

Factors Associated with Standard Hour Variations of Production Lines: A Case of a Sri Lankan Manufacturing Company

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M.S.D. Senavirathna¹ and K.P.P. Rathnamali²

Department of Management and Organization Studies, Faculty of Management and Finance, University of Colombo, Sri Lanka.
shanika@mos.cmb.ac.lk¹, poornimarathnamali@gmail.com²

ABSTRACT

Time study is a modern efficiency indicator in Apparel Industry. The time study concept leads the industries to have a focus not only on the material and machinery inputs but also the time taken in each step to produce the product. Relating with the time study concept, standard hour variation in production lines is a major issue faced by XYZ (Pvt) Ltd that caused several inefficiencies in their business operations. Therefore, this article discusses the factors associated with standard hour variations of production lines in XYZ (Pvt) Ltd and applies the theory of constrain with the intention of making recommendations to bridge the gap between planned hours and actual hours in production lines. Based on a qualitative approach the study uses case study strategy. The data were collected through semi-structured interviews, questionnaires and secondary data. The findings reveal many factors affecting the negative variation of standard hours such as time waste on machine breakdown, boring and stressful work environment, unfamiliar styles of products, and capability issues of the employees and delays in internal inputs. Hence, the study recommends the implementation of long-term, enduring practices that aim to assist policymakers and practitioners in mitigating the disparity between planned and actual standard hours.

Keywords: Standard hour variation, Production line, Apparel, Sri Lanka

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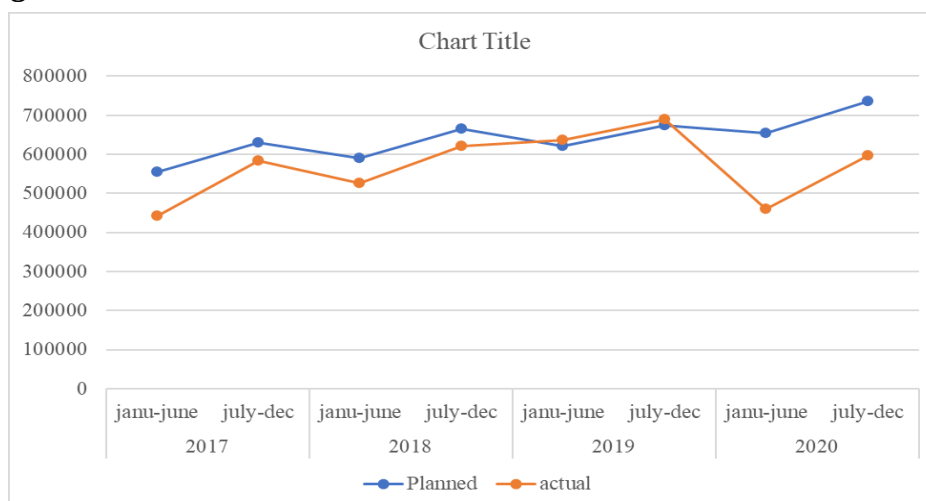
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1. Introduction

Globalization lets the world to make trades going beyond the land boundaries. And this causes an expansion of consumer preferences since, the customer base has enlarged with different varieties. This directly caused to higher requirements of the production level of the factories in apparel industry. Organizations can achieve its productivity and goals by implementing different mechanisms. The selected organization focuses on time measurement to align with production efficiency goals. Jadhav et al (2017:1) has states that “By using method related to time saving, its capacity and production study, it is possible to improve productivity while reducing wastage. Two important attributes have been considered, one is possible standard method for each process and another is considerable time is consumed.”

Normally, every apparel and textile related companies are performing their tasks according to the orders. In this particular company, productions are coming or the targets are achieving through production lines. The performance of each production line has been measured basing on standard time concept. According to company sources, these production lines have been assigned specific performance targets, to be achieved within defined hour rate which is known as standard hours. The issue has been identified related to the standard hours of the production lines. The organization has a planned standard hour rate, which should be achieved in each month. And the production lines have achieved the planned hours to certain extent.

Figure 1: Standard hour variations statistics 2017-2020



Source: Author's compilation based on data provided by the XYZ Apparel factory

In the stipulated six-month period spanning from January to June 2020, the specified company encountered a notable increase in negative variation with the standard hour ratios of its production lines, as assessed during the performance evaluation of the company.

Based on the defined scenario, the paper contemplates on two research objectives. 1) Identifying the factors that influence the standard hour variation of production line of XYZ (Pvt) Ltd. 2) Analyzing how their existing programs and strategies support to fill the gaps in standard hour variation of XYZ (Pvt) Ltd.

The article is organized as follows: the first section explains the theoretical foundations underlying the factors associated with standard hour variations of production lines. The second section introduces the methodological design of the empirical work, which is based on qualitative data. The third section presents the data analysis results, while the final section discusses the findings and implications for policy and further research.

The study is anticipated to yield benefits for various stakeholders, including the organization under investigation, other entities within the same sector, academic researchers, and organizations adhering to standard hour measurement practices. For the organization where the study is conducted, in this case, XYZ (Pvt) Ltd, the results are expected to furnish valuable insights into the negative variations of the standard hours ratio. By identifying the root causes of this issue, the organization can make informed decisions to address and overcome these challenges promptly.

The implications of this research extend beyond the focal organization, providing guidance and solutions to companies operating in similar sectors. In the Sri Lankan context, where lessons learned in this area may not fully address common issues in the apparel industry, this study contributes to the broader understanding of problems, factors influencing these issues, and strategies for overcoming them. The findings are poised to assist similar organizations in identifying, understanding, and resolving issues specific to their own operational contexts.

