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By Dhaarani U & Thenmozhi R

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IMPLEMENTATION OF LEAD TIME REDUCTION IN MERCHANDISING DEPARTMENT USING LEAN TECHNIQUES

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Implementation of Lead Time Reduction in Merchandising Department using Lean Techniques

Dhaarani U^α & Thenmozhi R^ο

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I. INTRODUCTION

Lean is a culture in which many people use as a tool to solve the continuous problems occurs in the manufacturing industry, the main goal is to provide customers expectation and satisfy their need, and it also helps to reduce the wastage. It promotes the flow of value to the work flow by implementing continuous improvement in the overall work in progress, some of the most used lean techniques are 5s, kaizen, value stream and just in time methods. It also helps to maintain inventory, better motion and it eliminates wastage, defects, over-processing, and over production. Lead time is the amount of time required from the start of a process until date of completion. The organizers are reviewing their lead time in the form of manufacturing, supply chain management, and project management during pre-processing, processing and post-processing stages. Reducing lead time can streamline the operations, improve productivity, increasing output and revenue Production processes, and inventory management both are affecting lead time. Transportation delay may lead to delay in the routing process, slows down the production and reducing output and return on investment (ROI). During high demand product production, productivity may increases that may lead to reducing production time automatically. The quicker production process to increase sales, customer satisfaction, and organizers' reputation. To

maintain the production schedules and consumer demand, its necessary to manage the inventory. The production process will get stopped if the organization fails to have the required amount of stock. The inventory management has been done through vendor-managed inventory (VMI) program, which provides automated stock replenishment. These can be done by the off-site supplier, using just-in-time (JIT) inventory management for ordering and delivering components based on usage.

Some lead time delays cannot be predicted. A shipping delay may happen due to raw material shortages, natural disasters, human error, and other uncontrollable issues that will affect lead time. For a critical situations, the organization may employ a backup supplier to maintain production. Working with a supplier who keeps inventory on hand can prevent from delay. This research is to focus on increase lead time, productivity, and manage the inventory by applying lean techniques.

II. LITERATURE REVIEW

The quick changes in garment styles, the deviation of the requested amount, and the improvement of the quality level with the most minimal cutting rate require the garments producing industry to concentrate on more powerful and effective assembling procedures to get by in the profoundly serious market [1]. These days, the degree of rivalry is extremely high, and each industry is attempting to give great items at a sensible expense, so lean creation is the most recent device to accomplish this goal [2]. To increase the profitability of the clothing ventures we have to diminish the wastage of the assembling and time to make the product. Lean is the device to decrease the wastage in all procedures of clothing manufacturing, diminishing expense, and worth added to the item [1]. The idea of lean assembling has been presented in Japan, and the Toyota creation framework was the first to utilize lean practices. Lean assembling helps in improving creation forms and boosting up the worker's work fulfillment (Singh, Garg, Sharma and Grewal, 2010c) [3]. Promoting capacities is to design clothing items to draw in their objective customers, a value that they ready to purchase, styles they need, and the ideal time they need

*Author α: Department of Apparel & Fashion Design, PSG College of Technology, Peelamedu, Coimbatore-641004, India.
e-mail: dhaaru1516@gmail.com*

to purchase. Earlier anticipating is one of the most significant angles to achievement in the present clothing industry [7]

Prior, India would send out low-esteem things, like fiber, to create textures for garments. Anyway, net revenues are most noteworthy in the texture. India has developed as an overall major sourcing base of cotton attire and the vast majority of the main US retailers, for example, J.C.penney, Gap and Nordstrom ,etc[13]

Deals execution by item classification, traffic stream structure, benefit commitments by item classification, the ID of promoting issues, targets for the coming exchanging period, marketing strategies, timing of usage, material providers, preparing necessities, contender response, spending plan and methods for assessment are the important significant reports kept up by the merchandiser[14]

With the active support and cooperation of the purchasing department and product developers, the development of samples was observed based on the technical data of specific buyers. Researchers directly or indirectly participated in the study of the sample preparation and approval process of the knitted composite material factory [6]

The sewing industry is a major part of the textile industry, which requires many operations to be performed by using sewing machines to assemble fabric pieces and attaching various accessories (such as elastic bands, buttons, and labels) [21].

