



Lean Wastes and its Consequences for Readymade Garments Manufacturing

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Abstract- Waste is unnecessary for any kind of industry because it raises the manufacturing cost of products. For owners or clients waste is anything that cannot create any value. By effective lean production system it becomes possible to decline the generation of wastes and increase the productivity in any industries. So, it became very significant to identify lean wastes and its effects on productivity and manufacturing cost of RMG products. By this research work it was possible to categorize the lean wastes in four RMG industries. Motion studies during manufacturing also helped to bolstering the work. Strong willingness of management of RMG industries for increasing productivity and lowering the wastes level accomplished the study successful and finally seven dead wastes were recognized. According to lean manufacturing these dead wastes encompasses overproduction, more waiting time and bottlenecks, over transportation, excess inventory, more processing (re-works), excess motion and defects. These lean wastes could not contribute in adding value of different products. However, this research paper mainly underscored on seven lean wastages of RMG industries and its consequences for increasing production cost and hindrance of productivity due to greater production time.

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Abstract- Waste is unnecessary for any kind of industry because it raises the manufacturing cost of products. For owners or clients waste is anything that cannot create any value. By effective lean production system it becomes possible to decline the generation of wastes and increase the productivity in any industries. So, it became very significant to identify lean wastes and its effects on productivity and manufacturing cost of RMG products. By this research work it was possible to categorize the lean wastes in four RMG industries. Motion studies during manufacturing also helped to bolstering the work. Strong willingness of management of RMG industries for increasing productivity and lowering the wastes level accomplished the study successful and finally seven dead wastes were recognized. According to lean manufacturing these dead wastes encompasses overproduction, more waiting time and bottlenecks, over transportation, excess inventory, more processing (re-works), excess motion and defects. These lean wastes could not contribute in adding value of different products. However, this research paper mainly underscored on seven lean wastages of RMG industries and its consequences for increasing production cost and hindrance of productivity due to greater production time.

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I. INTRODUCTION

After World War II, Japanese manufacturers were faced with the dilemma of vast shortages of material, financial and human resources. The problems that Japanese manufacturers were faced with differed from those of their Western counterparts. These conditions resulted in the birth of the "lean" manufacturing concept. According to Rameez and Inamdar in the 1950's Toyota Motor Corporation created Toyota Production System (TPS), then it formatted a new kind of management concept 'Lean thinking' [1]. Agile manufacturing, just-in-time manufacturing, synchronous manufacturing, world-class manufacturing and continuous flow are all terms that are used in parallel with lean manufacturing. According to Kuo et al. lean production is a multi-dimensional approach that encompasses a wide variety of management practices, including just-in-time, quality system, work teams, cellular manufacturing, supplier management, etc. in an integrated system [2]. Benefits of lean manufacturing system are improved productivity, overall wastage or

'muda' (the Japanese word for waste) reduction, cost reduction, reduces defects and overall quality improvement according to Chahal [3].

In a company, lean design and lean production can eliminate the seven wastes to create value for the supplier as well as for the client. According to one paper published by Mossman, creating value is the best way as it can eliminate wastes in design and construction [4]. For any industry cost and time related to production and quality management or wastes reductions have important impact on overall factory economy. Internal cost spent by a company and savings made by eliminating non productive works and time are important for management to keep the industry economically sound and safe. According to Islam^d et al. by applying lean tools in the manufacturing industry, seven lean wastes such as overproduction, re-processing (re-work), excess motion, transport, excess inventory, waiting time and defects can be reduced to a great extent which in turn improves the productivity of the organization [5]. The basic purpose of Lean Manufacturing is to manufacture the product with minimal wastage, optimal usage of available resources and at the least cost. To doing this, it uses various techniques like SMED, one-piece flow, kanban, poka-yoke, 5S, total productive maintenance, visual management, line optimization and synchronous manufacturing according to Satao et al. [6]. According to Chakraborty and Paul lean thinking focused on value-added lean and consists of best practices, tools and techniques from the Indian industry with the aims of reducing waste and maximizing the flow and efficiency of the overall system to achieve the ultimate customer satisfaction [7].

In the face of fierce competition resulting from the rapid globalization of businesses in Bangladesh, some companies across the garment industry sector have been practicing lean production to remain globally competitive and create a strong market position. There is a lack of research evidence regarding the impact of lean practices on manufacturing performance improvement in Bangladeshi garment firms. Researchers are mostly soundless on this very important area of production philosophy. According to Ferdousi and Ahmed the entire field of lean remains unexplored in Bangladesh [8]. However, one imperative study should be done in RMG industries of Bangladesh to identify the lean wastes responsible for less productivity and higher manufacturing cost of the

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products. Thus, industry people will be able to control those wastes and profit of the RMG factories will be maximized.

II. ANALYSIS AND FINDINGS

The study had been carried out for six days a week of two months period in four RMG industries (appendix) of Bangladesh having variation in its' production capacity and product category (woven or knit). Seven lean wastes such as overproduction, more waiting time and bottlenecks, over transportation, excess inventory, more processing, excess motion and defects were identified by direct observation and discussion with the people of different sections of RMG industries.