Moreover, this research serves as a foundation for future investigations by offering valuable suggestions for academic researchers. The findings are expected to become an integral part of the literature, serving as a point of reference for subsequent researchers in their studies. This way, the research not only addresses immediate concerns but also

contributes to the ongoing scholarly discourse and informs the direction of future research endeavors.

2. Literature Review

Standard Time derived from time study method. According to Hartanti (2016:192) “Work measurement technique is mainly used to quantify the work content related with a job, in terms of the standard time.” Further she explains “Time study is the most widely method that used to determine standard time. It is a technique of establishing an allowed time standard to perform a given task, based upon measurement of work content of the prescribed method, with due allowance for fatigue and personal and unavoidable delays. Time study is accomplished by performing analysis of work, standardization of methods and making time study respectively.”

The literature provides evidence that many authors have also explained the term standard time. Standard time is the total time in which a job should be completed at the standard performance (Wickramasekara and Perera, 2016:28). Further it can be defined as the estimated time period that consumes to produce expected output rate by the production line or the assembly line. According to Abtew et al. (2019:1), “A cumulative data of every line which are running in the industry will give total production efficiency. Line output varies depending on the line efficiency. When a line performs at lower efficiency than the standard (100%), it will produce fewer units in a day compared to what line could make at 100% efficiency. However, the factory still spends the same amount of money for salary whether the line performs at 100% efficiency or less. Therefore, per unit cost will increase when the line performs at lower efficiency. To overcome this problem and enhance the overall production in the garment industry, an investigation of the correlation between SAM and production efficiency will provide fruitful results to enhance productivity.” Further his paper indicates that efficiency of SMV relies on balanced layout model, proper synchronization among man, machine, materials, and methods, proper initiation of standard operation procedure (SOP).

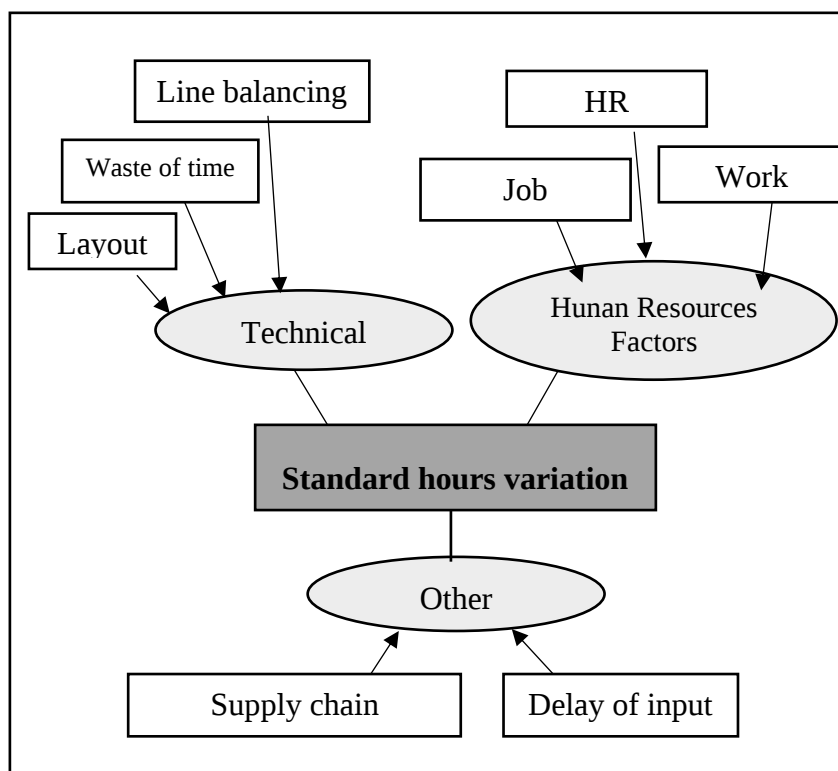
Hui and Ng (1999:181) conducted a study on the effect of time variations for assembly line balancing in clothing industry and tried to find the answers how standard time exceeding affect to the assembly line balancing of the stations. They defined standard

minute time is generally used in the clothing industry as a predictor of sewing speed and production efficiency. They found many factors that cause the variations on standard time of the same time such as the fabrics and sub materials, performance of the machinery, working environment and quality level of the product.

These studies evident that the standard time of the product line is a very important factor of the performance of the company, since it directly affects to the productivity. Therefore, identifying the factors that are causing to exceed the standard time is very crucial in a factory.

According to the information gathered though literature the causes for standard time variations can be illustrate as three main schemes such as human resource related factors, technical factors and other factors. Summarizing all together, the report can bring up a graphical analysis as illustrated in figure 2 for the Factors affecting to standard hours which explains how the research approaches for solutions based on the dependent and independent variable.

Figure 2: Factors affecting to standard hours



Source: Author's compilation

Human Resources Related Factors

According to the Mittar and Mathe (2014:990) there is a significant relationship between specific HR practices and employee performance in apparel export industry in Delhi, NCR region and that specific HR practices leading to better employee performance. Amir (2010) stated that a physical workplace is an area within an organization that is set up to help the organization achieve its goals. Thus, issues of organizational environment influence employee's productivity which will affect to the standard time of a production line.

Human resource management practice is another factor which affects the standard hour variation. In order to improve employee performance, both the employees and the supervisor must do their share, which is to commit to the relationship. If full dedication is offered, the employees' performance will improve (Blau, 1964).

