Beyond Green washing: Profit with Purpose Measuring Sustainable Textile Manufacturing for Business Excellence

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Abstract

This paper examines the implementation of Lean manufacturing (LM) in the textile/ garment manufacturing industry of Pakistan, a developing country in the global south, aiming to enhance operational efficiency and financial performance. Data was collected from the garment production floor supervisors, and a current state map was created, identifying non-value-added activities and waste sources. The respondents were the actual process owners of production and stitching departments of different textile/garment manufacturing factories. The paper provides a blueprint for the textile/garment manufacturing process and presents the outcomes of applying Lean manufacturing. Comparing the current and future state maps, the study demonstrates that fully adopting Lean principles with the proper support of higher management levels can significantly benefit the textile/garment industry by reducing excessive production and waste in Pakistan, a developing country. Hence, there are actual production practices beyond greenwashing. LM is crucial for improving competitive performance in the current market landscape, enabling them to become key players in achieving sustainable practices. These practices assist in achieving SDG 07, 08, 09, 12, 13, 16. This research highlights the financial benefits of adopting LM. It shows that Lean principles can help remove the greenwashing label and allow industries to sustain and expand their production edge through continuous employee development.

Keywords: Lean manufacturing (LM); business excellence; sustainability; human capital ;green washing.

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1. Introduction

In the contemporary business world, there is an utmost emphasis on maximizing the allocation and utilization of resources. This is a beneficial approach for sustainable business practices for every business. Under the visionary leadership of senior management, sustainable practices involve innovation in daily business operations, nurtured through the human capital of any organization. This approach over-arches every organization's under-utilized or over-utilized resources (Vitale et al., 2023). This production and process excellence is achieved via technological support (Razavi et al., 2024) and various quality management and enhancement techniques like Lean manufacturing (LM), ISO 9000, Six Sigma, etc. (Gupta et al.,2024). Industry 4.0, with the help of ICT and modern production technologies, has optimized the business dynamics (Timperi et al., 2023). LM brings a competitive advantage by enhancing processing efficiency in production and reducing cost, thus leading to customer delight and profitability, which are the ultimate goals of all businesses (Chaurasia et al., 2019).

In response to growing environmental concerns, manufacturing companies are re-evaluating their practices toward business excellence to minimize their environmental impact (Szwejczewski et al., 2024). The LM approach can have multifold effects on any manufacturing organization's sustainable process optimization and waste reduction effort. This "Business Excellence" is defined as "a situation where employees see and feel the value flows and can prevent and repair its failure" (Institute for Operational Excellence, 2024). This brings the role of the knowledge worker to the limelight, who reaches this excellence under the aegis of higher management support and commitment. While being an employee, Prophet Joseph, serving as Egypt's vizier under Pharaoh's rule, effectively managed grain storage, ensuring Egypt's resilience during a seven-year famine. His expertise in grain storage techniques was crucial in maintaining food security amid a widespread scarcity in neighboring regions (Quran 12:47; Genesis 41:48-54). Hence, it is evident that empowered and engaged people lead societies and organizations towards wonders.

1.1 Theoretical lens

This study is an effort to support further the concept of the "sand cone model" coined by Ferdows and De Meyer (1990). The theory postulates that the pattern of capability enhancement in Lean manufacturing involves building one capability upon another, leading to simultaneous improvements across multiple manufacturing capabilities within organizations. The theory also postulates that enhancing one capability complements the other business operations, with or without additional cost or expense (Lee et al., 2010). These outcomes will give the organization a competitive edge, which the competitor may not be able to compete in the short haul. This progressive approach is affected by evolving and modernizing production practices and managerial approaches (Danishev, 2024).

