

Report On

Production Lead Time Improvement by Implementing
Operation Management Strategies in a Zipper and Button
Manufacturing Company

Submitted by

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An internship report submitted to the BRAC Business School in partial
fulfillment of the requirements for the degree of
Masters of Business Administration (MBA)

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BRAC University

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Declaration

It is hereby declared that

1. The submitted internship report is my own original work while completing the MBA degree at BRAC University.
2. The report does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The report does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institutions.
4. I have acknowledged all the main sources of help taken.

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Letter of Transmittal

Dr. Md. Abdul Hoque
Professor,
BRAC Business School
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66 Mohakhali, Dhaka-1212

Subject: Submission of the internship report on YKK Bangladesh Pte. Ltd.

Dear Sir,

With great pleasure I am submitting my internship report for your kind approval. I have completed my internship in YKK (Yoshida Kogyo Kabushikigaisha) Bangladesh Pte. Ltd. During the whole internship program, sincerely I have learnt about the management principle, policy and culture of this company as well as how knowledge and skills of operation management are implemented in manufacturing processes. This report contains my understanding, observation and result of working with the planning and operation team on button production. From this program I have learnt a lot relating to the academic knowledge of the real field work experiences.

I have tried my best to cover all the important aspects of my internship in this report and I hope this will fulfill all the requirements of the MBA internship report of BRAC Business School of BRAC University.

Sincerely yours,

Ashraful Alam Rafi
Student ID: 20364039
BRAC Business School
BRAC University
Date: 13 June, 2023

Acknowledgement

I would like to express my gratitude to my academic supervisor, Dr. Md. Abdul Hoque, for the kind guidance and suggestions he provided in preparing this report. I would also like to thank my co-supervisor Dr. Saad Md. Maroof Hossain. I would also like to thank my organization supervisor, M.M Rezaul Karim, for giving me the chance to work and helping me in carrying out my internship work in this organization.

Executive Summary

YKK Bangladesh Pte. Ltd. is a part of the giant multinational fastener manufacturing company YKK Corporation, originated in Japan, which was founded by Tadao Yoshida in 1934. This company mainly manufactures zippers, snap & button and other fastener items for Ready Made Garments (RMG). This company has very enriched management principle, policies and culture. The production capacity of this company is around 45,00,000 pieces of zipper and 13,00,000 pieces of Button per day. There are several departments like HR, Compliance, Safety, Product Development, Production, IT, Accounts, Export-Import, Sales, Marketing, Planning and Operation, Maintenance and so on. The Planning and Operation team works dynamically to optimize the production processes, allocating the resources effectively, making production flow efficient, ensuring raw materials and improving the overall productivity. In this report, a brief overview of YKK Bangladesh Pte. Ltd. is given and the operation management activities are analyzed. Lead time is the time that is required to produce a final product from the raw materials through various manufacturing processes. It is a critical issue for operation management. In this study lead time perfection by implementing the operation management knowledge and skills in maintaining production and delivery, lead time was the main focus.

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CHAPTER 01

OVERVIEW OF INTERNSHIP

1.1 Student Information

- Name: Ashraful Alam Rafi
- Student ID: 20364039
- Program: Masters of Business Administration (MBA)
- Major: Operation Management

1.2 Internship Information

1. **Company name:** YKK Bangladesh Pte. Ltd. (YKK stands for Yoshida Kogyo Kabushikigaisha)
2. **Department:** Planning and Operation
3. **Address:** Plot# 6-16 & 89-91 extension area, Dhaka export processing zone, Ashulia, Dhaka 1349, Bangladesh.
4. **Internship company supervisor name:** M.M Rezaul Karim
5. **Internship company supervisor designation:** Manager
6. **Job Description:**
 - Preparing and maintaining production schedule in systematic way.
 - Monitoring the lead time of order delivery.
 - Planning to utilizing the production capacity in maximum level.
 - Planning for improving productivity.
 - Ensure smooth flow of materials for efficient production.
 - Ensuring availability of required machines for production.
 - Regularly preparing performance report and meeting with the management for further improvement by consultation.
 - Meeting with production and sales team to optimize the production.

Chapter 2

ORGANIZATION OVERVIEW

2.1 Brief history of YKK Bangladesh Pte. Ltd.

YKK Bangladesh Pte. Ltd. is a part of Japanese multinational organization YKK Corporation. Basically, YKK group is a manufacturing company of fastening products. As a fastening products manufacturer, this company manufactures zippers, snap & button, hook & loop and some other items for garments. Apart from fastening products, YKK Corporation also manufactures architectural products and plastic hardware. This company also develops a method for attaching machines for its products.

The founder, Tadao Yoshida, established his own philosophy called ‘Cycle of goodness’ and some core values with management principles. Throughout this enormous organization, his principles and philosophy are strongly followed. The founder believed that nobody can prosper without rendering benefits to others which is ‘cycle of goodness’. He always thought to satisfy his employees, enriching the society, improving the environment and satisfying the customers. This company still works on these principles. In over 72 countries around the world, YKK Corporation has its branch companies. It has more than 106 production facilities to produce its wide range of products. More than 44,000 people work in this organization around the world.

