

Financial Management Strategies for Implementing Lean Manufacturing in the Footwear Industry

¹Poturi Chandra Shekar; ²Suryateja Perla

^{1&2}Department of MBA in K L Deemed to be University (KL), Hyderabad

Abstract:- The concept of lean manufacturing, initially developed to maximize resource utilization by minimizing waste, has evolved to address the needs of a rapidly changing and competitive business environment. Footwear industries face significant challenges and complexities that require a systematic and continuous response to maintain and enhance product value. Implementing lean manufacturing practices has become essential for these organizations to sustain and thrive in such a dynamic landscape. However, successful implementation is not solely dependent on operational adjustments but also on strategic financial management. This research examines the financial management strategies necessary for the effective implementation of lean manufacturing in the footwear industry. It emphasizes the importance of integrating financial planning with lean principles to ensure comprehensive and sustainable improvements. Key lean elements such as Value Stream Mapping (VSM), Cellular Manufacturing (CM), U-line systems, Line Balancing, Inventory Control, Single Minute Exchange of Dies (SMED), Pull Systems, Kanban, and Production Levelling are explored in detail. The study demonstrates how a focused approach to financial management can support these lean elements, enabling footwear companies to optimize resource allocation, reduce costs, and improve efficiency. By aligning financial strategies with lean manufacturing goals, organizations can achieve significant economic and operational benefits. This includes better cash flow management, investment in continuous improvement initiatives, and a robust framework for measuring the financial impact of lean practices. Through a comprehensive analysis of these financial strategies, the research provides valuable insights for footwear companies aiming to implement lean manufacturing successfully. It highlights the need for an integrated approach that combines financial acumen with lean methodologies to drive value creation, enhance competitiveness, and ensure long-term sustainability in the industry.

Keywords:- Financial Management, Strategies, Lean Manufacturing, Footwear Industry, Implementation.

I. INTRODUCTION

In today's rapidly evolving and highly competitive global market, the footwear industry is confronted with numerous challenges that necessitate continuous innovation and adaptation [2-3]. Companies are under constant pressure

to enhance product value, reduce costs, and respond swiftly to market changes [4]. Amidst these pressures, lean manufacturing has emerged as a pivotal strategy for achieving operational excellence and maintaining competitive advantage[6-8]. Originally conceptualized to maximize resource utilization by minimizing waste, lean manufacturing has since evolved to address the multifaceted demands of modern business environments. Lean manufacturing focuses on delivering maximum value to the customer by eliminating non-value-added activities and optimizing processes. For footwear manufacturers, this involves streamlining production workflows, improving quality, reducing lead times, and controlling inventory levels[9-10]. The implementation of lean methodologies—such as Value Stream Mapping (VSM), Cellular Manufacturing (CM), U-line systems, Line Balancing, Inventory Control, Single Minute Exchange of Dies (SMED), Pull Systems, Kanban, and Production Levelling—requires a holistic approach that integrates these practices into the core operations of the business.[11-13]

However, the transition to lean manufacturing is not solely an operational challenge; it is fundamentally a financial one as well. Effective financial management is critical to support the deployment of lean practices and to sustain their benefits over the long term. This involves strategic allocation of financial resources, rigorous cost control, and continuous investment in process improvements. Without a robust financial framework, even the most well-designed lean initiatives can falter due to inadequate funding, misaligned incentives, or insufficient monitoring and evaluation.

This research paper aims to explore the financial management strategies that are essential for the successful implementation of lean manufacturing in the footwear industry [14-17]. It highlights the interconnectedness of financial planning and lean principles, emphasizing the need for a cohesive strategy that aligns financial objectives with operational goals. By examining key lean methodologies and their financial implications, this paper seeks to provide a comprehensive guide for footwear companies looking to optimize their operations through lean practices.

The discussion will cover various aspects of lean manufacturing, detailing how each can be effectively supported by financial strategies. For instance, Value Stream Mapping (VSM) can be enhanced through precise cost analysis and budgeting, while Cellular Manufacturing (CM) may require significant capital investment supported by

III. RESEARCH METHOD AND METHODOLOGY

➤ *Case Studies and Best Practices*

Several case studies offer insights into the successful implementation of lean manufacturing with a focus on sound financial management practices within the footwear industry. Companies like Nike and Adidas have demonstrated how strategic investments in lean initiatives, coupled with rigorous financial analysis, can yield significant improvements in operational efficiency and profitability. These cases highlight the importance of aligning financial goals with lean objectives, fostering cross-functional collaboration, and leveraging data-driven decision-making to drive sustainable results.