1.2 Pakistan's textile and apparel industry

Globalization and industrialization, coupled with certain other universal factors, have intensified the dependence of production economies on natural resources, leading to hazardous environmental footprints (De Oliveira et al., 2022). They require a sustainable approach to address this growing trend. Sustainable production, an evolving systematic environmental management strategy, offers potential benefits for industries in developing nations like Pakistan. Implementing industrial processes to reduce environmental risks and mitigate harm to humans and natural resources contributes to preserving Earth's ecosystems (United Nations Environment Program, 1996). The textile sector has a long supply chain and consumes many natural resources, from raw materials to finished products (Xu et al., 2024). Sustainability performance has become a significant focus for the global textile industry, especially concerning the environmental impacts of the textile sector (Sarker & Bartok, 2024). It may be in the form of water pollution, smoke emission, or depletion of natural resources. The textile sector is the backbone of Pakistan's economy (Rasheed et al., 2024). This sector is progressively moving towards sustainable manufacturing practices to have better productivity (Razzaq, 2024), and LM is one of those practices, witnessed as a value-addition tool in the manufacturing sector (Badhotiya et al., 2024), having a constant evolution since 1970 (Stone, 2012). The concept of LM was initialized by the Toyota Production System (TPS), a Japanese automobile automaker (Reke, 2024). Lean Manufacturing focuses on operational models by systematically reducing waste across manufacturing processes. The key focus of this approach is to cultivate a critical mindset for identifying and eliminating non-value-added activities from processes prioritizing value addition. Senior management's commitment, facilitated by a lean steering committee, ensures resource allocation and fosters a progressive lean culture within the organization (Machingura et al., 2024). Several studies have found its effectiveness in the textile sector and recommend its implementation in other sectors for process efficiencies (De-la-Flor et al., 2024).

Critical prerequisites for such continuous improvement initiatives include solid management involvement, adequate mature human capital, and an understanding of environmental aspects. These frameworks assess sustainability performance and employ appropriate tools to advance sustainable development. An integrated approach combining Lean, Green, and Six Sigma methodologies is proposed to reduce the adverse sustainability effects of industrial processes (Ng et al., 2015), reducing resource dependence through responsible consumption and production. Pakistan's textile sector has long backward linkages. It shows more significant potential for progressive transformation towards efficiencies through structural, procedural, and intellectual development, benefiting the Pakistani economy's micro and macro dimensions (Tasneem & Khan, 2024). This study has focused on the structural and procedural developments of the textile industry players of Pakistan and how it is developing sustainable human capital.

1.3 Greenwashing

The term greenwashing was coined by Jay Westerveld in 1986 against the fabricated environmental practices of hotels (Pearson, 2010). Since then, it has spread into the business sector as an epidemic (Hsu,2011). Greenwashing organizations tend to mislead consumers by falsely promoting products, policies, or initiatives as environmentally friendly while engaging in practices that harm the environment. Companies exaggerate or fabricate commitments to environmental sustainability to enhance their public image or attract environmentally conscious customers. There is no fixed phenomenon to define greenwashing; it varies from industry to industry (Lyon & Montgomery, 2015). In Pakistan, a developing country, the lack of effective governmental control and stringent policies has led to this significant greenwashing challenge (Ottman, 2011). As the textile sector is involved in several activities related to environmental issues, there exists a probability that greenwashing may be practiced there. This study explores the phenomena by providing evidence-based practices to verify that the phenomena of sustainable production are followed in Pakistan`s textile sector with actual letter and spirit (Pervez, 2020).

2. Literature Review

Organizations are on a constant roller coaster ride of innovation, change, and sustainability (Daw, 2024). They are on this twin endeavor to achieve the collective goal of a sustainable future for all. Making these changes and adoptions in the production or services is not an easy ball game as it entails many practices to be gauged, molded, and scrutinized before implementation. Even after these provisions, not all endeavors are acceptable to lay in the ideal and sweet spot covering all three triple-bottom aspects of sustainability. Until profitability aligns with these initiatives, organizations may not prioritize them, given the necessity for a robust and ongoing measurement and evaluation framework supported by dedicated resources (Zwikael, 2024). This overarching triple-bottom approach couples every organization to the global endeavor of sustainability. In globalization, sustainable business practices are crucial for manufacturing operations. They entail understanding sustainable production not as isolated norms but as evolving within a collective framework of international organizations shaping specific industries. Today's global market complexity, driven by advanced technology and widespread geographic reach, underscores the importance of understanding its integrated communication, production, and consumption mechanisms. This results in quantified, measurable, sustainable performance (Hummel & Szekely, 2022). Pakistan is one of the foremost textile exporters globally, with its textile industry being its primary tradable commodity, contributing over 56% to the nation's total export revenue (Abbas & Bhutto, 2024). This textile sector must incorporate enhanced sustainable practices in its corporate practices to attain a green future.