Rossett, Gautier-Downes and Steward (1999:57) stated that the goal of work help is to direct and guide employees in order to improve their performance. Job assistance is also beneficial in assisting employees in their performance. All employees that have job satisfaction are high performers in their respective workplace (Maslow, 1943 cited in Bushiri, 2014:10). Therefore, significant changes in promotions, compensation benefits, appreciation and recognition help in keeping employees satisfied and in turn increase production and productivity. As define by the Kumar and Patel (2017:316) the apparel exports house pays very less attention on the issue of training of existing worker.

Technical Factors

As technical factor layout affects for the standard hour variation. According to Srinivasan and Heragu (1997:281) a facility layout is an arrangement of everything needed for production of goods or delivery of services. A facility is an entity that facilitates the performance of any job. It may be a machine tool, a work center, a manufacturing cell, a machine shop, a department, a warehouse, etc. The layout design generally depends on the products variety and the production volumes.

Line layout is another key area we need to give attention. Syduzzaman and Golder (2015:1736) describe the sewing line layout as follows, “Sewing Line Layout is the sequential arrangement of sewing machines as per processes involved in a particular style of apparel. Layout of apparel directs the flow of materials and work-in-process from start till its completion and integrates material handling and equipment. An efficient layout has the flexibility to be changed to meet requirements of the product line, delivery schedules, and anticipated volume. Safety is a major consideration in sewing line layout.” The allocation of sewing machines according to the style and design of the garment is known as line balance. It depends on the type of garment it needs to make.

Objectives of line balancing that should be gained in a sewing line are as regular material flow, maximum usage of man power and machine capacity, minimum process times, minimizing slack times, minimizing workstations, maximum outputs at the desired time, agreed quality maintenance of the garments, reduce production costs. When talk about steps in line balancing at present, Standard Minute Value (SMV) is used as a tool for the line balancing, production control and the estimation of efficiency (Syduzzaman and Golder, 2015:1738).

According to Syduzzaman and Golder (2015:1738) there can be various causes for having an imbalanced production line, such as unequal work content individual operators, inability to distribute work quality among operators, ineffective supervision, inability to identify individual skills accurately, inconsistent individual efficiency, unequal skills distribution, sub optimum allocation work, demoralized employees, quality issue, poor guidance, input delay, machine break down, disagreement on actual & proposed method, erroneous estimation of work content.

Waste of time is another factor which causes standard hour variation. According to Karim (2013:46) to obtain a competitive edge, maintain market share, and compete with new competitors, quality items must be delivered on time and at a reasonable price to the customer. Ahmed and Chowdhury (2018:45) stated that too much transportation tends to increase costs, wastes time, increases the likelihood of product damage and deterioration and can result in poor communication. According to the Rahman and Amin (2016:31) Stated that machine problem (m/c) is one of the common problems of

garment manufacturing industries where frequently m/c break down occurs. Jadhav et al. (2017:1) found time wasting activates as the first reason that the factory cannot produce at its standard time edge in his time study.

Other Factors

When it comes to other factors external factors plays major role. Rahman and Amin (2016:31) mentioned in their study that when the input supervisor (logistic manager) is unable to deliver the required input on time, it results in a production loss. As per Kader and Akter (2014:277) suggested in their study, the slow delivery of inputs to a garment manufacturer is primarily due to a lack of infrastructure.

Theoretical Explanation

The paper mainly discusses the standardize procedure that mainly relies with Theory of Constraints which brought a step-by-step analysis for conditions where a company does not align with its SMV.

In the manufacturing sector to understand the factors influence on standard time in production line the theory of constraints by Eliyahu M. Goldratt in 1980s provides a systematic approach to identify and manage bottleneck in the production process. Therefore, the researchers apply TOC to understand the factors that influence standard time in a manufacturing production line of a XYZ production line.

Theory of Constraints (TOC)

Theory mainly emphasizes five steps such as identifying constraints, exploiting constraints, subordinate, elevating capacity and overcome inertia. And further the theory identifies the most disrupting constraint to the system chain. Şimşit, Günay and Vayvay (2014:930) further elaborates “Theory of Constraints (TOC) becomes an important theory which focuses on the weakest ring(s) in the chain. TOC views processes as they are rings of the same chain instead of thinking they are independent from each other. At the same time, theory focuses on the weakest points which are bottlenecks for the entire company and try to determine the relationship of these bottlenecks.” Also, the authors emphasizes that original TOC brings a systematic approach to develop a production process plan. Therefore, hereby with the report, it is expected to provide a

systematic flow that assists eliminates the factors which cause to negative variation of SMV.

TOC can rely on any material such as people, machinery, staffing, structure etc. This theory also used by Bhojane, Pundir and L (2015) to understand the bottleneck and exploit strategy for faster and smother operations of the organization. Further, Sahin and Sumen (2008) also used TOC to understand organization constrain to overcome barriers for the continuous improvement of the organization.

Eight Waste of Lean

According to Ahmed & Chowdhury (2018:43-45) “Taichi Ohno, considering the father of Toyota Production System, created a lean manufacturing framework, which was on the basis of the idea of preserving (or increasing) value with less work., Anything that doesn’t increase profit in the eye of the customer must be considered waste.”

And there are eight lower performing operators which can be identified through eight wastes of lean methodology. They define the eight factors as follows,

Transportation: The transportation element discloses that increased frequency or extended distances in transportation during the manufacturing process will notably affect the overall time consumption of the production process.

Inventory: Work in Process (WIP) Inventory arises from material between operations, often resulting from large lot production or processes with extended cycle times. This form of waste occurs when there is an excess supply beyond the actual demand from operators, thereby masking the true production needs.