The movement of body parts of the workers was captured for the investigation. The study was mainly conducted to observe how the workers pass their time during working in the industries.

Following lean wastes in RMG industries were identified and represented after the studies:

- a) *Overproduction*: In case of *Style Garden Ltd.* about 6% of products (ski jacket) were over manufactured from the total order quantity factory people received, whereas *Fakir Apparels Ltd.* and *AJI Apparels Industry Ltd.* were found to make 8-10% of more pieces (tank top and t-shirt). Besides, in *Mim Dresses Ltd.* 0.5% over production was found for order quantity of one lac pieces, 1% for order quantity between 20,000-1 lac pieces and 2% over production for order quantity less than 5000 pieces. According to industry people they considered additional quantity to circumvent the likelihood of having short quantity of items due to rejection of defective pieces during inspection process. Thus, overproduction generated wastes and minimized the profit of the industries.
- b) *Waiting time & Bottlenecks*: Waiting time and bottlenecks were found to be mostly common in the sewing section of RMG industries due to lack of engineering and wrong manufacturing layout. Among four industries these types of lean wastes were found greater in case of *Style Garden Ltd.* as around three hours of work breakdown took place there every day due to load shedding. Workers spent idle time for the unavailability of generators which reduced the productivity of the factory. In *Mim Dresses Ltd.* workers were found to spend about 15.33% of the total working time due to waiting for materials. Waiting time and bottlenecks were normal for other two industries. Henceforth, more waiting time and maximum bottlenecks increased the production time and reduced the productivity, which has salient impact on the production cost.
- c) *Over Transportation*: *Style Garden Ltd.* was found with a single production floor which was

unorganized and having manual material transportation system in the sections (sewing, finishing etc.). *Fakir Apparels Ltd.* had an automated material movement system and forklift was used to transport the materials from one place to another place. In *AJI Apparels Industry Ltd.* since different sections were at different floors, so it consumed more time for the movement of material from one section to another section due to having manual handling system. There were many people worked as loaders who carried materials from one floor to another section and each loader was suggested to carry 30 kg of materials at a time. *Mim Dresses Ltd.* was also found with same material handling system like *AJI Apparel Industry Ltd.* A fixed number of workers were involved for overall material handling and they were found to carry maximum 10 kg at a time. Over transportation also increased the manufacturing time and declined target productivity.

- d) *Excess Inventory*: The inventory section was found completely un-organized in *Style Garden Ltd.* and 3-4 % extra materials (fabrics and accessories) were purchased. Besides, in *Fakir Apparels Ltd.* and *AJI Apparels Industry Ltd.* inventory section was found to be organized and 2-3% excess inventory took place after placing orders by the buyers. For *Mim Dresses Ltd.* inventory section was found organized and 2-5% of more fabric and 1-3% of extra accessories were purchased considering allowances and nature of the materials. In case of sensitive products, 20-30% of extra materials were purchased in that industry. Excess inventory decreased the profit maximization as it did not add any value to products.
- e) *More Processing*: In case of *Style Garden Ltd.* 40% of Ski-jacket and 20% of Men's pant were found defective and thus re-worked. About 15% of the defective pieces (tank top) were found to be re-worked and 24% of garment items (t-shirt) were found to be re-ironed which was of great concern to the authority of *Fakir Apparels Ltd.* 12-15% of the defective products (polo shirt) were found to be re-worked in *AJI Apparels Industry Ltd.* In *Mim Dresses Ltd.* 5-10% of products (men's half shirt) were found to be re-worked for minor defects and 2-3% of pieces were re-worked for major defects. More processing has been observed in all industries which declined the productivity of the lines and increased manufacturing cost of the products.
- f) *Excess Motion*: In *Style Garden Ltd.* it was observed that, maximum workers were used to sit idle or engage themselves in gossiping during waiting time. On an average, every worker was used to waste 12.5% of total working time doing nothing. Comparatively less unnecessary movement was

found in *Fakir Apparels Ltd.* and *AJI Apparels Industry Ltd.* But, productivity of those industries deteriorated up to 15-18% after the lunch break due to less consistency of work pace. Besides, in *Mim Dresses Ltd.* about 10% of total workforce were found in wander here and there and in engage themselves for gossiping with each other. However, workers of those industries were found to spend their time through working, waiting and movement. Following pictures were captured from RMG industries while workers were found in working, in movement (unnecessary) and in waiting for materials and instructions of supervisors. Some videos were also recorded and some variations were found in the movement of workers to perform the same task.