Empirical evidence suggests a rising trend of developing countries' firms adopting sustainable business practices, with Pakistani firms also following suit (Nadvi & Halder, 2002; Chen, 2024). Hence, the inclusion of these sustainable practices enables the industry and supports

the Government of Pakistan to achieve SDG 07 of clean water and sanitation by installing ETP plants, SDG 08 of gender equality by providing equitable employment opportunities to all genders, SDG 09 of industry innovation and infrastructure and SDG 12 of responsible consumption and production by utilizing LM practices in their operations, (which is the focus of this study as well). This phenomenon requires a solid effort to be deployed at all three levels: strategic, tactical, and operational (Merz & Siepmann, 2016). Higher management support and inclusion of the Lean Management (LM) approach in business operations and strategy significantly enhance efficiency, foster continuous improvement, and drive overall organizational success (Bashar et al., 2024; Siegel et al., 2024).

Hence, this study aims to explore sustainable business practices within the Pakistani textile industry, acknowledging a lack of literature on the specific socially and environmentally responsible measures adopted by textile firms despite evidence of their increasing adoption of such practices (Pervez, 2020). Lessons learned from this research provide valuable guidance for improving economic and environmental sustainability in developing nations, aligning with the principles of the triple-bottom-line approach. Our study contributes to this context, discusses the issues, and accumulates the achievement stories of organizations and employees engaged in leveraging the support of higher management to bring consumption and production efficiencies through LM's best production practices. The discussion leads to these research propositions.

RQ1: What are the possibilities for the textile industry's convergent production and stitching processes to create value?

RQ2: How does the support and control from senior management contribute to improving the production process?

3. Methodology

Primarily, this study used a qualitative research approach consisting of semi-structured interviews. These methods served the goals of this research, as, according to Miles et al. (2020), qualitative data enables the chronological flow of events and consequences while deriving credible explanations. It focuses on real-life context and helps explore new ideas and propositions. The respondents were selected based on purposive sampling, as the research questions were focused on the specific idea of Lean manufacturing and required opinion can only be acquired through employees selected purposely, as they practice this technique and have developed novel ideas after applying the LM techniques. For these kinds of qualitative studies, purposive sampling is used preferably, which fulfills the necessary condition (Dul, 2024). The semi-structured interviews contain a pattern of open-ended questions and questions that emerge during the business process analysis and interviewees (DiCicco-Bloom & Crabtree, 2006). The method of interviews enables focus on details while giving space for new pertinent ideas (Adeoye-Olatunde & Olenik, 2021). Our eight semi-structured interviews enabled us to gather more in-depth opinions from the

respondents as the discussion unfolded the diverse thinking patterns of the respondents. Each face-to-face interview took an average of 40 minutes and was audio-recorded. This enabled us to encode the discussion systematically. The second method was collecting and sorting secondary data with the business process in focus. Eight professionals from different departments participated in the interviews, and everyone belonged to different textile factories in Karachi, Pakistan. The selected people were engaged by providing them with an advance email containing info about the nature of the discussion. The selected size enabled the data to be saturated to the point where the same subjects were mentioned repeatedly by different persons. The research team contacted the interviewees, who consented to the interview. All sessions were audio recorded and reinforced with written transcripts. Once the written transcripts were finalized, they were sent to the respondents for final review about addition of missing points and deletion of excessive points.