In Asia region, this Corporation has factory in India, Pakistan, Nepal, Vietnam, Thailand, Malaysia, Indonesia and some other regions besides Bangladesh.

Overview of YKK Bangladesh Pte. Ltd. at a glance:

Products: Fastening products as Zipper, Snap & Button

Customers: RMG manufacturing companies.

Establishment year: 2000

Start of Commercial production: 2002

Head Office: Gulshan-2, Dhaka, Bangladesh

Factory: Dhaka Export Processing Zone (DEPZ), Savar, Bangladesh

Factory area: 50,443 square meters.

Regional office: Chittagong, Narayanganj and Gazipur.

Number of employees: nearly 2000.

2.2 Vision

YKK sustainability vision 2050 includes action plans as given below:

- a. Tackle climate change by reducing emission of Green House Gas, GHG (CO₂) and by implementing more usage of renewable energy
- b. Increase the use of sustainable materials. YKK will reduce waste and petroleum derived materials for the production of fastening products.
- c. Boosting water resources by reducing water waste and reusing waste water by treatment.
- d. Manage and reduce use of chemical as well as developing environment friendly production process.
- e. Upholding human rights and ensuring more safe and fair work environment for the employee.
- f. Increasing Corporate Social Responsibility (CSR) activities to promote a healthy society and environment for everyone.

2.3 Management Principle of the organization

YKK seeks corporate value of higher significance. This company think about customer, employee and society. The motto of this organization is to achieve high level of customer satisfaction. They always try their best to fulfill the customer's requirements. Employee satisfaction is very important to this organization. They have developed safe working environment with all types of safety measures, a great compliance system, and fair culture for every employee with various benefits. This organization also work for the benefits of the society. They work to reduce environmental pollution and are trying to develop more ecofriendly process for the production.



Figure 01: management principle, source: Annual report, This is YKK- 2022

2.4 Certifications

- YKK has acquired certifications such as, ISO 9001 for quality management and assurance, ISO 14001 for environmental management system, and ISO 45001 for work safety and health.
- YKK has acquired OEKO-TEX® STANDARD 100. The OEKO-TEX® STANDARD 100 is a global testing and certification system for textile raw materials, intermediate products, and finished goods at all stages of manufacturing. The certification shows conformity with laws that regulate or prohibit the use of specific substances and chemicals.
- YKK is a bluesign® system partner with bluesign® approved products that meet the world's most valuable standards. The bluesign® system is a solution for sustainable textile, accessory, and trim manufacture. It eliminates hazardous pollutants from the start of the manufacturing process and establishes and enforces criteria for environmentally friendly and safe production.
- The Higg Index is a collection of standardized instruments created by the Sustainable garment Coalition (SAC) to measure the environmental and socioeconomic impact of whole value chains in the garment and footwear industries. YKK Bangladesh has achieved 77% Higg index in 2021-22 FY. It consists of seven assessment items: Environmental Management Systems, Energy Use and Greenhouse Gas Emissions, Water Use, Wastewater, Emissions to Air, Waste Management, and Chemical Management.

2.5 Product mix

YKK manufactures garments accessories for the RMG industries. World renowned buyers like H&M, M&S, Walmart, C&A, Kiabi buys fastening products from YKK. In terms of fastening products, YKK Bangladesh manufactures metal zipper and metal snap & buttons for shirts, jackets, pant and for both top and bottom garments.

In zipper section there are mainly 3 category such as

1. Metal Fastener
2. Vislon Fastener
3. Plastic Fastener

Among these categories there are thousands of different items with different shape, size, colour, appearance, logo and design.



Figure 02: zipper, source: Annual report, This is YKK- 2022

YKK takes order from the buyer and develop the final product according to customer requirements.

In snap and button category there are mainly 4 segment such as-

1. Jeans button
2. Snap button
3. Snapet
4. Burr



Figure 03: snap and button, source: www.ykkfastening.com



Figure 04: button, source: www.ykkasia.com

Under these categories there are thousands to items which are manufactured according customer requirement.

2.6 Human resource management strategies

YKK firmly beliefs to become competitive in the competition, participation from each and every one is very important. That's why this organization focus more on developing its man power. YKK runs many development trainings to boost up the knowledge and skills of the employee. This organization tries to build multi-skill employee so that the overall organizational performance might be increased. YKK beliefs the principle of its founder, Tadao Yoshida, which is 'Seek the strength of a forest rather than a strength of a big tree'. This organization maintain 'Çycle of Goodness'. Human rights, wages and other benefits, work place safety and various compliance issues are strictly maintained and monitored to ensure the best working environment. Besides the monthly wages and salary, the employees also get medical allowance, transport allowance, overtime allowance, provident fund, free meal, loan and other benefits from the company.

2.7 Marketing strategies

RMG companies are the customer of YKK Bangladesh. Buyers order garments from the RMG manufacturing companies. YKK runs its marketing activities differently to both the buyer and the customers.