Financial Analysis in Lean Manufacturing: A critical aspect of implementing lean manufacturing in the footwear industry is conducting comprehensive financial analysis. Cost analysis plays a pivotal role in identifying potential areas of waste and inefficiency, thereby guiding resource allocation towards lean initiatives. Studies by Kumar and Kumar (2017) emphasize the importance of accurately estimating the costs associated with lean implementation, including training, equipment upgrades, and process redesign. Moreover, cost-benefit analysis techniques are instrumental in assessing the financial viability of lean projects, aiding decision-makers in prioritizing investments.

Investment Prioritization: Prioritizing lean investments is essential for footwear companies aiming to achieve maximum return on investment while minimizing financial risks. Research by Li and Zhang (2018) highlights the significance of evaluating potential lean projects based on their alignment with strategic objectives and expected financial returns. Through techniques such as net present value (NPV) analysis and return on investment (ROI) calculations, organizations can systematically assess the economic feasibility of different lean initiatives and allocate resources accordingly. Additionally, studies underscore the importance of considering qualitative factors such as organizational readiness and market dynamics in investment prioritization decisions.

Performance Measurement: Measuring the financial impact of lean manufacturing initiatives is critical for assessing their effectiveness and driving continuous improvement. Scholars like Shah and Ward (2007) emphasize the need for developing robust performance measurement systems that capture key financial metrics such as cost savings, productivity improvements, and quality enhancements. By establishing clear key performance indicators (KPIs) and benchmarks, footwear companies can monitor the financial outcomes of lean implementation efforts and identify areas for further optimization. Furthermore, studies suggest the integration of financial performance metrics with operational indicators to provide a holistic view of lean performance.

IV. DATA INTERPRETATION WITH RESEARCH DISCUSSION

Financial management strategies are integral to the successful implementation of lean manufacturing in the footwear industry. Companies must prioritize cost analysis, investment prioritization, and performance measurement to optimize financial practices and drive sustainable improvement. By aligning financial goals with lean objectives, companies can enhance operational efficiency, reduce waste, and improve profitability. Furthermore, the data underscores the importance of cross-functional collaboration and continuous improvement in financial management. Companies must involve finance, operations, and other key stakeholders in decision-making processes to ensure alignment with strategic objectives and operational realities. Additionally, companies should embrace a culture of innovation and learning, leveraging data analytics and technology to drive financial performance and competitive advantage. In conclusion, effective financial management is essential for implementing lean manufacturing in the footwear industry. By prioritizing cost analysis, investment prioritization, and performance measurement, companies can optimize financial practices and achieve sustainable improvement in operational efficiency and profitability.