Motion: Motion can be identified as non-value adding movements during the production process

Skill: A well-trained workforce is extremely beneficial to a company. The concept of "skilfulness" is bolstered by the quality of training provided by the company to its personnel. Also, it is crucial to utilize the proper skills in the proper places otherwise, the skill set becomes an underutilized resource, resulting in wastage.

Wait: This situation arises whenever work comes to a halt due to various reasons, such as breakdowns, running out of necessary resources and etc.

Overproduction: waste due to unnecessary production of units would be a severe time waste. Aside from that, it results in a shortage of inventory.

Over-processing: over-processing factor product design, planning, and procedure planning are milestones in production process. Once a firm fails to move with suitable product and process design, it cases to sever wastes of time.

Defect: Wates occur with defective products, the need for correction, repair, rework, scrap, replacement production, errors in paperwork, provision of incorrect product information.

3. Research Methodology

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them (Kothari, 2004:8). Methodology articulates the logic and flow of the systematic processes followed in conducting a research project, so as to gain knowledge about a research problem. It includes assumptions made, limitations encountered and how they were mitigated or minimized (Kivunja & Kuyini, 2017:28).

Kivunja & Kuyini (2017:30), states that “large number of paradigms have been proposed by researchers but Candy (1989), one of the leaders in the field, suggests that they all can be grouped into three main taxonomies, namely Positivist, Interpretivist, or Critical paradigms.” The authors’ further states that in a Positivist Research located in this paradigm rely on deductive logic, formulation of hypotheses, testing those hypotheses, offering operational definitions and mathematical equations, calculations, extrapolations and expressions, to derive conclusions.

Moreover, Kivunja & Kuyini (2017:33) reflect that elements of Interpretivist paradigm can be considered as, Subjective epistemology (making the meaning for the data basing on the own cognition), relativist ontology (exploring the situation assuming that here are multiple realities), naturalist methodology (interviews and reflective sessions are

taken as data sources), balanced axiology (reflects the balance of the findings and integrity of the researcher)

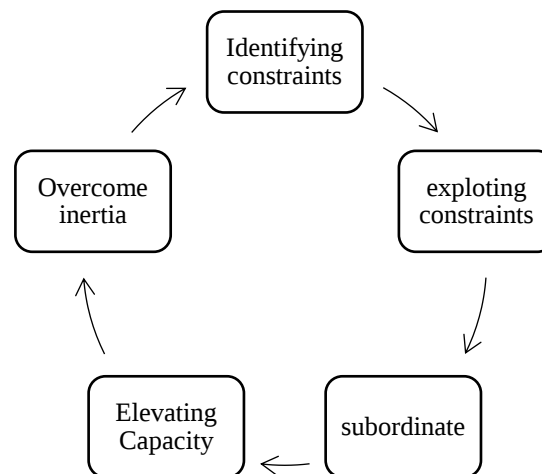
According to Williams (2017:67), Qualitative research is conducted within a poststructuralist paradigm. There are five areas of qualitative research including case study, ethnography, phenomenology, grounded theory study, and narrative inquiry (Eranda, 2021). These five areas are representative of research that is built upon inductive reasoning and associated methodologies. Qualitative research builds its premises on inductive, rather than deductive reasoning. It is from the observational elements that pose questions that the researcher attempts to explain.

The research about the associated factors which effect on negative variation in the standard hour ratio, is conducting as a Case Study Methodology on the inductive approach. And basically, the study will be conducted through qualitative manner. As the epistemological base, it follows Authoritative Knowledge. Furthermore, it flows under Interpretivist Paradigm which reflects relativist ontology naturalist methodology balanced axiology

Further, it can be explained the main reason for selecting the qualitative manner is the in-depth exploration which it provides for a deep exploration of the factors associated with standard hour variation. Further qualitative research helps to identify and delve into both human and organizational aspects and allows collecting data directly from the individuals involved in the production lines. The research considers the dependent variable as Factors associated with Standard Hours Variation and it is based on 84 semi-structured interviews with randomly selected employees in 42 production lines of XYZ (Pvt) Ltd. The researcher was unable to engage in field observation due to the pandemic situation in the country. The main data collection method relies on questionnaire and interview. The interviews were conducted in 2021 via telephone conversations with the employees. The sample is consisting of both male and female and also, team leaders and team members in a production line. The reason behind selecting two employees per production line was, the research study needed to evaluate unbiased data. And the proper combination of gender, age, years of working experience and positions (team leader/ team member) would help to dig into deep of the research issue with broader perceptions of respondents. The interviews were conducted in Sinhala, and later the **Peradeniya Management Review – Volume 04, Issue II (December) 2022**

transcripts were transcribed into English before conducting the thematic analysis. Since the research flows with descriptive data which aims of providing an extensive and comprehensive description, more than numbers of an exact subject matter and the thematic analysis acts as method of data analysis.

Figure 3: Theoretical Framework



Source: Author's compilation

4. Results & Discussion

As explained by Bell et al., (2019:92) one of the key distinctions of qualitative research studies is the ability of “seeing through the eyes of people being studied”. Accordingly, in relation to this study, the researcher attempted to view the phenomena through the eyes of the production line employees, in order to get rich perspectives and probe beneath the surface of the context.

Factors Associated with Standard Hour Variations of Production Lines in XYZ (Pvt) Ltd

Mainly as human resources related factors literature gave evidence for the job satisfaction of employees, motivation, training, performance appraisal, Line planning and work environment (for more details refer annexure 01).

Job satisfaction of employees

Majority of employees direct responses move toward positive impression about their job satisfaction. Mostly as the cause for the higher satisfaction could be identified as; team playing environment, supportive culture, appreciation and recognition, guidance for occupational improvement.