4. Findings

To attain sustainability in production practices by implementing LM practices in daily business operations was the main interest of the higher management in these textile and apparel-making organizations. An evident finding from these events highlighted that tailor-made approaches are necessary for deploying Lean Management (LM), as the Lean Tools (LTs) implemented in organizations vary significantly. This led us to understand that implementing LM does not necessarily follow a uniform pathway. All the respondents of this study were given training on LM. The higher management started the initiative for the LM training. This LM training enhanced the working capacities of the supervisors of different departments related to production or production facilitation, like packing, delivery, or raw material stores. The management was very inclined towards the application and demonstration of these tools. Ample time and resources were dedicated to the LM learners so they could achieve the best possible outcome. The higher management brass diligently addressed repetitive errors and issues for real-time outcomes, endorsing their genuine commitment.

The learners of the LM system reported the following beneficial outcomes in their different work setups.

4.1 Errand One: Carton Size Reduction

One packing team member, supervised by Mr. Ahmed, was trained on LM. Their training on LM focused on the 5 Why`s. The 5 Why`s analysis taught in lean training equips employees with a systematic approach to identifying and addressing the root causes of problems, fostering proactive problem-solving and continuous improvement within the organization. After the training, the team found damaged cartons in the finished goods warehouse upon inspection. They applied a five-why analysis and found the root cause of damaged cartons. It was because of extra space in the cartons, and they changed the dimensions of the cartons. After successful trials, the cartons with new specs were implemented for production, and this resulted in reduced cardboard

usage because the dimensions were reduced; with the new dimension, it was observed that no of cartons in each container increased because the cubic meter per carton was also decreased. LM was practiced here, and this wastage was reduced to 01 container fright for the shipment of given orders with a cost saving of PKR 1,890,777 per tenure (refer to Table I). This initiative achieved SDG 09, 12, and 13.

Table 1
Root Cause Analysis of Damage Cartons

	Before	**After**
Dimension in cm`s	65x36x90	96x60x33
CBM (cubic meter)	0.211	0.19
Order Quantity*	2966 Cartons	2966 Cartons
Container required for fright	9.63	8.67
Cost Saving	Rs0	Rs1,890,777

*** Order quantity is constant before and after.**

4.2 Errand Two: Carton PDQ

The second LM Training was given to the stitching department and focused on the LM tool Gemba, which means "in the real place." This tool is beneficial in understanding the challenges on the production floor. After this training, the team started performing Gemba Walk on production floors and found improvement opportunities. One of those examples is mentioned here. The display item of towels was kept in three different folders with double folded borders (before). Still, with LM practice, this excessive packaging was identified as waste, and the design modification in shape was done to reduce waste and machine processing time, saving paper (sheet) consumption to 82,620 Kg with a cost saving of Rs. 7,754,760 (refer to Table II). This initiative achieved SDG 09, 12, and 13.

Table 2
Waste Reduction Carton PDQ

	Before	After
4 Pack Tray		
Sheet Weight	0.24 kg	0.13 kg
Material Saved	0 kg	0.11 kg
Total Qty	144000 Cartons	144000 Cartons
6 Pack Tray		
Sheet Wight	0.42 kg	0.25 kg
Material Saved	0 kg	0.17 kg
Total Qty	25000 Cartons	25000 Cartons
6 Pack Tray		
Sheet Weight	0.48 kg	0.27 kg
Material Saved	0 kg	0.21 kg
Total Qty	300000 Cartons	300000 Cartons
Total material saved	0 kg	84620 KG
Total cost saving	Rs0	Rs7,754,760

*** Order quantity is constant before and after.**
PDQ refers to "pretty darn quick" retail point-of-sale/purchase (POS/POP) displays due to their ease of set-up and the fact that they typically come pre-packed. PDQs can display products throughout the store, including on shelves and endcaps, in addition to the checkout area.
Note: Walmart refers to all floor displays as PDQs.
A four-pack means each bundle consists of four pieces. The same goes for a six pack, which consists of six pieces.
3 cost of sheets per kg = 129,130,131 Avg 130 rs per kg cost of sheet.