Each department must mainly focus on lead time management to meet their customer needs. Lead time can be measured throughout the manufacturing process, which indicates how quickly raw materials can be transformed into finished products [8]. The exporter is the most important link in the industry where the manufacturer produces the goods ordered by the buyer. The buyer determines the specifications, quality, price, and time[11].

Most studies only focus on a single aspect of lean elements, and only a few focus on more than one aspect of lean elements, but to successfully implement lean organizations, organizations must focus on all aspects, such as value stream mapping (VSM), cellular manufacturing (CM), U-line system, production line balance, inventory control, single minute mold change (SMED), pull system, kanban, production leveling, and timely [4]

5S visual management is one of the lean tools to improve the process, used to establish the workplace organization to a more standardized level. Reduce problems in the work process, improve product quality and productivity [1] Kanban is a subsystem of the lean manufacturing system, and its purpose is to control inventory levels, component production, and supply [4]. This is an important tool to increase output from the push-pull system. Improve flexibility to respond to customer needs, simplify the procurement process and

eliminate unnecessary paper work [1] From a production point of view, it is controlled by the logistics chain, which is an important way to realize JIT [21] Value stream-the collection of all the specific operations required to bring a specific product through the three key management tasks of any enterprise. Problem-solving, information management, and physical transformation, it is the process of mapping materials, and information flows to coordinate activities performed by manufacturers, suppliers, and distributors to deliver products to customers [4].

Just in time means to provide one part at a time, exactly when needed. It helps reduce batch size, buffer size,and order delivery time [3]. The JIT method is called continuous improvement or kaizen method, kai stands for change, and zen stands for better. Therefore, it means that continuous change is better to involve everyone in the company and gradually eliminate problems by collecting data [3] Indian apparel manufacturers try to eliminate waste and increase productivity at a lower cost. At the same time lean manufacturing tools help improve the process environment by eliminating waste with a reasonable investment. It helps manage garment manufacturing waste [1]

By using lean tools to control production, waiting, transportation, excessive inventory, unnecessary movement and excessive production of major defects, this is an efficient system that brings new achievements to the industry and customers, and it is also committed to the concept of zero waste and provide better quality and benefits to customers [2]. Lean surveys have been carried out to reduce some obstacles and make it possible to run counter to the implementation work, psychological problems, lack of responsibility, financial problems, lack of education, training, and demand turbulence are some of the drawbacks [3].

Utilizing the blended technique approach, the examination found that most organizations, as a major aspect of their methodologies, decided the point by point and genuine article of clothing cost by thinking about the benefit, texture, work, trim expense, and overheads. Cost in addition to technique, advertise investigation, markdown procedure, client-based evaluation, and market division were the most famous ways to deal with fixing articles of clothing costs [5]. The four distinct phases of an article of clothing costing are starter costing, cost evaluating, point by point cost, and real expense. New textures and conceivable change made to the examples likewise considered in the piece of clothing costing. Significant segments in the article of clothing cost are materials, trims, and work. Trims incorporate help materials, for example, interlining, strings, terminations, elastics, and names. Texture type and amount of the texture are regularly seen as a significant expense all together execution and wastage

level of the texture during the cutting procedure is the most troublesome procedure to evaluate [5].

Correspondence issues, for the most part, happen in apparel advertising and estimating, item advancement, speaking with purchasers and providers, finishing arranging including time and activity plan, sourcing of crude materials, haggling with all the required separate, example improvement and endorsement, valuing, booking, oversight, checking the request just as creation, obligations, and responsibility, request managing and controlling, revealing according to require, observing the whole process like CAD, cutting, sewing and washing and so forth, item conclusion, assessment and arranging, last shipment[6].

It identifies with all the divisions like from request to shipment; it guarantees that all the movement assists with enduring cash. Still, a large portion of the enterprises don't know an accurate number of tests required for the purchasers, so it results that consistently the greater part of the ventures shut down their business because of the absence of executing order[9] Industry finds it extremely difficult to identify and arrive at exact profit made from a particular order or style. To identify the actual manufacturing cost and compare it with the cost projected and identify the areas which exceeded the cost projected for each order and style [15].

