



An Empirical Analysis of the Effective Factors of the Production Efficiency in the Garments Sector of Bangladesh

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ABSTRACT

This paper represents the investigation of the causes of different problems of production through a surveying in different garments manufacturing industries in Bangladesh. Though Bangladesh is a second largest garments manufacturing country, it often fail to meet the production goals in due time. How these factors affect in a production line in a garments manufacturing industry from hour to hour has been analyzed graphically and the frequency of the problem occurring of different problem in different garments. The graphical representation of the different problems also indicates how decreasing the material quantity from operator to operator. This paper will highlight the problems of production and fluctuation of material flow from the first operator to QC table in the eye of the top management of garments or apparels manufacturing industry will also help to take necessary actions against it. Besides this paper represents some mitigation ways and a proposed production line to tackle these problems that will help the top management and also improve the efficiency of the production.

Key words: 5s, 7 wastes, RMG, Production problems and Production efficiency

INTRODUCTION

The apparel industry is one of the oldest, largest and among the most global industries being primarily concerned with the, design and production of clothing and their supply. It is the typical 'starter' industry for countries engaged in export-orientated industrialization and is labour-intensive [1-2]. Key to the economic transformation Bangladesh experienced over the last four decades has been the contribution of the globally competitive, export-oriented ready-made garments (RMG) sector. Increasing the competitive strength of Bangladesh's RMG sector helped the country to attain the distinction of being the second largest global supplier of apparel after China. Despite its consolidation as a major sourcing destination for apparel, Bangladesh still faces major challenges as sourcing strategies have evolved in accordance with the shifting dynamics of comparative advantages [3].

Readymade Garment (RMG) Sector is the main source of earning foreign currencies in the economy of Bangladesh. In 2010–2011 financial year 78.15% of the total income was from the garment sector. At present 5,100 garment factories are operating in this country and 3.6 million workers are working in this sector (EPB 2012) where more than 80% of them are female who mainly came from the rural areas of Bangladesh. It plays an important role in generating employment opportunities for the rural illiterate women otherwise they had to work as maid servant. Therefore, RMG sector opened a new door for rural people to engage themselves into the economic activities of Bangladesh [4]. One of the main challenges of today's apparel manufacturing industry is to be efficient and contribute to high effectiveness, i.e. customer satisfaction [5-6].

International trade of textiles and garments, and globalization in this industry, are not new phenomena. In fact, apparel is one of the oldest export industries, and has served as the "starter" industry for many export-oriented countries, especially in Asia [7-8]. Like 2005, 2008 was an important year in the global garment and textiles industry: 1) Vietnam entered the World Trade Organization (WTO) in 2007, and has turned out to be one of the leading competitors for Bangladesh; 2) U.S. and E.U. textile safeguards on China were set to expire on January 1, 2009; 3) the U.S.GSP5 was on hold at least through 2010; 4) there was some evidence of a slow decline in imports from countries like Bangladesh and Cambodia in 2007; and 5) 2008 saw the economic slowdown and recession in the major markets of the U.S. and E.U. [9].

Bangladesh is the second largest garments manufacturing country. Garments industries are labour incentive and millions of people are depended on this sector. These sectors are developing in day by day, besides the competition in the garments sector is increasing throughout the world. If it becomes to overcome the production problems that related to garments manufacturing, this sector will be rich and more competitive. This paper highlights the problems and the frequency the problem occurrence and also the mitigation ways of these problems that will be very informative to increase the concern of the top management that will help to increase the efficiency of the production and also the total FOB.

THE EFFECTIVE FACTORS BEHIND THE PRODUCTION EFFICIENCY

There are many reasons for decreasing the production efficiency that have been cumulated through a surveying in different garments manufacturing industries. These are listed in this paper by the following section with short description.

Machine Problem

Machine Problem (m/c) is one of the common problems of garment manufacturing industries where frequently m/c break down occurs. Due to needle break or destroy needle head production process stopped and any other process directly related with core process like sewing process may hamper. So because of machine break down or there is any problem in the machine may decrease the garments production.

Sewing Problem

Another problematic factor which is responsible for garments production is sewing problem. Some time it is seen that garment piece make gathering under Q.C table is responsible for production hamper which is known as "Alter". Sometimes the alter percentage goes up to 20 or more that is unbelievable, where 5 percentage or it's below is the tolerable limit or bounded limit. Normally when a new style enters in a line, the alter percentage increases due to lack of proper instruction by quality control department or due to forcing the operator to hurry up, even that times the reject percentage also increases.

Shade Variation

Shade variation problem is one of the major problems in garment manufacturing industries. When different type of fabric lot is mixed with each other in the cutting section then it may create deviation in the production floor and which ultimately decrease garments production.

Late Come

If operators and helpers come late to the work place or become absent then the starting of the production is to be delayed and for this consequence the production of garments also decrease for that day. Late come of the operator or technician or mechanics sometime results into bottleneck operation.

Size Mistake

In a factory you may find garments of different size (XS, S, M, L, XL, and XXL). If mixed with each other than it will decrease the garments production. It often occur during sewing the size label. Besides due to mismatch of the cutting department within different sized bundle, size mistake problem also occur that is very hardly controllable to the operator.