4.3 Errand Three: Hanging loop reduction

The third respondent was Mr. Danish, who works as a supervisor in the stitching department of a textile firm. He looks after the process of "Cut to Pack." He was trained on the MUDA classification of over-production, over-processing, and excess inventory under the umbrella of TIMWOODS. He identified the issue of "over-processing," which refers to performing unnecessary or redundant tasks that do not add value to the product or service. He and his team identified a loop attached to a specific article of towel in stitching, which was causing over-processing, which meant stitching time was increased due to the additional operation of loop attachment, affecting productivity. So, the stitching department asked the marketing department if removing the loop from the towel was feasible as it was a non-value addition. The marketing

department discussed it with the customer. It approved removing the loop from the specific article, which resulted in productivity improvement, a reduced stitching cost of Rs 0.14, and a hanging loop cost of Rs 1.25. On the other end, cloth wastage was reduced to XXX units; the overall cost saving is Rs 6,953,705 (refer to Table III). This initiative achieved SDG 09, 12, and 13.

Table 3
Removing loop from Short Hem

	Before	**After**
Quality (same as mentioned in Appendix ii)	xxx	xxx
Loop Cost	Rs1.25	Rs0.00
Stitching Cost	Rs1.56	Rs1.42
Order Quantity*	5,002,666 pcs	5,002,666 pcs
Stitching Cost Saving	Rs0	Rs. 700,373
Loop Cost Saving	Rs0	Rs. 62,53,333
Total Cost Saving	Rs0	Rs 69,53,705

* Order quantity is constant before and after.

4.4 Errand Four: Rotor Disc replacement

Mr. Shoaib Hussain was the In-charge of the spinning department. He and his team were trained on Kaizen. Kaizen is a Japanese philosophy centered on continuous improvement through small, incremental changes driven by employees at all levels to enhance processes, products, and overall organizational performance. After the training, he and his team discussed the improvements in spinning open-end machines. Spinning open-end machines used supporting discs with an estimated operating life of 03 years and a unit cost of Rs.1,084. Afterward, they replaced the efficient and low-weight supporting disc with the anti-static supporting disc, which had an estimated life of 04 years, and the price was the same. Ninety-six person-hours were saved for (Changeover time), and there were 220 rotors in each open-end machine. This improvement was initially implemented on two machines. Energy saving was also calculated, which was 6 watts saving on each rotor, and total energy on the life of four years is 92505.6 Kilo Watts, energy cost saving was estimated on four years to be Rs. 1,526,342 (Refer to Table IV). This initiative achieved SDG 09, 12, and 13.

Table 4
Anti-Static Supporting Disc

	Before	After
Supporting Disc	PV-N-D78-AS-bal	PV-M-D78-AS-bal
Life	3 Years	4 years
Energy Savings/ Rotor	0 watts/hour	6 watts/hour
Total Rotors in 2 Machines*	440	440
Total Energy Saved/Hour	0 watts	2640 watts
Total Energy Saved/Day	0 watts	63360 watts
Total Days in 4 years	1460 days	1460 days
Total Energy saved in 4 years	0 watts	92505.6 kilo watts
Total Cost saved from energy	Rs0	Rs 15,26,342
Total Cost Saving	Rs0	Rs 18,90,777

* Rotors in machines is constant before and after.

4.5 Errand Five: Paper reel saving

Mr. Noor Alam, in charge of the corrugation dept, said that after getting the lean training, which focused on value stream mapping (VSM) for the reduction of wastages, after the training he came up with a waste reduction and cost-saving project, focused on the lab testing done on paper reels after receiving them from the supplier. For this purpose, many layers in the form of windows are cut from the reels (as seen in Plate 04). Due to this window, the entire circumference of the reel has to be wasted before; on average, 11 layers were used for this testing purpose and wasted due to this. Also, no standard was defined for the number of samples. To reduce this wastage, they revised the testing criteria and reduced the number of layers being cut from 11 to 3. This was achieved by increasing the cutting size of the window. After implementation, we successfully saved 08 layers that had been wasted previously. The time taken to remove this wastage was also reduced. This all accumulated to reduce paper wastage to 51981.6 Kg with a cost saving of Rs 3,164,866 on yearly testing (Refer to Table V). This initiative achieved SDG 09, 12, and 13.