Each division has a particular objective of diminishing the lead time with the planned impacts. Embracing innovation to take out more harms and decrease of wastage of pieces of clothing, it additionally assists with cutting down the remaining task at hand and serves to diminish the assembling cost. The business needs to guarantee that there is a legitimate progression of expected data to accomplish the shared objective of decreasing the assembling lead time [8].

Costing of clothing is evaluated at the hour of test advancement, including barely any attributes, for example, crude material cost, producing cost and over heads, regulatory overheads, and cost of transportation and benefit margin[10]. Fabric issue, shading conceal coordinating of texture, coloring, and imprinting in examining, conceal coordinating of frill and sewing string, crease puckering, sewing quality, shrinkage of pieces of clothing, completing of tests and untalented professional are the most widely recognized issues looked in the request execution[16] The finished sample garments undergo a thorough evaluation ,whether they want to present the overall picture of the styles in a particular collection. Then the sample garments are accepted or rejected [17].

For creation and all different procedures are isolated into two classifications: esteem included and nonesteem included. For the most part, it tends to be commonly characterized by other hardware, parts, materials, space, and work time, which are fundamental in increasing the value of the item or administration [21].

The total venture made on assembling an article of clothing is called fabricating cost; cost of a piece of clothing is anticipated at the hour of test advancement with numbers showed up at dependent on broad assembling boundaries, for example, crude materials, over heads, and overall revenue [10].

Generally speaking, assembling cost of the processing plant is estimated with Standard Average Minute (SAM) esteem; distinguish the utilization and different overheads. . An old-style model could be created to distinguish the specific expense brought about in the assembling process, for instance: a specific style by evaluating the specific expense of crude material expense of creation per unit, overheads, genuine dismissal, edge, and cost ready. Growing such Add on arrangement could take as long as 60 days, i.e. is again controlled by the degree, multifaceted nature and different components [10].

Industry discovers it amazingly hard to recognize the specific benefit produced using a specific request, to distinguish the genuine assembling cost and identify the concerned zone which surpasses the cost anticipated for each request and styles [12]Lead time in clothing assumes an indispensable job, so every office needs to concentrate on lead time decrease to fulfill their client need, and it very well may be estimated on the absolute assembling process it demonstrated about the completed item quality and the vibe of the item ,and it is the one of the most significant factors which will help the association [8].

Style industry requires gifted chiefs with a sharp feeling of the commercial center and finely sharpened administration aptitudes that empower them to settle on the basic choices expected to stay with a's product offering seriously attractive and profitable. A merchandiser is a mindful individual to make the item as per the purchaser's boundaries and fulfillment. Merchandisers need to care for each activity directly from purchasing the crude material, segments, and adornments, making the attire, completing the clothing, documentation, and correspondence to and from all colleagues to at last delivery and significantly more. The merchandisers assume the job of a 'support' inside clothing to send out associations, arrange and balance the business needs of the provider toward one side and purchaser on the other. Their exhibition influences the business aftereffects of clothing send out organizations [16].

Item advancement and its job in worldwide sourcing appear to be significant for merchandisers. The obligation could be as little as obtaining materials for item improvement, reaching out to the dynamic work relationship with item engineers. Merchandisers must comprehend the Item improvement procedure and worldwide sourcing and a period and activity schedule, to impart the hugeness of ideal subsequent meet-ups in crude sourcing materials [11].

Quality affirmation information in clothing assembles and conveyance proposing that quality confirmation encourages them to deal with the conveyance plans for a superior way. "Information on a unique item costing" and retail recommending that retail valuing figuring is to be overseen by merchandisers. Association and relational abilities have a better mentality, and it ought to contribute to improving the work culture of the association [14].

The reason for the examination is to distinguish the job and significance of marketing and the fulfillment level of overall revenue, scarcely any inquiries were engaged are does the client gets a similar item what he prefers, does it offers fulfillment to the buyer. It does the best possible promoting will build the productivity of retailers [20].

The components of configuration were related with useful, embellishing and tasteful highlights that are identified with the presentation, hues and format of the items [18] Due to the specialized impediment of photograph imprinting in a test where clients were requesting real view and shade coordinating of photograph print however in genuine case it was unrealistic due to some specialized constraint by the industrial facility since it requires some investment of

test making and endorsement [16]. The merchandiser's wages are paid by the maker and relies upon retailers, his goal must be animate stock go into assembling and advertising economies are accomplished by the workers in the processing plant and this manner creating more beneficial exchanging [14].