YKK Bangladesh does not follow traditional marketing strategies. This organization takes part in many social activities which boost their image and branding such as children development program, sports, tree plantation. Also, YKK advertise their effort in creating eco-friendly products which has the least harmful impact in the environment. This organization also advertises numerous certification which they have achieved in terms of being their products' superior quality and less harmful for human skins and body. These marketing strategies create different brand image into the customer's mind.

YKK Bangladesh mainly runs its marketing activities through digital channels. They have web based Digital Showroom where customers can visit and come to know about the product details, specification and latest developments of this company. This is very convenient and easy to access by anyone from anywhere in the world.

YKK Bangladesh also takes part in many international exhibitions like Denim Expo and so on, where they show their products to customers.

So over all, YKK runs its marketing activities that create an image that the organization thinks not only for their business but also for the betterment of the society and the environment.

2.8 Supply Chain Management strategies

YKK has an integrated supply chain management system. There are several segments in a supply chain such as supplier, vendor, manufacturer, distributor, retailer and customer.

YKK has implemented vertical integration in the supply chain system. It produces its own raw materials and use it to manufacture the final products. Even this company develops the machines for their own production facilities.

YKK Bangladesh collects raw materials from other sister concerns of YKK Corporation. By this strategy it is not dependent on foreign suppliers. The company also tries to control the lead time and the cost of the supply chain management.

The company uses rapid delivery system and FIFO method that's why they can meet lead time properly. Ultimately, the performance of the supply chain is high.

For manufacturing the goods, a certain quantity of stock of raw materials is always maintained to support production. Finish goods are also stocked at a certain level to support the flow of product delivery on time.

Inventory is maintained very efficiently to reduce holding cost and wastage.

YKK Bangladesh Pte. Ltd. has set up its distribution hubs close to the customers, so that transportation cost may reduce and delivery lead time can be minimized. Most of RMG factories are at Savar, Narayanganj, Gazipur, Chittagong. YKK Bangladesh has its regional distribution offices at these locations to serve the customers faster.

2.9 Quality management strategies

YKK firmly believes quality in everything. To maintain product quality, the company has developed an integrated quality control system throughout the manufacturing process. The quality control team continuously monitors and evaluates the parameters of the products and checks whether it is under control limit or not. They use various quality management tools such as

1. Total productive maintenance (TPM)
2. 5S
3. KAIZEN

Products pass through technologically advanced systems to maintain the quality properties. As they use raw materials which are produced by the sister concerns, quality is also highly maintained for the components. There is also an inspection department which tests the quality of the product in terms of strength, durability and some other criteria.

2.10 Productivity management strategies

YKK has a well-developed and technologically sound production system that helps to reduce wastage and use the available resources properly. There is waste management and reuse system which reduces the cost of loss. The production and the machine capacity is monitored time to time so that the rate of utilization becomes high. To boost productivity several management tools are used such as-

1. OEE overall equipment efficiency
2. 5S

2.11 Operation management strategies

YKK Bangladesh has defined systemic procedure for managing the operations. All the activities from receiving customers' orders up to delivering the finished products to them, all the activities are monitored and evaluated to maintain maximum performance. Firstly, sales teams receive orders from the customers. Then they are inputted in the data system. Secondly, the planning and operation team schedules the production according to FIFO and ensures readiness of all the machines for the production. Planning and Operation team also work for maximum utilization of the available capacity to produce the required goods in the specified lead time. Thirdly, production team produces the goods within the specified lead time after getting required materials from warehouse. Finish goods are then sent to dispatch team. Fourthly, the dispatch team packs the goods and make necessary steps to deliver the final products to the customers. Thus, there are many activities in the aforementioned processes. The whole operation system is maintained by an integrated computer aided method.

2.12 Information Management System

Information are very strictly maintained in YKK Bangladesh for both the internal and the external aspects. Whole information management system is maintained by an advanced software package. There are several criteria for information management system and disclosure of the confidential information of this organization is out of law and subjected to penalty.

2.13 Work safety and Compliance

YKK Bangladesh has developed a very well safety system throughout the whole organization. Safety measures on fire, electric hazard, chemical hazard, work hazard are systematically monitored and evaluated to maintain standard benchmark. Compliance team also work very efficiently to maintain work-friendly environment and workplace security.

The Alliance of Bangladesh Worker Safety has certified YKK Bangladesh Pte. Ltd. as the country's only zipper manufacturer with workplace safety standards. The Alliance of Bangladesh Worker Safety (Alliance) has used independent Qualified Assessment Firms (QAF) to undertake industrial safety evaluations to guarantee that the available facilities fulfill the Alliance Fire Safety and Structural Integrity Standard.

2.14 Sustainability strategies

YKK Bangladesh is taking many initiatives to make the environment sustainable. Each year the company spends a lot of money in developing new ways and techniques to make the environment better.

This company has been developing products that are made of natural elements in order to reduce harmful impact to the environment.