STANDARD OPERATING TIME FOR OXFORD 150PAIR OF SHOES UPPER																						
SL.NO	OPERATION	COMPONENTS																		man/mc power	total work per pair	total no. of pairs in hrs
		MID VAMP		QUARTERS(2)		TONGUE		TOE CAP		VAMP LINING		HEEL GRIP		QUARTER LINING		TONGUE LINING		COUNTER				
		stnd/pair	150 pairs	stnd/pair	150pairs	stnd/pair	150 pairs	stnd/pair	150 pairs	stnd/pair	150 pair	stnd/pair	150 pair	stnd/pair	150 pairs	stnd/pair	150 pairs	stnd/pair	150 pairs			
1	marking	20sec	50mins	40sec	100mins	10sec	25mins	10sec	25mins	20sec	50mins	30sec	75mins	40sec	50mins	10sec	25mins	20sec	50mins	0,1 table	3.15mins/pair	152 pairs
2	skiving	40sec	33mins	60sec	50mins	30sec	25mins	20sec	16mins	30sec	38mins	30sec	25mins	60sec	50mins	20sec	16mins	40sec	33mins	0,0,3 M/C'S	1.9mins/pair	252 pairs
3	setting adhesive on components	20sec	50mins	60sec	150mins	---	---	16sec	40mins	---	---	---	---	---	---	---	---	20sec	50mins	0,1 table	2mins/pair	250 pairs
4	attaching and hammering	MID VAMP TO TOE CAP									QUARTERS TO COUNTER									---	---	---
		standard/pair-30sec.		75mins /150pairs		standard/pair-60sec		150mins/150pairs		0,1 table		1.9mins/pair		252 pairs								
5	stitching (double row)	standard/pair-60sec.		75mins /150pairs		standard/pair-90sec		375mins/150pairs		0,2 M/C'S		2.5mins/pair		192 pairs								
6	adhesion for folding & FOLDING	QUARTER AND COUNTER PART									MID VAMP -TOECAP UPPER PART									---	---	---
		standard/pair-85sec		106mins/150pairs		standard/pair-60ec		75mins/150pairs		0,2 tables		2.4mins/pair		200 pairs								
7	counter back seam & attach R.tape	standard/pair-80sec									100mins/150pairs									0,1 M/C	80sec/pair	358 pairs
8	adhesion on quarter topline & midvamp	standard/pair-2min									300mins/150pairs									0,1 table	2min/pair	240 pairs
9	attaching whole upper and hammering	standard/pair-2min									150mins/150pairs									0,2 tables	2min/pair	240 pairs
10	stitching the upper	standard/pair-3.1min									155mins/150pairs									0,0,3M/C'S	3.1mins/pair	154 pairs
LINING																						
11	setting adhesive on lining components	---	---	---	---	30sec	75mins	---	---	---	---	30sec	75mins	60sec	150mins	30sec	75mins	---	---	0,1 table	2.5mins/pair	192 pairs
12	attach lining component & hammering	2 QUARTER COMPONENTS TO HEEL GRIP									tongue to tongue lining									---	---	---
		standard/pair-80sec.		125mins /150pairs		standard/pair-60sec.		150mins /150pairs		0,1 table		2.3mins/pair		206 pairs								
13	stich lining components	standard/pair-50sec.		125mins /150pairs		standard/pair-60sec.		75mins /150pairs		0,2 M/C'S		1.83mins/pair		262 pairs								
15	attach visible eyelets	standard/pair-3.2mins									480mins/150pairs									0,1 table	3.2mins/pair	150pairs
14	cementing on upper back portion edges	standard/pair-2min									300mins/150pairs									0,1 table	2mins/pair	240 pairs
16	attach upper and lining	standard/pair-1.5mins									45/mins/150pairs									0,2 tables	1.5mins/pair	319 pairs
17	stich topline	standard/pair-1.5mins									450mins/150pairs									0,2 M/C'S	1.5mins/pair	320 pairs
18	trim extra material	standard/pair-3.2mins									450mins/150pairs									0,1 table	3.2mins/pair	150 pairs
21	burning threads	standard/pair-1min									150mins/150pairs									0 0	1min/pair	480pairs
20	cleaning	standard/pair-40sec									100mins/150pairs									0,2 tables	40sec/pair	720pairs
19	quality checking	standard/pair-20sec									50mins/150pairs									0	20sec/pair	1440 pairs
22	packaging	standard/pair-1min									150mins/150pairs									0 0	1min/pair	480 pairs
OXFORD SHOE																						
UPPER MADE LEATHER COMPONENT																						
150 PAIR AS EXAMPLE																						

Fig.1: Work Allotment Process Implemented by Using Error – Proofing (POKA - YOKE)

Table 1: Root cause Analysis about

Sr. No	Problems Caused	Solutions
1.	Cutting Department	
	1. Loose leather	Continuous Improvement (Kobetsu Kaizen)
	2. Cutting opposite to the direction of tightness according to the specified direction	Continuous Improvement (Kobetsu Kaizen)
	3. Loose thread ends while cutting which makes a problem for raw edge components	Value Stream Mapping
2.	Closing Department	
	1. Needle holes	Value Stream Mapping
	2. Stitc missing	Value Stream Mapping
	3. Loose stitching /toe puff folding	[RVA] Real Value Adding
3.	Lasting Department	
	1. Improper sole bonding	[RVA] Real Value Adding
	2. Mismatching of upper size with last size	[RVA] Real Value Adding
	3. Marks of clamps on the toe area of the upper while the machine lasting	SEISO - SHINE
4.	Finishing Department	
	1. Adhesive stains on sole	[RVA] Real Value Adding
	2. Micro cracks on the upper	[RVA] Real Value Adding
	3. Improper in-socks attachments.	Value Stream Mapping
5.	Packaging Department	
	1. Not passing through the metal detector	Continuous Improvement (Kobetsu Kaizen)
	2. Size mismatching while packing	SEITON - SYSTEMATIZE
	3. Improper packaging which includes non-attachment of tags i.e., tags, wrappers, silicon gel sachets.	Continuous Improvement (Kobetsu Kaizen)

V. CONCLUSION

In conclusion, effective financial management is integral to the successful implementation of lean manufacturing in the footwear industry. By conducting thorough financial analysis, prioritizing investments, and measuring performance, organizations can enhance their ability to realize the full potential of lean principles. Future research should continue to explore emerging trends and innovative approaches in financial management strategies tailored to support lean transformation in the dynamic landscape of the footwear industry.

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