audit	Evaluate sewing out against standard audit	No of audit pass / total number of audits	100%	88%
Quality	Rejection	Scrap which is not reparable	No of good pcs produces / total number of pcs produced	100%	89%
Sewing	Takt time achievement	Sewing out as per the takt time	[{takt time} / (available time - schedule down time) / (actual output)] x 100	98%	91%
Sewing	Inventory days	Waiting time in sewing	(Total sewing stock / daily paining demand)	1.5	2
Sewing	SAH plan vs actual/ [efficiency]	Actual produce hours against plan	(Actual produce hours / planned hours) x 100	60%	51%
Sewing	Lost time	Unscheduled down time occurred due to sewing	Sum of hours line shut down	0	22430
Industrial Engineering	SMV accuracy	Right first time SMV calculation	(No of styles SMV revised / total number of styles) x 100	100%	87%
Industrial Engineering	Yamazumi achievement	Level of skill balance in YAMAZUMI	(Sum of each operation cycle time / (takt time x number of operators in layout) x 100	85%	79%

Industrial Engineering	Machine availability for layout	Accuracy in machine forecast one month ahead	Measure deviation from initial forecast	0	113
Industrial Engineering	Lead time (SMV process)	Achievement of lead time against standard	(Onetime SMV submission / total number of SMV submission) x 100	100%	91%

Source: Author's work

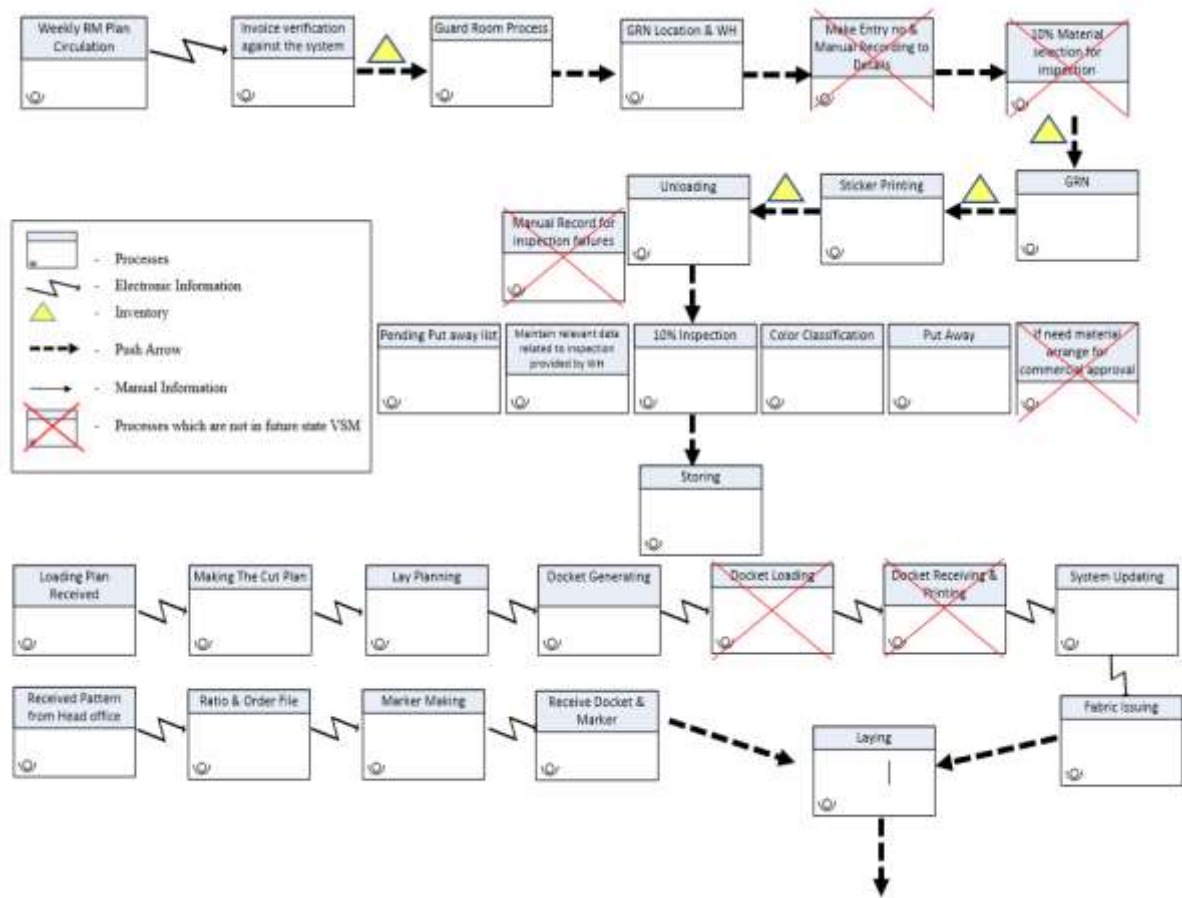


## Appendix II: Recommended Lean Implementation Framework

Phase	Steps	TOP Management Sponsoring, Monitoring & Controlling
Phase 1: Conceptual Phase	Re-define lean goals and objectives	
	Review lessons learned from early lean implementation	
	Establish a new lean team and nominate a Lean champion	
	Provide proper practical trainings for the lean team	
	Establish proper communication methods and feedback channels	
	Define lean assessment model	
	Establish lean performance metric framework	
Phase 2: Execution	Perform structural changes	
	Provide lean trainings for all levels of employees	
	Streamline processes with suppliers and customers related to lean initiatives	
	Re-implement and adjust the lean tools in order match with the apparel factory processes	
Phase 3: Complete lean transformati on	Stabilize the lean tools on factory processes	
	Continuous improvement	
	Standardize the lean practices and establish lean culture	

Source: Author's work

Appendix III: Value Stream Map (VSM) Analysis



Source: Author's work