Emission of GHG (Green House Gas) is very dangerous for the world and YKK is developing new techniques to filter the exhaust gas before leaving them into the air better than before.

YKK Bangladesh has water treatment system that filters the waste water and make it reusable.

This company is also trying to reduce the usage of chemicals and making eco-friendly color that has the least impact on the environment.

YKK Bangladesh has acquired ISO 14001 Certification in 2001 for maintaining the codes of environmental safety.

2.15 Industry and Competitive Analysis

Porter's 5 forces are also a great tool to measure the competitiveness of an industry in the market.

Analysis of the RMG Fastening Product industry in Bangladesh regarding Porter's five forces are as below.

Porter's Five Forces

1. **Rivalry among competitor:** Rivalry in this industry is getting high as companies are trying to overtake others by their competitive advantages
2. **Power of Supplier:** Bargaining power of suppliers in this industry is not high as there are many suppliers to sell raw material in competitive prices.
3. **Threat of new entrants in the market:** Threats of new company in the business is low as entry barrier in this industry is high and existing companies are holding the whole market.
4. **Power of Customer:** Bargaining power of customers is not high as there are few companies in the market.

5. ***Threat of substitute product in the market:*** No threat of substituting by other product in the market

SWOT analysis of YKK Bangladesh Pte. Ltd reflects the strength, weakness, opportunity and threats of this organization in the RMG Fastening Product industry as below.

SWOT Analysis

Strength

1. Largest production facility in fastening product industry in the country as well as among the top list in Asia
2. Wide variety of products
3. Strong organizational culture
4. Superior quality
5. Multi-skilled employees.
6. Strong and integrated operations management system
7. Large number of quality certifications.
8. Customer and employee satisfaction

Weakness

1. Product price is relatively high than other competitors.
2. Lead time gets high in some particular cases.
3. Higher operating cost.

Opportunity

1. Can increase production capacity as RMG sector has been raising in Bangladesh
2. Can introduce new items.
3. Introduction of environment friendly products at less price than the competitors.

Threat

1. Entrance of new companies in the market.
2. Unstable economic condition.
3. High bargaining power of buyers as number of companies increases

Chapter 03

PROJECT

3.1 Introduction to the study

I have worked in YKK Bangladesh Pte. Ltd. as an Officer in Planning and Operation department. Planning and Operation department deals with activities which are directly linked to the production and operation. This department plans for the overall production capacity, creates data for production analysis and optimizes the operations to maximize productivity.

Operations management team monitors the activities of the operations such as production performance, inventory control, flow of information, material control, product development, resource allocation, cost minimization, resource utilization, process optimization and so on.

As a Planning and Operation officer in Snap and Button section, I performed below duties

- a) I made schedule for the production. First, I scheduled the orders according to its allocation date. The most recent allocated orders are placed on production serial first that means the latest one is selected first.
- b) Once I am done with scheduling, I made sure the raw materials are ready to go to production floor by communicating with inventory management team.
- c) I followed up the running production to check whether the orders are within the lead time or not. Lead time is a very important issue to maintain production performance. So, I followed up the orders and in case any order completion has possibility of crossing the lead time, I tried to improve it with by whether allocating more resources (machines, man power) or correcting the schedule or making an improvement plan with production team.
- d) I made plan to maximize the production capacity. There were a large number of machines and production capacity was fully based on the allocation of production orders in those machines. The more the machine capacity be used, the more the production. I sort out the items that would go for production and allocated the identical items at the same time to the machines according to the plan. Thus, machine capacity could be raised at a higher level.
- e) I prepared daily production performance report and evaluated the key factors which were mostly effective to the performance.

- f) I attended the improvement meeting with planning and operation team, production team, material control team, sales team and product development team to discuss the difficulties and scope in the operations and how these problems can be overcome.
- g) I also maintained communication with the sales team and fulfill their urgent request in quest of supporting the customer more promptly.

During my job, I found that, maintaining lead time was very vital issue for achieving higher performance. Lead time is the time interval between the start and finish of a process. It is often used to measure how long it takes for a customer to receive a product or service after placing an order. In production process, the time required to manufacture a final product from its raw materials, is called production lead time. Lead time is one of the most important KPI (key performance indicator) as commitment to the customers for product delivery is directly related to it. There are two types of production category such as big quantity or bulk production and small quantity or sample production. Lead time is different for these two categories.

Before placing any bulk order for zipper or snap or button, the customers demand for sample to have a look how the final product would look like. Sample needs to be delivered in short amount of time to catch the customer. So, lead time for sample production is short. When customer choose the sample and confirm orders then production goes in bulk quantity. Lead time for bulk production is higher than the sample production.

The planning and operation department has analyzed lead time issue as one of the concerning aspects to achieve customer satisfaction and overall performance and so, it was decided to improve the existing lead time for both sample and bulk production in snap and button section. As an officer of this department, I have worked to improve the lead time by implementing operation management knowledge and skills.

In this report, it will be shown that how I identified the scope of improvement in lead time of both bulk and sample production as well as the strategies developed and implemented to get actual benefit.