To find out the strategic advantages of lean techniques in the apparel industry and helps to compare production data in terms of SMV target, line efficiency, bottlenecks, capacity utilization in both traditional and lean production line and to compare the productivity factors like transportation, inventory analysis, space utilization, defect analysis in both traditional and lean line production [19]. Technological problems were found in garment sample department are control of thread tension, the problem of thread puckers, irregular movement of fabric during take-up, sewing dynamics with change in fabric and thread mechanical properties, problem of needle heating and damage and needle penetration force [16].

Implementing lean techniques in the sampling department helps to optimize the better result for the sample development, and it also helps to compare the previous and future data of the sampling process.

III. METHODOLOGY

Study the overall work flow process of the merchandising process



Analyze the time delay process for order execution



Implementing the time and action plan in the order processing



To examine the standardized work flow



To achieve better optimum result

Methodology 1:

a) *Study the overall work flow process of merchandising process*

Merchandising is the department that intermediates between the buyer and the production

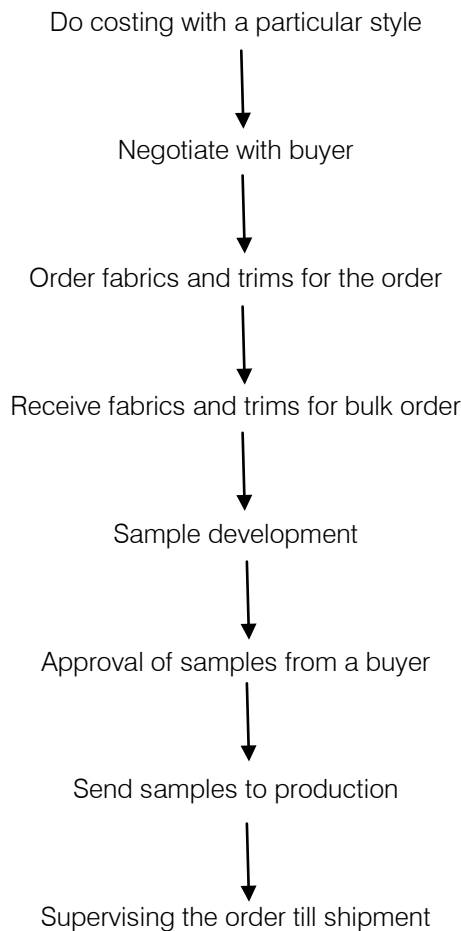
team. A garment merchandiser has to interact with various departments to complete work on time. It involves understanding customer needs, planning and scheduling the work in progress, deciding on the pricing, and communicating with the people.

Make contact with a buyer



Get order





Methodology 2:

b) Analyze the time delay process for order execution

Time delay for the various process has been done. It was analyzed at various stages like pattern making process for complicated design, raw material delay, delay in the washing process, and lack of stock. It was observed from the study CAD department has played a major role in calculating fabric requirements for a particular order. If there is a delay in that process results in a delay in fabric manufacturing process. This type of delay may be delay in the washing process. Other than above process delay, the various list of process delay has been discussed here such as lack of fabric and trims, technical issues as improper and lack of machinery, insufficient man power, lack of communication between various departments, sample approval delay and delay in lead time. To overcome all the above lean tools such as 5S and kaizen were implemented.

Methodology 3:

c) Implementing the time and action plan in the order processing

The time and action plan is an important tool for a merchandiser to analyze the day-to-day activities involved in the process of completing an order. TNA is the most important activity for timely shipment. This process involved various departments and the process

of manufacturing. T&A plan helps the merchandising department to analyze every individual operation in terms of start and end of production activities. Time and action calendar define the ideal date and period within which the major activities of an order should occur against a scheduled delivery (i.e., defines the planned date and actual date) from that the delay period can be identified. The merchandising department is highly responsible for developing a list of activities that need to be performed for order in an excel sheet, in that need to mention the expected date of completion. After completion of the TNA calendar, the activities such as the execution of process and its problem were analyzed.

i. Time and Action Plan: Order 2131U

T & A plan for an order 2131U (Formal shirt) style had been analyzed and listed the over all activities with the proper schedule.