According to employees' terms reason behind their considerable rate of satisfaction are work as team, good work environment, performance and benefits on performance, supportive culture and work on time.

"We can grow with our experience and skills" (Participant 1)

"Supportive culture helps to grow in both target achievement and job"
(Participant 16)

"Working with a team is impressive" (Participant 76)

"Company has better promotion scheme that we can grow, salary is basing on our performances." (Participant 55)

But when we consider both positive and negative aspect, there were some employees who had dis-satisfaction about the company. While some said organization stick on target achievements some other respondent said it is really hard to make leave approvals.

"Company highly focuses on performance and stick with the target levels. But they give many benefits to our performance." (Participant 36)

"It is really hard to take a leave." (Participant 22)

Human resource practices

Another important HR component of the chosen firm appears to be their motivating initiatives. Some employees talked about their motivational program experiences, saying things like,

"There are regular (yearly) programs which held concentrating on New Year Festival and supplementary programs. Festival-based events are

there and we can show our hidden skills in New Year festivals”
(Participant 47)

“We have job-oriented motivations such that target based special appreciations and payments.” (Participant 07)

However, the survey found that few employees place a greater emphasis on monetary factors than non-monetary motives. A few requirements are,

“It had better to increase salary level instead of investing on events.”
(Participant 65)

It doesn't matter how much money a corporation spends on motivation; they should see a return on their investment. Some employees express their satisfaction with the acquisition of motivating programs.

“It's good, we can learn something new to go better work life. Motivational programs clear out the path to get promotions and growth and sometimes we are appreciated for our performances and skills during programs and it let us to enjoy out of the production lines, can know each other very well” (Participant 05)

An employee mentioned one of the noticeable statements. According to that employee motivation programs enable them to reduce their stress.

“It reduces stress.” (Participant 28)

It is known that the motivation component plays a significant role in reducing normal workplace stress. There are also some negative comments concerning the motivational process. As previously stated, some employees prefer monetary reasons to non-monetary motives. However, a few individuals directly declare statements implying that there are a few individuals who have not acquired the substance of motivational programs.

“It is not that much interesting” (Participant 49)

The company's training programs have proven to be successful based on employee responses. All of the employees' responses are comparable to the statement that they have received compulsory training after their recruitment.

"Compulsory training is conducted 3 weeks after recruitment. We were entitled to 21 days of training, which fully prepared us for a specific role on a manufacturing line and the training period was adequate and good." (Participant 25)

Employee replies indicated that personnel with lower capabilities have an impact on line performance, which results in a reduction in hourly rate of output. (Hearle, 2016) Capabilities of employees can be shaped by the training procedure that the company follows. Benefits of training programs do not necessarily have to be monetary but can include enhanced standard of living and increased consumption levels. Moreover, he discovered "Both soft skills and technical skills can have positive implications on firm productivity." Further, Hearle (2016) States that often there is no noticeable skill difference between male and female trainees, but perceptions of their skills can vary. Therefore capability issues affect the smooth productions of production lines.

The performance appraisal as a main factor the data collection wanted to put much weight on knowledge and awareness of the employees about their performance appraisal since, it is important to be aware about the evaluation bases and the path to grow in each job positions. Through the study we observed that they are mainly getting knowledge about the occupational growth and performance evaluation through training and some of their motivational programs. Majority of employees clearly state that

"Promotions are available, performance measured by target achievement of team" (Participant 21)

"Performance measured basing on ability of target achievement on time and the rate of output per time." (Participant 34)

And, 50% of the selected employee sample had been got promoted to upper level from team member positions. And all employees' responses were positive about company's feedback process on their performance.

Line Planning

It looks like the company allocates sufficient tools and equipment for employees to perform. Employees clearly stated they receive the all the equipment which they need to perform their task. All employees have same idea about the equipment's and they mentioned that their achievements are teams play which the need to complete.

"Yes, we receive all the equipment we needed." (Participant 27)

*"Yes, if we don't have, we can inform and they provide it sooner."
(Participant 83)*

"Target is received as production line but completion of my targets within period is important to complete our line target." (Participant 18)

Work Environment

Majority of the employees had the same opinion about the space and they mentioned that they have enough space for the works which enable them to easily accessible member distance.

*"We have enough space and work environment which is safe and tidy."
(Participant 11)*

But there are identical challenges which they facing like stay standing, safety guard barriers and boring and stressfulness. One employee has said that they have to stand whole day and nearly 50% of employees mentioned that with safety guards it is hard to work which emphasis that their regular performance is affected by the currently using safety wearing.

"We have to stand all the day. It is really tired." (Participant 12)

"Sometimes hard to work with safety guards" (Participant 17)

*"Sometimes it is not easy to perform same task in whole day. Some days we feel like boring to perform same repetition task day by day."
(Participant 30)*

“Most of the days it is hard to complete the given targets. We feel like really tired” (Participant 23)

According to employee data boring and stressful work environment affects their performance. Understanding human limitations and human performance-such as the way in which boredom affects the standard of work produced by team members-enables an understanding of the factors associated with errors and adverse events (Russ et al., 2013, as cited in Cleary et al., 2016). In employee's aspect organization relies on target achievement. This could be affected by the monotonous tasks they perform.

As Technical factors time waste, line layout and line balancing has greater influence to the standard hour variation of production lines of XYZ (Pvt) Ltd. (for more details refer annexure 01)

Time waste

Through this phase the report is expecting dig into deep about non-value adding actions done by the employees. As per an employee perspective they have to do some extra activities other than their job role which needs to be performed.