3.1.1 Objective of this study

The objective of this study is

1. To analyze the lead time of existing snap and button production process.
2. To identify the bottleneck of the existing process.
3. To identify new process that leads to better lead time.

3.1.2 Significance of the study

1. Reduction in lead time can help to produce finish goods faster. The less the time gap between the production processes, the faster the production completion.
2. Improved lead time can help to achieve customer satisfaction. If the goods are ready in least amount of time, then customers will get the product soon.
3. The more the customer satisfaction the more the overall benefits of the company. When the customers are satisfied, they will place more orders in future.
4. Improved lead time can help to utilize capacity and resource more efficiently than before. If there is no time loss, then more production can be possible in the available duration.

3.2 Methodology

1. Primary source of data
 - In-person conversation with the officials
 - In-person training and working in production facility
2. Secondary source of data
 - Organization's website
 - Annual report
 - Advertisement and related articles
3. Flow of working procedure-
 - Collecting data from the production of various items from the existing process.
 - Counting the total accumulating time from the order input to order delivery.
 - Breaking down the total production process into various steps.
 - Calculating time for each steps of the steps of the production.

- Finding out which step is creating bottleneck
- Analyzing the process thoroughly to find out scope of more utilization of machine capacity or scope to implement a new process.
- Identifying more than one alternative solution to decide the least lead time.
- Among the alternatives selecting the best one
- Implementing the solution in production.
- Monitoring and evaluating the result of the new process.

3.3 Findings and Analysis

Button production is consisted of 4 processes such as Press, Plating, Assembly and Packing.

1. Press: it is a process of making Cap (upper part of a button) by stamping various designs. Press machines press and cut cap from metal elements made of brass, copper, stainless steel and many others. Raw material comes to press process and pressing machines produces raw cap. There is a certain lead time for press process. After press raw caps go to work in process inventory.
2. Plating: it is a process of changing the appearance of the caps such as making caps of various kind of different colors. There are several plating procedures that are used differently for different colors. Raw caps come from WIP inventory to plating process and plated caps are produced and again it goes to WIP inventory.
3. Assemble: in this process plated caps are attached to the bottom part of buttons by attaching machines. Finish products which is a complete button is produced in this process and sent to packing process through WIP inventory.
4. Packing: in this process buttons are packed according to the orders and delivered to delivery team. Delivery team delivers the final goods to the customers.

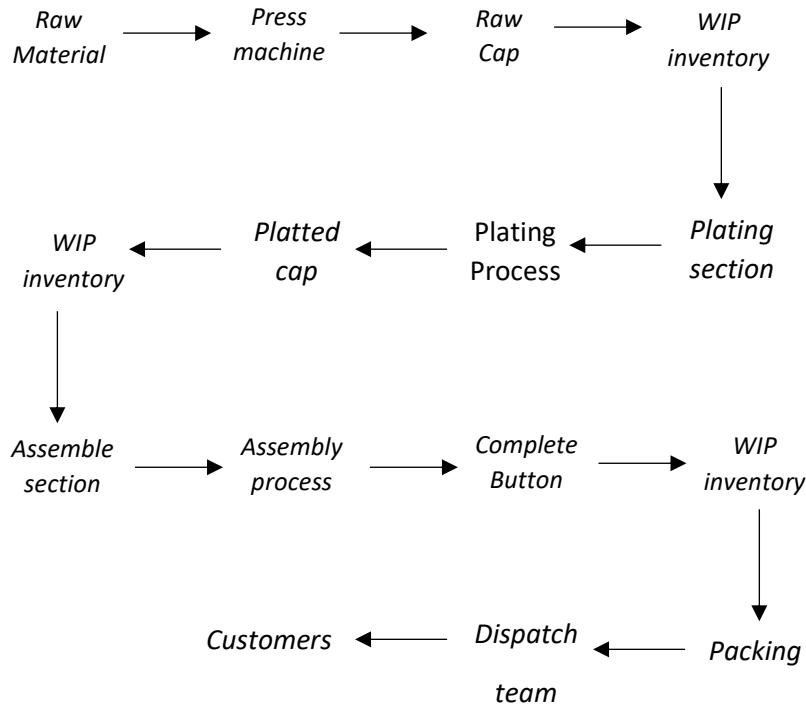


Figure 05: button production flow chart

Lead time improvement for bulk quantity production:

Now in snap and button production, it takes around 12 days to produce a finished product from the raw material. This process includes press, plating, assembly and packing. By calculating standard time for each process, the overall lead time is evaluated. There are a lot of items in production schedule. One by one different items are produced by different machines in each process like press, plating, assembly and packing. But there is somewhat similarity in the category of items. So similar data was taken for the identical items. By this, some cluster of data was made. At a time, thousands quantity of various items came in production. It was a complex process to accumulate all the data separately for each item. So, an average time was taken for each production process. Some allowances were also counted with the actual production time because of some extra time were needed due to human performance errors, machine breakdown, lack of regular maintenance, material arrangement and other unavoidable issues. By these criteria, lead time for bulk quantity snap and button production was found from the study and as given below.