Table 5
Testing Method of Paper Reel Optimization

	Before	After
No of Layers	11	3
No layers reduced	0	8
No of Inspection/year*	3267	3267
Weight of each layer	1.99 kg	1.99 kg
Raw material cost	Rs.97.9/kg	Rs.97.9/kg
Cost saving of each layer	Rs. 0	Rs. 60.9
Total Cost Saving		Rs3,164,866

* No. of inspection per year, weight of each layer and raw material cost is constant before and after.

4.6 Errand Six: Poly size reduction

Mr. Shahrukh Naveed works as the floor manager of the stitching department of a towel-making firm. He and his team were trained on 5s methodology. 5S is a methodology derived from Japanese terms Seiri, Seiton, Seiso, Seiketsu, and Shitsuke, translating to Sort, Set in Order, Shine, Standardize, and Sustain. It is a systematic approach to workplace organization and standardization to improve efficiency, safety, and effectiveness. After lean training of 5s, the stitching floor in charge identified a problem with managing various poly roll sizes used for packing the finished products, leading to production floor difficulties and wastage. Through analysis of daily production, they selected a standard 500 mm poly roll size that covered most packing needs. After a successful trial, a new item code was requested and implemented. This change reduced poly wastage and carbon emissions and resulted in cost savings. This saved the cost of Rs 1,863,896 and reduced poly wastage to 2.9 grams in each pack, which is a 47.2% reduction compared to previous wastage (Refer to Table VI). This initiative achieved SDG 09, 12, and 13.

Table 6
5S Work-place Management

	Before	After
Poly Roll Sizes	584 mm	500 mm
Weight of poly/pack	6.15 gm	3.25 gm
Wastage reduction in poly of each pack	0 gm	2.9 gm
Total no of Packs/year*	3,046,080 packs	3,046,080 packs
Poly waste reduction/year	0 kg	8,834 kg
Cost of fresh raw material/Kg	211	211
Total Cost Saving		Rs1,863,896

*** Total no of packs per year is constant before and after.**

4.7 Errand Seven: Twill tape size reduction

Mr. Fakhr e Essa, an assistant manager of the stitching department of a textile firm, was trained in Gemba. Gemba training focuses on improving processes through observation skills. Participants are divided into small groups and assigned specific areas to observe, guided by questions to focus their attention. After observing, each group shares their insights and observations with the whole group. As a result of this activity, the stitching floor supervisor found an opportunity during a Gemba walk in the by-product of a particular towel article. Two towels were knotted with a twill tape of width 50 mm, and a proposal was sent to the marketing department that we could reduce its width by half; this proposal was discussed with the customer, and he agreed to this as this change was not in the core product, before implementation a trial was done which was approved by the quality head and after that, successfully implemented. This resulted in cost savings and responsible consumption of raw material wastage reduction, with a cost saving of Rs 6,145,728 on the total order quantity in the current year (refer to Table VII). This initiative achieved SDG 09, 12, and 13.

Table 7
Twill width Reduction (Material Saving)

	Before	**After**
Item Code of Twill	ACC-091819	ACC-125330
Width of Twill	50 mm	25 mm
Cost of Twill	Rs0.32	Rs0.24
No pieces knotted by twill*	2	2
Total Order quantity in pcs/year*	1,613,052 pcs	1,613,052 pcs
Total Cost Saving		Rs 61,45,628

*** Total order quantity in pcs/year and no pieces knotted by twill is constant before and after.**

4.8 Errand Eight: Weaving wastage reduction

Mr. Bilal, who is in charge of weaving planning with his team, got training in the LM process of MUDA. MUDA classification covers over-production, over-processing, and excess inventory under the umbrella of TIMWOODS. In their textile firm, they identified the possibility of reducing the weaving wastage percentage in the planning module. Each Month, the wastage percentage used by planning was higher than the wastage generated by the process. This led to increased yarn procurement to fulfill demand. The weaving waste percentage in the planning module has been revised, reducing the monthly demand of 499 bags for the in-house weaving requirement. These 499 Bags will not be purchased monthly from outsourcing, leading to cost savings in yarn between in-house and outsourced rates. Salvage wastage was reduced to 2 inches/

pc with a cost saving of Rs 26,637,701 yearly (refer to Table VIII). This initiative achieved SDG 09, 12, and 13.