“Yes, we have to repair and clean machines.” (Participant 50)

“Sometimes, we have to help each other such as weak performers” (Participant 55)

“Yes, we have to iron fabric and cut the threat.” (Participant 23)

When these factors are considered, it is notable that above mentioned actions could not be considered as non-value adding actions. But there are some similar responses related to a statement done by employees by highlighting machine breakdowns and the issues with the safety guards. Comparatively, it is significant to see that there is huge interruption to the continuous performance of a production line by machine breakdowns and safety wear.

“We have to wait because machine breakdowns as average 15mins.” (Participant 02)

“Hard to achieve targets with machine issues and safety guards.” (Participant 33)

The findings reveal that some focused factors that directly involves with stand hours variation. As per the employee's experiences, there is a critical situation related with time wastes on machine breakdowns. According to certain employee testimonials, the research discovered that the corporation had given tasks to employees that were not related to their primary responsibilities. However, in this case, the study could not classify those actions or motions as non-value-adding because each of those out-of-duty functions adds significant value to the core product, such as machine repair and cleaning: improves cleanliness and smoother operation, Iron and cut threads: Is one of a main function of processing the product. Support for weak performers: emphasizes the smoother flow of operations. Especially, that reduces line bottleneck.

Line layout

According to almost all employees, the shape of the production line takes “U” shape. And it is clear the shape has higher influence on accessing processing and communicating between line members. This factor proved by a statements provided by employees. Few of employees had the same opinion while some others simply defined the gains of U-shaped production lines help them to easily support each other in the production line.

“Yes, U shaped line is easier since we can communicate easily.” (Participant 57)

“Once a member gets late in producing, we can easily access him/her and help out to complete the order” (Participant 28)

“When a member fail, we can support them and easy to collaborate” (Participant 69)

Line balancing

Hereby, Line balancing is focuses on strategies that employees are following or ordered to follow to eliminate the bottlenecks in lines. As per Ahmed and Chowdhury (2018:45) defines a bottleneck as which works as a constraint for smooth flow of production. One

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employee shared her experience and mentioned that there is differences in employee working speed which refers the capabilities of people would be different and through that bottleneck or stock pileup would be happened

“Employee working speed different person to person” (Participant 06)

As mentioned before, employees are allowed to go for other members in the same line and help to week performers. And there are uncontrollable conditions also.

“Until familiar with new styles hard to achieve the production lines targets.” (Participant 29)

Even though, the company behaves in only intimate sector, there are different styles, patterns and fashions they have to deal with. When it comes to employees, who are routine job followers, they are unable to recognize the product's style quickly. This, in the perspective of the staff, reduces the efficiency of the smoother performance because of the unfamiliar styles of products.

Some stock pileup or the bottlenecks are occurred as a result of unfamiliar intimate designs. Also, same as the time waste majority's focus goes on sudden machine breakdowns.

“Some machines get suddenly stopped.” (Participant 18)

Delays of input

As the other factors, the report puts its weight on delay of input (supply aspect) rather demand aspect, since the data collection was handled with production level employees. Mainly, basing on the collected data, the report identified that the employees had to spend considerable waiting time as a result of delay of input. These delays could be internal (flow of materials internal plant) or externally (delay of shipment). One employee mentioned that there is a slow material flow when handling bulks.

“Bulks come slowly to the production line, 10-15mins late.” (Participant 12)

When it comes to other employees about 24 members have rarely experience on material delays since it was shipment delays, one of among those 24 members mentioned,

“Our line rarely waited, for delays. We only had to wait for shipment delays not for internal delays.” (Participant 41)

But, some lines, they had to wait nearly 30 minutes until the stock arrive. And an employee mentioned her action when there is a delay.

“Sometimes yes, if I have to wait, I will help them for material and do line work too.” (Participant 04)

In employee's responses, they specified that production lines have to face two different delays of inputs. Internal input delays cause material flow to be slower within the manufacturing plants. External input delays: some uncontrollable external causes which make the production lines wait, such as shipment delays, custom clearance delays. Furthermore, these delays result in deterioration in the on-time performance of the production line

Existing Strategies to Fill the Gap of Employees' Standard Hour Variations

The above present analysis of data revealed that to overcome standard hour variation of production lines of XYZ (Pvt) Ltd they are conducting some kind existing programs and strategies.

Employees have to face unfamiliar styles of products that needs more time to align with it. To overcome this issue, organization followed additional training programs to make employees familiar with new style/ design of a product batch. But as a company it is hard to conduct training programs for every unfamiliar style because they cannot let days to learn every unfamiliar style since it takes their valuable production time. Therefore, they are in between battle of this issue.

Skill Master Concept is another strategy which use by XYZ (Pvt) Ltd to fill the gap between standard hours of production lines. Skill masters are well trained Multitask employees assigned for absent members and support to weak performers.

The company tries to establish a safe and comfortable work environment for employees. Especially, through the "culture shop" concept the organization let the employees to be conforming to the existing culture. Also, company focuses on general motivation for endeavor to implement a preferable work environment for the employees.

XYZ (Pvt) Ltd try to conduct training programs in regularly basis since they believe that employee motivation has strong impact to the performance. Furthermore, company has strategy which call “dancing concept” which production line employee need to know task of left- and right-hand side person and with this concept they use standing working culture. Even though management thinks that concept will smooth the production line performance that negative impression of production line employees shows that employees are not fully satisfy about the standing method.

When comparing factors which we identified through previous researches arguments and our findings we can emphasis that working environment is one main factor which identified in literature which managers need to be address but finding revealed that even though managers implemented existing strategies to address working environment those effects are not fully effective. Finally, findings revealed that even though company tries to implement strategies they are not fully successful in implementing some of those strategies.