Existing lead time for bulk quantity production:

Process	Press	Plating	Assemble	Packing	Total LT
Lead time (days)	3	5	2	2	12

Analysis to reduce bulk quantity production lead time:

After identifying the existing lead time which was already known in the organization, I started to look forward to the scope to improve it. I used time study method to find out if there was any room to reduce production time. To do that, I calculated average cycle time (the average time needed to produce a certain item). I took cycle time for different items in order to get better result.

Then I calculated the basic time for production of an item. In this basic time performance rating was counted. Performance rating was such index that showed how better the system worked. I assumed that 1 was neutral. Greater than 1, meant the system performed well and less than 1, meant the performance worse. As the production was automated, I considered evaluation of the machine performance. I rated the performance based on the condition of machines' performance such as how accurately it produced, how long it could run at a time, how often it needed maintenance, etc. By multiplying the average cycle time with the performance rating, I calculated the basic time, the time that were basically incurred for the production.

After that, I calculated the standard time for the production, the time that was standard for an item including some allowances. There were some incidents that incurred extra time consumption during production such as machine conversion, regular maintenance, material arrangement, and human fatigue time. I calculated an average time for these factors. Then I added the allowances with the basic time. Thus, I calculated the standard time. This was the estimated time which was required to produce an item. It was impossible to calculate standard time for each item as there were thousands of items. So, I calculated the standard time according to some item categories in each production process. Then I accumulated those time for each production process. In this way, I obtained the lead time finally. My calculation procedure is explained below.

Time study: different items had different production times. So, the production time was calculated separately for each item. In every process, the whole production was carried out

by automatic machines. So, standard time for the machines were calculated and then some allowances for human work and other factors were added.

For each item average cycle time was calculated.

$$\text{Avg cycle time} = \frac{\text{total cycle time}}{\text{no of observation}}$$

Basic time was calculated considering a certain performance rating which was different for different items and for different machines.

$$\text{Basic time} = \frac{\text{Avg cycle time} \times \text{performance rating}}{100}$$

Then, standard time was calculated including some allowances for human work, machine breakdown and other attributes.

$$\text{Standard time} = \text{Basic time} + \text{Allowance}$$

After calculation, new standard time was compared to previous standard time.

During identifying the lead time, I found some factors that were related to the requirement of more lead time, which could be improved to reduce lead time. These are as follows:

- a) There were some activities which incurred time loss such as unnecessary material movement, man power movement.
- b) There were some extra times consumption or time loss due to faulty or defective items production.
- c) There was an extra time for a machine setup
- d) An extra time for maintenance.
- e) An extra time for machine conversion and material preparation

So, to address these issues, I analyzed these factors according to lean manufacturing ideology. Lean manufacturing is a technique to reduce all type of waste or factors that impact negatively on the production performance.

I analyzed and found out the reasons for disrupted flow loss or time loss due to unnecessary material and man power movement. There were some flaws and faults in the layout of the production floor. The material and the machines were not in the linear layout. So, an extra time

was spent for moving the raw materials to machine areas. I worked to improvise the layout and made a linear flow of raw material to machines. I calculated the time before improvement and after the implication of a new process. As the flow was linear without a repeated movement, so the lead time was reduced.

Then I analyzed the time loss due to defective items production. I found that a good amount of time was spent in reworking on the same product due to defect in the products. It was very clear that if 100 pcs of goods needed 30 minutes for production, then when the items were defective, another 30 minutes would take to produce those items again. I calculated time of working on defective items several times and measured their average time. Then I found out the reason of those defects as color problem, shape problem, fault logo, mismatched assemble and some other facts as the reasons of defects. So, I talked to the production team on how to minimize these defects. Production team tried to overcome these factors and after improvisation I calculated loss time due to defects and found out the percentage loss of time, which were less than before. Thus, the lead time was improved.

I worked to reduce the waiting time for production. It means the time that incurred in between the production processes where material waited to go from one process to another. I identified the bottleneck in this process. Then I calculated the time that was incurred due to that bottleneck. After that production management tried to solve those bottlenecks. After solving these issues, I calculated the lead time again and found less waiting time than before. Thus, lead time was also improved. The calculation procedures for implementing lean manufacturing techniques are briefly explained below.

Implementing lean manufacturing technique: there were several processes in the production flows. In between these flows, many losses happened. Lean manufacturing techniques helped to find out those losses. In this study, lean manufacturing techniques were used.

- **Reducing motion flow loss:** due to a faulty layout in production floor, materials and manpower had to move unnecessarily which led to loss of time and energy. In this study, the time spent in the flow of the production processes were recorded and analyzed.

Motion loss time = extra time spent in the movement of production (min)

$$\text{Avg motion loss time} = \frac{\text{total time of motion loss}}{\text{no of observation}}$$

Observed Lead time = actual lead time + motion loss time

Percentage of motion loss time = $\frac{\text{observed lead time} - \text{actual lead time}}{\text{actual lead time}} \times 100$

By improving the layout of machines and the flow of materials, motion loss time was improved. For example, production layout was made line-wise so that materials flow in one direction only. As a result, percentage of motion loss time was reduced as well as lead time was improved.