Table 8
Reduction in weaving waste %

	Before	After
Salvage End size	2.96 cm	1 cm
No of Ends	128 ends	40 ends
Monthly Yarn Bag Reduction	0 Bags	499 Bags
Annual Yarn Bag Reduction	0 Bags	5988 bags
Total Yarn Reduction (Kg)	0 kg	271,616 Kg
Cost saving/kg	Rs0	Rs98
Total Cost Saving		Rs27,637,701

5. Implications

The initiatives highlighted in the section above can help textile companies practically. The examples from the case organizations have been shared along with images with a rationale that waste reduction is the ultimate of Lean manufacturing. This aligns the organizations with environmental initiatives like saving energy, reducing carbon emissions, etc. While implementing the ideas associated with Lean manufacturing practices, assessing organizational culture regarding environmental initiatives is also important. Textile companies can improve their business processes to make them more environmentally friendly due to the involvement and commitment of their top management. Also, the prerequisite for continuous improvement of the processes is the proper orientation of project leaders and team members so that they can come up with valuable suggestions. It enables the stakeholders to equip themselves using Lean tools and consider environmental aspects. Furthermore, as discussed above, different teams working in the manufacturing and production unit of textile companies must be given training to develop their competencies related to Lean management and its implications on sustainability. It will help in boosting their interest and enthusiasm. Not only this, but when organizations avoid greenwashing and sincerely work towards sustainability, it yields many non-tangible benefits like customer satisfaction, change in culture, and the behavior of employees in the system. Moreover, such actions will help society achieve reduced emissions and a sustainable future. It is the call for C-suit professionals working in the textile sector of Pakistan to embed the practice of value creation in the organizations' strategic goals. If they become the torch bearer and empower the employees under them, miraculous outcomes can be achieved. Once the practices of employee competency are explored, the gap in trust between higher management and lower staff can be filled. Suppose the employees who own the processes are trained and provided with the appropriate tools for capacity development. In that case, they can potentially have a multiplier effect on the organization's profit. Not only is profit generated, but it also tends to develop a sustainable competitive advantage, one after another.

6. Conclusion

The current study employed personnel of textile/garment manufacturing and production organizations as a model to assess the benefits yielded by these organizations when they take a step ahead toward LM. The reason behind the selection of these organizations was that their leaders were dedicated to adopting sustainable practices to move towards business excellence and environment preservation. To do so, various initiatives were undertaken by the organization, which were initiated by training the teams working in the manufacturing unit so that they could identify loopholes in the processes of their concerned departments and suggest strategies to overcome them. The purpose of the training was to ensure the identification of effective, waste-free processes with the most negligible environmental impact. It ultimately helped the organization reduce costs and adopt environment-friendly procedures. The case evaluation depicted significant improvements, namely, reduction of carton wastage worth PKR 18,90,777 per tenure; Carton PDQ reduction saved PKR 77,54,760; hanging loop reduction reduced the cost by PKR 69,53,705; Static Rotor disc replacement with the anti-static rotor disc saved the energy and cost by PKR 18,90,777; Paper reel saving came up with saving Rs. 31,64,866; Poly size standardization leads to a saving of PKR 18,63,896; Twill tape size reduction saved PKR 61,45,728 and the magic of saving the weaving wastage lead to the saving of PKR 2,76,37,701. These endeavors in Lean manufacturing practices reduced costs and significantly impacted the planet. Every saving has led to a reduction in the production and consumption patterns of these organizations. The lynchpin of the whole process was the employee, who was given the responsibility and authority to shape up the whole process, and once their attempt is successful, they will go for more and more. Hence, the sand cone theory can be visualized for the foreseeable future, as one set of employee capabilities will lead to developing a more sustainable foundation for business functions.