Application of the Theory

Expanding beyond the company's existing strategies, the report advocates for the adoption of steps aligned with the Theory of Constraints. Rather than solely relying on the Theory of Constraints, the report integrates two additional theories namely, the four principles and the eight wastes of lean, providing a comprehensive approach to address challenges and improve efficiency.

Theory of Constraints

Identifying Constraints

The first step in TOC is to identify organizational restrictions or bottlenecks. These are the points in the production or process flow that limit the system's throughput. From the viewpoint of both management and employees, the research successfully pinpointed several distinct underlying causes. The study identified various factors responsible for variations in standard working hours, such as machine breakdowns resulting from a monotonous and stressful work environment, unfamiliar product styles, issues related

to employees' skills and capabilities, as well as delays in receiving internal inputs. Notably, the level of orders was significantly impacted by the COVID-19 pandemic, making it a critical factor in the supply chain.

The Table 1 shows an investigated capacity of members in a sewing line during a period of one hour.

Table 1 existing capacity flow

Member No.	Line 1	Line 2	Line 3
1	6	8	8
2	10	8	8
3	8	8	5
4	8	8	8
5	5	8	8
6	8	6	8
7	8	8	8
8	8	8	8

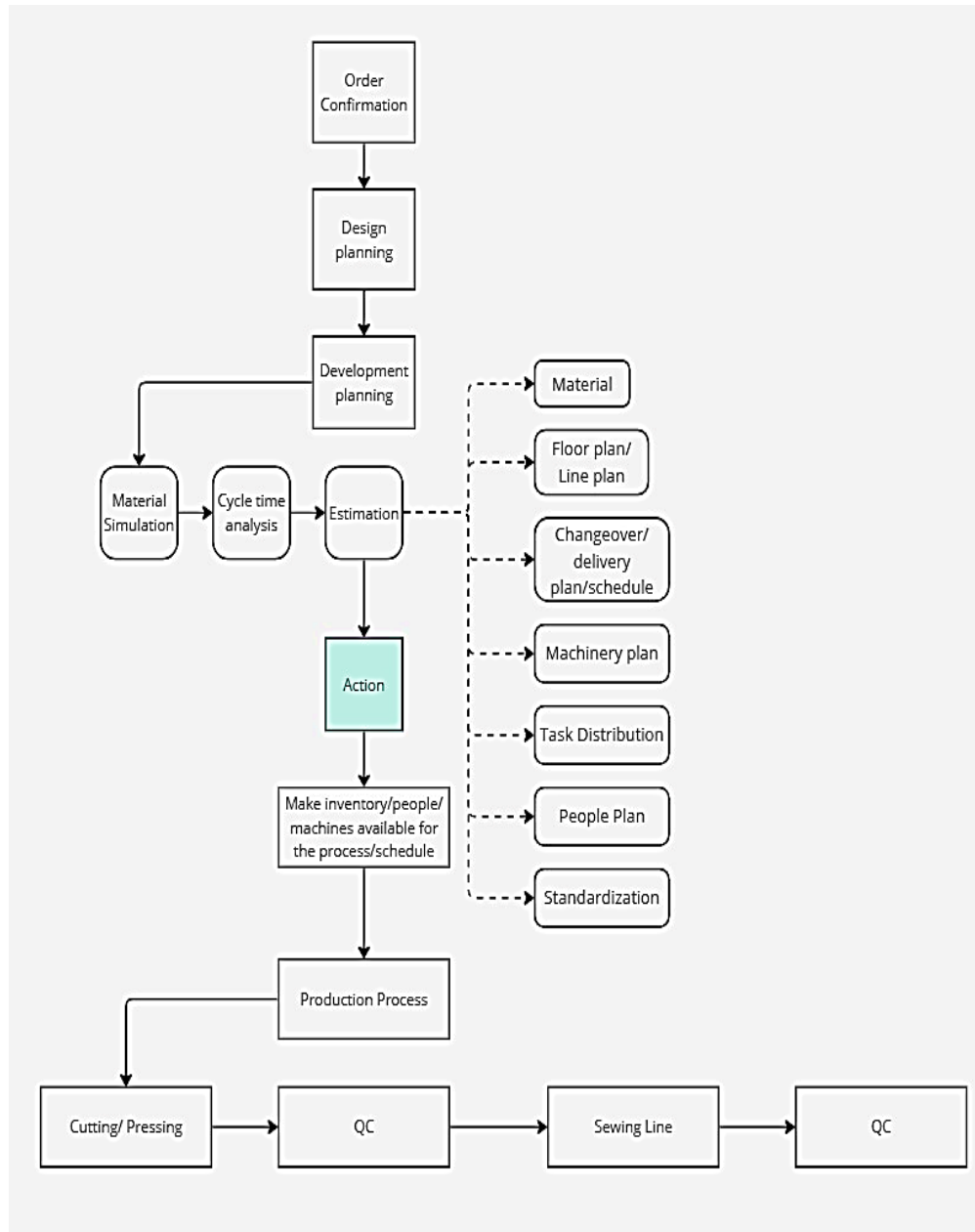
Source: Author's compilation

It indicates that the member two performs ten units while others performing eight and member number one and five perform six and five units per hour respectively. It is notable that line one found members with over performing and lower performing. In order to balance the line for an efficient performance it's important to reduce the all performing member to the standardize performance rate while increase the performance of lower performing members. Other than the above, the exploiting constraints stage will come up with long term procedure to eliminate the observed reasons for the variations of standard minutes.