- **Reducing rate of rework:** rework consumed time which was absolutely a loss to lead time. If damaged products came out, then the process had to be reworked to get non-defective products. Damaged products came out due to machine problems. In this study, the rate of defective items was calculated and root cause of those defects were analyzed using Why-Why method. Using this technique, some improvements were done in machines.

Rate of defective items = total number of defective items / total observation.

- **Reducing waiting time:** waiting time was another reason for long lead time. Between the processes employed, if materials were not transferred rapidly, then there was time loss due to waiting. In this study, waiting times were calculated for different processes and after analyzing the data, time gaps between processes like press, plating, assemble and packing were found. A method was implemented which determines the starting time of a next process after calculating the standard time of the previous process. Thus, the waiting time has been reduced.

Capacity calculation: capacity was calculated for producing different items in different machines. Capacity was calculated as below,

The machines were set to a specific RPM (revolution per minute). Item produced per revolution varied from process to process. So, based on a process, I multiplied the RPM by 60, then I found the per hour production.

Per hour capacity = RPM x 60

Then I calculated per shift production capacity by multiplying per hour capacity by 8 as 8 hours consisted a shift.

Per shift capacity= per hour capacity x 8.

Then by multiplying per shift capacity by 3 (as 3*8 hrs=24 hrs), I got per day capacity.

Thus, I calculated a machine capacity. Then I calculated actual production capacity by counting the standard time. I calculated the production capacity as below.

Per hour capacity = Unit produced per hour = 60 / standard time (min)

Per shift capacity = Unit produced per shift (8 hour) = unit produced per hour x 8

Per day capacity = Total Unit produced per day (3 shift) = unit produced per shift x 3

After calculation of the new capacity with the new standard time, it was compared to the previous capacity. Capacity was calculated with the new lead time and a significant increase in capacity was observed.

After calculating machine capacity and production capacity, I found that machine capacity was higher than production capacity as there were no loss time. So, from this analysis, it was found that, there were further scope to reduce the loss time and improve the lead time as well as to achieve better production capacity.

So, accumulating and implementing above methods, the new lead time was achieved from 12 days to 7 days.

Improved Lead Time for big quantity production:

Process	Press	Plating	Assemble	Packing	Total LT
Lead time (days)	2	3	1	1	7

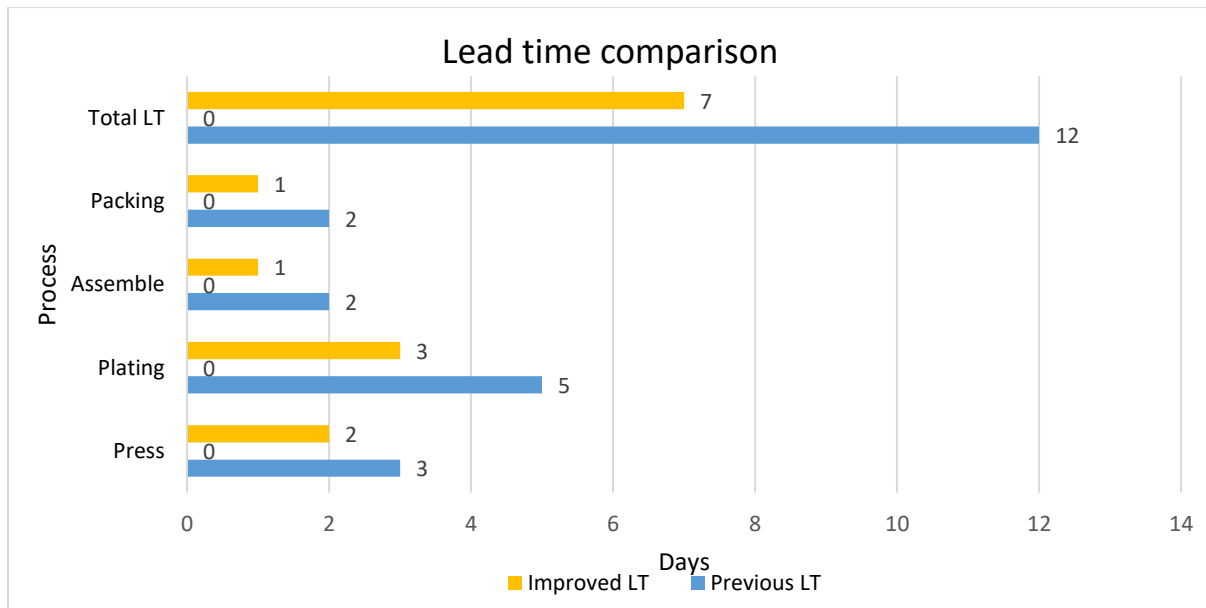


Figure 06: lead time comparison for big quantity

Lead time for producing fewer quantity which was a sample production, was also found following the aforementioned method. Significant improvement was achieved for the sample production.