Figure 1 : Pictorial views in RMG industries

- g) **Defects:** Defects or faults were common for four industries. About 35% of the products were found to be defective in one hour in *Style Garden Ltd* and 10% of those were rejected and residual went to re-work. In *Fakir Apparels Ltd.* 15-18% of the products was found to be defective in one hour and of those about 3% was rejected and remaining

amount went for re-work. 18-22% of the products was found to be defective within one hour in *AJI Apparels Industry Ltd.* and of those 5-6% products was rejected and residual went to re-work. About 15% of the products were found to be defective in one hour in *Mim Dresses Ltd.* and 2% of these completely rejected and remaining pieces went for re-work. Following types of errors made defective pieces at different stages in four industries-

Chart -1 : Category of defects found in four RMG industries

Types of Defects/ Factory Name	Fabric defects	Sewing defects	Finishing defects
Style Garden Ltd.	Oil spot, dust mark, fabric holes, wrong placement of embroidery design.	Open stitch, skipped stitch, zigzag stitch, bar take missing, sewing line displacement, wrong placement of zipper, inaccurate shapes. About	Uncut thread, care label missing, hang tag missing.
Fakir Apparels Ltd.	Oil spot, dirty spot, color spot and GSM variation.	Needle hole, open stitch, missing stitch, body mismatch, bar take missing.	Uncut thread, improper ironing, missing of care label & hang tag.
AJI Apparels Industry Ltd.	Oil spot, dirty spot, color spot, fabric shading and GSM variation.	Needle hole, open stitch, missing stitch, body mismatch, bar take missing.	Uncut thread, improper ironing, missing of care label & hang tag.
Mim Dresses Ltd.	Unwanted spots, uneven shade.	Uneven hems, misaligned buttons, open stitch, slipped stitch, incorrect stitch density, needle hole, wrong fusing.	Uncut thread, missing of care label & hang tag.

The variation in the amount of lean wastages stipulated above was found in different industries. Among seven wastages, some wastage was found more than the acceptable level and some were in considerable limit according to buyers' perspective. Besides technical causes more defects were generated at different sections of the industries due to following reasons-

- Lack of attention of workers towards work

- Lack of quality knowledge
- Improper co-ordination among different sections
- Lack of proper supervision
- Defective fabrics and accessories

Thus, excessive defects led more rejections and re-works of RMG products which finally generated wastes, maximized production time and reduced productivity of four industries.

III. CONCLUSION

Waiting time and bottle-necks were found in greater amount for manufacturing of RMG products which can be minimized to a considerable level through balanced work load distribution among the workers by line balancing technique. Line balancing can also reduce unnecessary motions of the workers during working time. After the study and analysis RMG industries were asked for providing proper training facilities to the workers before integration to the production floor. Besides, industries must have a good strategy to motivate and encourage the workers through offering various incentives and reward schemes for their performance through productive works. *Fakir Apparels Ltd.* was found with newly introduced incentive scheme, which improved productivity and declined wastes from earlier time. The industry also has traffic light performance assessment system by which workers became more attentive towards their works and thus fewer defects were produced in a line. In this process they were found to prepare a check sheet and were attached in every workstation beside the workers. An assigned person observed how many defected products a worker made in one hour. According to workers' performance they get the color mark GREEN (no defects), YELLOW (first time warning) and RED (second time warning). Using of this system can be imperative for other industries for the improvement of its productivity with quality products.

Other effective lean tools like 5S, KAIZEN, JIT, KANBAN, SMED, TPM, and VSM may also be employed in the RMG industries for the reduction of these lean wastes. These tools are effective enough to minimize the production time and increase the productivity which will help readymade garments (RMG) industries to compete and survive with less manufacturing cost and higher product quality.

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APPENDIX

RMG Industry Profile

Name of the Industry:

Style Garden Ltd.

Location	: Mirpur-12, Dhaka-1216.
Type	: Only garment making
Nature	: Supporting industry
IE activities	: None
Certification	: None
Clients	: Exposures Ltd.
Production lines	: 01
Production capacity/day	: 550 pieces

Workforce : 150
 Type of products mfg. : Ski Jacket and Long Pant

Fakir Apparels Ltd.

Location : BSCIC, Hosiery Industrial Estate, Narayanganj.
 Type : Composite (Knitting, Dyeing, Printing & Garment)
 Nature : 100% export oriented industry
 IE activities : Yes
 Certification : Oeko-Tex and WRAP
 Clients : H & M, Gap, Levi's, Esprit, S.Oliver, Tesco etc.
 Production lines : 90
 Production capacity/day : 1, 40, 000 pieces
 Workforce : 7,500
 Type of products mfg. : T-Shirt, Polo Shirt, Tank Top, Mens Shorts etc.

AJI Apparels Industry Ltd.

Location : 226, Singair Road, Hemayetpur, Savar, Dhaka.
 Type : Composite (Knitting, Dyeing, Printing & Garment)
 Nature : 100% export oriented industry
 IE activities : Yes
 Certification : ISO
 Clients : Carrefour, Tesco, Wal-Mart, Sears, K mart etc.
 Production lines : 44
 Production capacity/day : 48, 600 pieces
 Workforce : 2, 200
 Type of products mfg. : Mens Polo Shirt

MIM Dresses Ltd.

Location : Baishaki Super Market (2nd Floor), Mirpur-1, Dhaka.
 Type : Only garment making
 Nature : Sub-contract industry
 IE activities : None
 Certification : None
 Clients : New Yorker
 Production lines : 02
 Production capacity/day : 2, 400 pieces
 Workforce : 200
 Type of products mfg. : Mens Half Shirt and Ladies Skirt

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