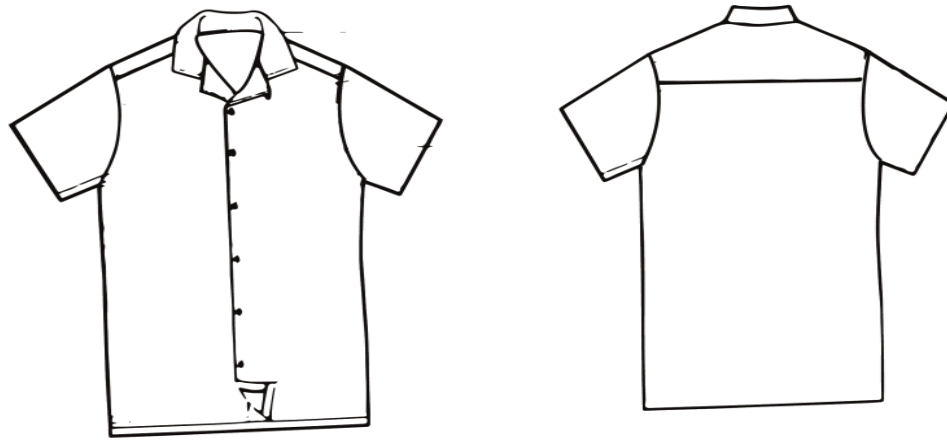


Fig. 1: Formal shirt

Table 1: Time and action plan

Buyer: M&S -T53		Style no: 2131 U		order quantity: 2000	
Fabric details: 100% cotton woven shirt		Product details: Women's LS denim shirt		Delivery date: April 21 2020	
Activity					
order details	Delay date		Days required	planned date	Actual date
order received date	0	1			
proto sample submission	0	2			
proto sample approval	0	2			
order confirmation	0	2	1	04.02.2020	04.02.2020
L/C received date	0	2	3	06.02.2020	06.02.2020
Lab dip status					
Lab dip sub date	0	5	5	08.02.2020	08.02.2020
Lab dip approval date	1	6	10	13.02.2020	14.02.2020
Fabric and trims for sample					
Requested fabric and trims for sample	0	6	16	19.02.2020	19.02.2020
Requested fabric and trims inhouse for sample	-1	3	22	25.02.2020	24.02.2020
sample making					
Fit sample approval	3	6	25	28.02.2020	02.03.2020
CS sample approval	6	7	31	05.03.2020	11.03.2020
Requested fabric and trims for bulk	0	3	4	07.02.2020	07.02.2020
Bulk fabric inhouse	5	38 days(1)	38	12.03.2020	17.03.2020
Bulk trim inhouse	3	34 days(5)	34	08.03.2020	11.03.2020
Test report approval	5	2	39	13.03.2020	18.03.2020
wash(heavy wash) and shade band approval	5	2	39	13.03.2020	18.03.2020
production					
planned cut date	-1	1	41	15.03.2020	14.03.2020
PP meeting	0	1	41	15.03.2020	15.03.2020
cutting	2	30 days(1)	42	16.03.2020	18.03.2020
Bulk production starts	2	30 days(3)	43	17.03.2020	19.03.2020

Finishing date	2	17	68	11.04.2020
In-line audit date	1	1	69	12.04.2020
Quality checking	1	1	69	12.04.2020
packaging	1	1	70	13.04.2020
Final quality inspection	0	30 days	71	14.04.2020
Ex factory	2	30 days	71	14.04.2020
shipment date		7 days	78	21.04.2020