Thus, this paper can serve as a guide for various organizations so that they can go for projects yielding business excellence through eco-friendly and efficient operations. These organizations can overcome the issues of greenwashing by giving a clear and transparent message to the stakeholders through adopting certain sustainability standards like GRI, SABS, and alike, what practices they have adopted for achieving the green goals, and what kind of hurdles they are facing in this dynamic change (Sathish et al., 2024). This will make the stakeholders understand that the organization is not just having lip service, they mean whatever they claim. In such scenarios, customers may become more loyal and committed to the organization and may be willing to purchase such products at a higher price. Similarly, once the customers are willing to pay more, an organization can generate higher revenue which can be further invested in R&D activities, innovating enhances green products (Xia et al., 2024). Hence owing to this organizations realize that sustainability and profitability can go hand-in-hand (Ngo et al., 2024)

The study also emphasizes the significance of employee empowerment, as employees at all levels shall cooperate to bring meaningful process improvement. This involvement of employees is not limited to just adhering to the rules and regulations of the organization, they

should be deeply engaged by firstly made responsible for advising and developing circular economy practices in the products of the organization (Dragan et al., 2024; Klein et al., 2022), stimulating to source and advice sustainable material for their product line and secondly the employees should be made idea champion of sustainability by providing them the facility to participate and organize such community engagement programs leading to sustainable efforts focused at triple bottom line(Ejibe et al., 2024). Organizations can attach the KPIs of the employees with these initiatives towards lean management ideas, as this will serve as a continuous source of motivation for the employees (Marrucci et al.,2024). Individuals are stimulated through some kind of motivation and money stands in the list as well (Loh et al., 2024).

The research also yields many non-tangible benefits like customer satisfaction, as the customer not only wants the best product for their utility but also wants the product to be environment friendly, as the applicability of the concept of the triple bottom line is widely understood and practiced on both sides of the consumption and production cycle (Gupta & Gupta, 2024). Hence this builds the premium brand image of the organization, with a concrete image for contributing to the domain of social responsibility of any organization (Fosu et al., 2024).

The organizations serving in this sector will be able to benchmark the required employee behavior This benchmark may help support the development of employees at an enhanced skill level (Gupta, 2024), and this war of talent will bring in the best potential in the organization (Stuss, 2024). Nurturing, developing, and sustaining competitive advantage will be easier for such organizations. Moreover, the demand of international buyers from such textile manufacturing and exporting units regarding their production process is always inclined towards sustainable production practices, and Leans manufacturing stands in the same league. Implementing Lean practices on the production floor to enhance sustainability can significantly increase the likelihood of securing lucrative orders from international buyers (Turker & Altuntas, 2014).

This purposeful effort towards sustainably will bring the required change in culture of the organization. as the sand cone theory will come into action. Once the organization has developed its expertise and competitive edge, the incoming workforce will be able to learn from it(Molinaro et al.,2024). Hence the human capital of the organization will be developed in the industry. Further and advanced approaches will be based on solid and authentic foundations based upon similar experimentations. Alongside the outcomes of the sand cone theory, the organization will develop a reputation in the industry as the talent nurturing portal where making the mistake by hit and try is allowed. Several renowned and successful organizations have found this method to be very effective in developing organizational efficiencies (Badhotiya et al., 2024)

6.1 Limitations and future scope of study

A deeper exploration of the impact of higher management support and the effect of external environmental factors on LM will provide broader insights. A critical determinant for

adopting LM principles is the approach of the top management team (TMT). If TMT does not support such initiatives, it hinders employee empowerment and, ultimately, the sustainable progression of the firm. Secondly, in the future, organizations working in other sectors can also be considered to foresee how business excellence can be achieved. Additionally, it is essential to evaluate the economic impact of sustainable practices, particularly in developing countries, to ensure inclusive growth and poverty eradication. This assessment would aid low- and middle-income countries in achieving dynamic, sustainable, and inclusive growth while eliminating poverty. This study is conducted on a cross-sectional basis. If this study had been conducted longer, it may have assessed the long-term effect. However, due to the limitation of publication time, the researchers could not conduct it in such a manner.

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