Previous lead time for sample production

Process	Press	Plating	Assemble	Packing	Total LT
Lead time (days)	3	3	1.5	1.5	9

Improved lead time for sample production

Process	Press	Plating	Assemble	Packing	Total LT
Lead time (days)	1	1	1.5	0.5	4

3.4 Conclusion

From the study in this report, it is shown that how lead time in the production processes effects the performance of the organization as well as the productivity. Maintaining lead time is a very critical issue as a lot of challenges often arise based on meeting demand in an expected lead time that affects the manufacturing processes. In this part, the overall outcome, benefits, limitation and recommendation are discussed.

3.4.1 Internship outcomes

In this internship, I have learnt a lot through in hand experiences. I have worked with a lot of people who were from various department such as planning, product development, production, maintenance, sales, inventory control and operations control. Through my work with them, I came to know how actually operations were managed between the correlated teams.

Lead time improvement is one of the vital issues for any production or operation. In this internship I have learnt about the importance of it, strategies and techniques to improve it. Every process and operation or activity is subjected to maintaining particular lead time. Unless the lead time is optimized and controlled to a considerable limit, expected performance and productivity will not be achieved.

Through my work I have come to know the key factors that affect the production performance and productivity. I have gained experience in lean manufacturing, total productive maintenance, wastage identification and elimination, 5S (a productivity improvement method which includes 5 activities such as setting in order, sorting, shining, standardizing and sustaining) and the time study for maximizing productivity. I have learnt how to analyze a practical oriented operations management problem, formulating strategies to solve it, and planning for implementing the best solution to it for a sustainable result.

I could relate my academic knowledge to the on-field activities to manage operations for the snap and button production in this company. I developed my knowledge further more in operations management as I have directly worked in the operation team of this organization.

I have learnt about the methodology, procedures and operations for different manufacturing processes. As the production facility in this company is huge, I came to know various manufacturing processes and operations management strategies. For instant, in button production there are several types of coloring process which all are different to each other. Thus, I got chance to broaden my area of knowledge and experiences.

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3.4.2 Benefits from the internship

I have learnt about time management policy from this internship. To improve the lead time and overall performance, I found so many activities were interdependent here.

There was a fixed time frame for each activity and within that time the given task had to be completed. So, I learnt how to utilize the time efficiently and effectively.

From this internship, I have developed management and communication techniques to deal with the employees from various levels. In an organization there are various categories of employees from top to bottom management. The way of communication is also different accordingly. The bottom management prefers verbal communications and information which are explained in depth. Whereas, the top management prefers email communication and graphically represented data. During my job, I have improved my communication skill and professionalism.

Through my work, I did a lot of brainstorming as well as trial and error to find out the root cause and the actual solution in various issues. By this I have developed my problem-solving skill.

I have worked in the operation team to improve the existing activities and to achieve better performance. I attended many group studies and meeting to find out the best solution. Thus, I have improved my team-working skill.

3.4.2 Limitation of the internship

YKK Bangladesh Pte. Ltd. is very restricted about confidentiality of internal information, for which in depth analysis for lead time improvement with their data could not be possible.

There are hundreds of items and hundreds of production processes in regards to different product categories. So, explaining every individual process was not feasible. During my work I faced difficulties in data collection. The production processes were very complex and executing time study was a bit tough. Besides, the concerned persons in production floor were busy with their regular works. So, communicating with them was also a bit difficult.

3.4.3 Recommendation

For improving lead time, production should be monitored regularly with the help of time study. Due to some issues like capacity barrier, resource scarcity, machine-based problem and so on, I found the standard production became longer than usual. If this issue were not solved in right time, the performance and productivity would be affected. So, the managers should evaluate the standard time and observe whether the production time is under limit or not.

For better productivity in manufacturing processes, implementation of lean manufacturing technique brings great success. Through my work I observed that, by the lean manufacturing technique, the actual factors which are the reasons for hampering productivity could be identified. So, in every production process, lean manufacturing should be implemented.

Machines, materials, man power and other resources have to be ready on time to maintain proper lead time and productivity. These factors affect directly in the production process. Unless these are available in time, the lead time will be hampered. Decision-making process should be improved in this organization. During my work I have found that decision-making processes in this organization were time consuming as there was bureaucratic complexity there. To make any effective decision, involvement from various management level were needed. Also, the management style of this organization was centralized. So, it took long time to conclude any issue. To find out proper solution to a problem, management style should be decentralized. Decision should be taken by the concerning employees from their given authorities and top management should evaluate the results and correct them if there is any mistake.

Reference:

1. <https://www.investopedia.com/terms/o/operations-management.asp>
2. <https://www.edureka.co/blog/operations-management-definition>
3. <https://www.coursera.org/articles/operations-management>
4. <https://ykkasia.com/ykk-bangladesh/>
5. <https://www.ykk.com/english/>
6. <https://www.ykk.com/english/corporate/financial/annual/index.html>