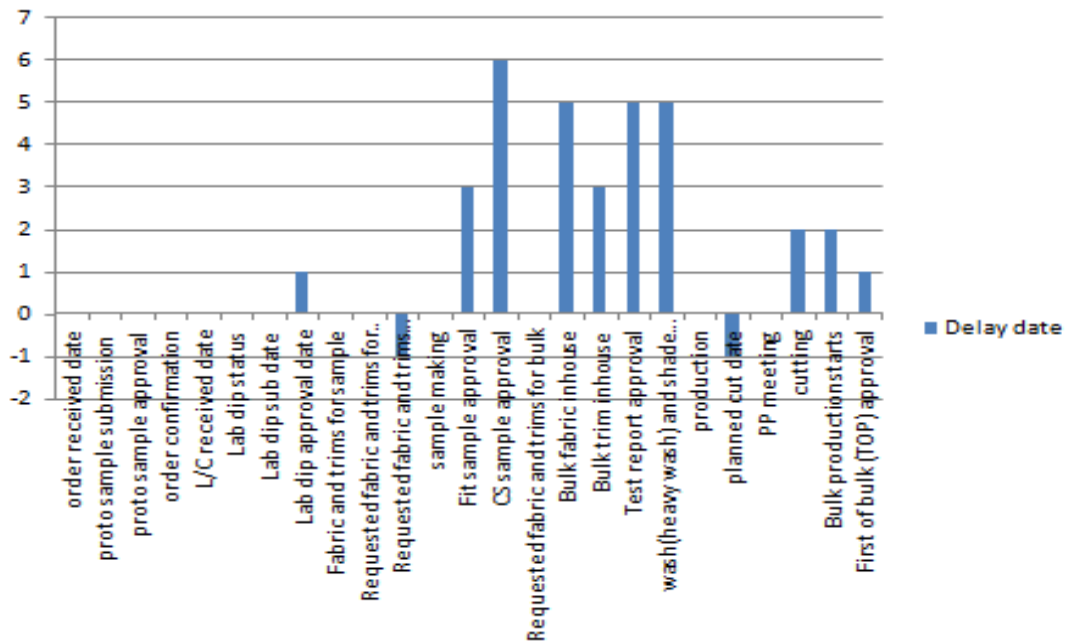


Fig. 2: Delay date

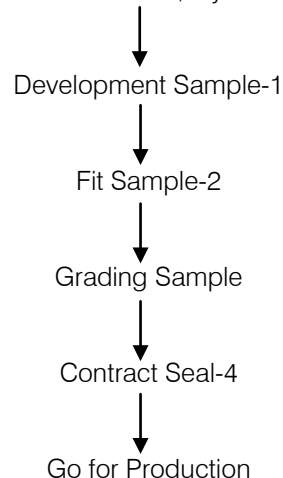
From the above flow chart, the time required for order execution has been identified. Analysis results showed that the sample making process takes more time than the planned actual time and for execution of

few operations takes only less duration. This helps to identify the delay process, and fast making process by doing this study will also helpful for future order execution.

Methodology 4:

d) To examine the standardized work flow

Tech pack (contains all details like BOM, style reference and indent details)



Three contract seal samples (One sample for merchandiser reference and two samples for buyer

approval), but usually one more extra sample had to be done for a factory use (to avoid production delay).

Methodology 5:

e) *To achieve the better optimum result- comparing actual and planned capacity*

i. *Actual capacity*

Two lines and 34 operators were allocated for development sample, fit sample and pre-production

ii. *Planned capacity*

$$\begin{aligned}\text{Operator capacity (garments/day)} &= 2 \\ \text{Total operators} &= 34 \\ \text{Total garments produced/day} &= \text{Operator capacity} \times \text{Total operators} \\ &= 2 \times 34 = 68 \text{ garments/day}\end{aligned}$$

The actual capacity plan with a lean implemented capacity plan was analyzed and compared. It was observed from the results; the lean implemented capacity plan showed better results of productivity.

IV. RESULTS AND DISCUSSION

By analyzing the overall process of the merchandising department, helps to know about the delay process like sample approval, wash delay, etc. To reduce time delay process, arrow chart and communication clarification to the buyer and Daily correspondence with the buyer has been done; this helps to built a proper communication with the buyer, response to the buyer complaints, understanding the requirements of the buyer and satisfy their needs by submitting the required samples and documents, follow up the comments from the buyer. By scheduling the TNA plan, the delay process for overall order execution has been identified and was implemented for the next order. To examine the standardized work in progress, the proper filing and better communication have been done. By accommodating samples to each, labor gives high capacity and also helps to submit the samples to the buyer on time without any delay; this also was executed the order without any time delay.

V. CONCLUSION

Studied the over all work flow process for order execution, analyzed the time delay process, implemented the time and action plan to avoid the delay period, balancing the standardized work process and increased the capacity by comparing with the existing plan results have been achieved by implementing the lean techniques.

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