Exploiting Constraints

Hereby, in the stage 4 where the organization should try to find out to eliminate the bottleneck and make the constraint more sustainable and effective, the researchers suggest overall map for the material delivery to final output.

Figure 4: Suggested overall map for the material delivery to final output



Source: Author's compilation

Design & development plan

The process where the product is designed or modelled graphically and basically analyses what kind of material and technology should be implemented to the output. At the development stage which is a critical point in the entire structure, it can be noted that the initial simulation will be brought out with the estimated cycle time for each stage of the production. Also with the estimated material, machinery, people required

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division of tasks and standards. In each step of defining and estimating the resources the report suggests to focus on practice and preventive actions such as follows,

Material: planning and defining exactly required material bulk and make check for the prompt availability. Also take an idea about what else will be needed more.

Floor plan: this is s about the movements of human and material flow during the production. It is important to decide which production lines which cutting sections will be operated in the production.

Changeover and delivery: in this stage the team should decide how the resources distribution should be allocated such as the standard quantity of semi process to products should be gone to a production line 1 or how many pieces should be allocated to cutting machine 1.

Machinery plan: is more crucial during the production. Hereby the team can decide which machines will operate for the order and ensure the machines are up to date and can be maintained before production starts. This will eliminate the machinery breakdown delays during the production.

Task distribution: this is all about how the one piece of product is going to be assembled or how each member in the production line should be allocated by each task

Standardization: in this stage all the processes will be standardized with its time frame, way of handling for example standard refilling time of material, standard time to finish up each piece, standard shapes & measurements to cut the raw material, standard number of complementary items to single product.

People plan: align with task distribution and declares the seating and the position should be allocated to each individual. Other than the setting of a production line, the management can decide how each skill can be balanced in the line, the training for the new products or work or style and communicating about the standardized objectives and modeled sketches of the product.

Make inventory/people/ machines available for the process/schedule

Hereby, it ensures the availability the group of people, material and machinery for the production. It eliminates the shipment delays, ensures the employees re trained as expected.

Production Process

Production stage should be, supervised in terms of quality and accuracy in order to right items to be moved forward. The report can suggest a simple method to ensure the accuracy and quality of the product.

Subordinate

This step is intended to guarantee that the entire system functions in concert to support and optimize the performance of the defined constraint. In order to ensure the smoother continuous performance, the report can recommend following strategies,

- Synchronize bottleneck and support by the skill masters and supervisors
- Prioritize performance enhancing constraints.
- Reduce waste of time based on Lean 7 wastes such as reduce time takes to clean and setting machine.
- Implement four principles of Lean.
 - Eliminate cost and waste of material of over producing.
 - Manage continuous one-piece flow.
 - Ensure quality and minimize the defects, by guiding each individual to follow “check-produce” style which emphasize check the defects of previous task before producing current task.
 - Follow time rhythm when producing. It should be linier for entire process function that all align with same rhythm not producing excess or less.

Elevating Capacity

If constraints prevent the organization from meeting the expected level of output, it should consider pursuing strategies to improve its capacity. It needs to continuously supervise the capacity compared to the planned one. If there are further constraints exist in production process, it needs to solved out by various strategies such as,

- Providing special training for lower performing employees and ensures the skill rates achieved by the employees.
- Continuously communicating existing status and desired status of the production target.
- Promote competition between production lines in achieving expected target.

Overcome Inertia

The major of belief of the theory of constraints is, every system has at least one constraint that limits the desired level of performance. Even if the production team eliminates the bottleneck or the constraints on the identified positions of the operation chain, there may be another constraint occurring somewhere else. Therefore, fifth step of the theory emphasizes that there should be on going observation on the existing constraints which simply reflects going back to this first step.

5. Conclusion

In conclusion, the first research objective of this study was to discover factors that effect on employees' standard hour's variation of production lines in XYZ (Pvt) Ltd. Following a qualitative approach, XYZ (Pvt) Ltd was selected as the case study on which the research was based upon. The findings of this study make it possible for the entire apparel industry and selected XYZ (Pvt) Ltd to understand the factors which influence on the standard hour variations of production lines to fill the gap between planned hours and the actual hours which they performed. Importantly researcher identified Theory of Constrain as a major underlying theory to provide solutions for identified research gap. Further, with the TOC researcher suggests to use the Lean eight waste and four principles of lean to get the better results. This is very important because

filling this gap is plays an important role which enable them to increase not only their performance but also productivity and efficiency. These results are very important to the all the apparel industries which deal with standard hours in their production lines.

The second objective of this study is to fill the employee standard hour's variation of production lines in XYZ (Pvt) Ltd. When researcher searched existing programs and strategies used to fill the employee standard hour's variation of production lines in XYZ (Pvt) Ltd identified they followed training programs, use skill master concept for eliminate the absenteeism and always they try to establish a safe and comfortable work environment.

After successful completion of the data analysis, recommendations should be provided to overcome the research problem in order to achieve the ultimate objective of this study. In response to that, study propose establishing efficient material handling system, establishing effective vendor management system, time to time change the production line employees, initiating SPD (Standard Probability Distribution) and extension of training period can be identifies as recommendation to fill the gap between standard hour variations of production lines.

The quality of the study can be further improved by embedding quantitative tools and techniques apart from the qualitative approaches which will enhance the measurability and comparability. Also, it can be proposed to conduct studies in organizations with different scales and context that can improve the applicability of the knowledge obtained while helping to increase the generalizability of the study. Another suggestion can be made to do a study in few years' time, on the same organization to find out the effectiveness of the recommendation proposed and to propose more timely and effective recommendations.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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