Cutting Problem

If there is a deviation of cutting of fabric asking by the production department from the cutting department then there will a problem of mismatch which will decrease the production. Cutting problem such as improper cutting is one of the main problems we normally found in factory and this problem arises because of unskilled workers.

Accessories Problem

When trims and accessories are not available or respective parties failed to supply in proper time in the production floor that may delay in operations. Sometimes invalid trims and accessories make bottle neck in production process and for this problematic factor production of garments reduced.

Delay in Input

When input supervisor doesn't bring the required input timely then it creates ultimate production loss. When order changes frequently, due to not having available fabrics that ultimately cause a problem to the cutting department even to the sewing department.

5S

5s is so much effective factor for the production. Maximum garments in the Bangladesh can't maintain 5s fully. It helps to eliminate waste, streamline production, and optimize efficiencies. When you adopt 5s thinking, you make a commitment to put safety, organization and effectiveness ahead of production deadlines, profits and output. The end result is always an increase in overall success, though growing pains will occur as the processes are implemented. 5s

helps put the worker in control, and uses their experience. Too often management rules process that they do not understand as fully and as well as the production line staff themselves. With 5s, the production line workers have a say in how the production line operates. Their experience and on-the-spot understanding of the production process can help them identify and eliminate waste in a way that a manager might never see. Another benefit of this idea is that the production floor staff becomes more invested in the process.

7 Wastes

To increase the productivity of a garments industry it is mandatory to reduce the waste and the non-value adding activities. Transportation, excess inventory, excess motion, waiting, over production, over processing and the defects are the non-value adding activities in a manufacturing unit and these activities also reduce the productivity. If it is considered, transportation is essential from cutting unit to sewing floor, from sewing floor to finishing unit. It is not possible to go ahead without transportation. For this situation the transportation time will have to reduce. Elevator system, transportation rail in the sewing lines reduces the transportation time. Generating more inventory than the demand of the following process means the excess inventory requires more working space that hamper the production. Excess motion at workstations is found due to poor training of workers in working methods and habit of working in traditional ways. In the factories where there are engineering department to designs workstation layout, operators may use excess motion due to poor workstation layout. For the good layout of the production it does not require excess motion from the operators and the excess motion frequently causes the quality defects. When layout changes sometimes it causes waiting for the operator even the delay input supply is the reason for supervisors waiting that hampers the production. Good planning system can reduce this non-value activity. Excess production is found in the cutting unit and sewing unit and that is the reason of excess inventory. To reduce this problem the organization has to maintain actual production with the actual demand even in the cutting unit. Over processing waste can be defined as doing task or adding features to the product those are not requirement from the customer. Accurate specifications and guideline of the quality department can reduce it. Defects in garment manufacturing are like shade variation, wrong cutting, stitching defective garment etc. In case defective garments are made, factory needs to alter and repair those defective garments before handing over to the buyer. Repair work costs money and time. In lean manufacturing factories aim to produce garments right first time.

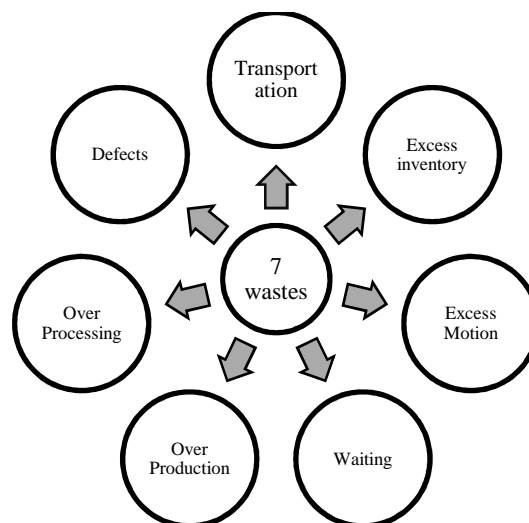


Fig. 1 7 wastes of a garments industry

Salary based/Piece Rated Operator

There are two types of production one is salary based production and another is piece rated production. Between this two types of production system piece rated production system is preferable due to having their own interest in the production. The management team has to be so strong for the production from salary based operator. Normally the piece rated operator are interested in a same order production. When there creates more order variation, normally layout changes and that ultimately creates production slow. In that situation there creates a problem among them. But for the salary based operator there is no such kind of problem but they always try to pass the time idly can restrict this through the strong management rules. Each of them has some advantages and disadvantages. For the production at first the organization has to choose what types of operator is preferable. There are available factories where there are both types of operator according to their necessity.

Power Failure

Inadequate power supply or failure of power is one of the considerable problematic factors which are responsible for decrease in garments production. Although you have enough man power but you do not sufficient power to run your production process, so ultimately your production will reduce.

In addition to the above mentioned factors there are some other important factors which are also responsible for decrease the garments production such as Change over time schedule, new layout, Air compressor problem, Embroidery problem, Printing problem, Problem of planning and proper coordination etc.

A survey in different garments manufacturing industries indicates there is many problems each and every factory. The common problems are m/c problem, sewing problem, shad variation, late come, accessories problem, cutting problem, size mistake, delay input, power failure, 5S breaks, 7 wastes and others. Sometimes it becomes very difficult to achieve the daily target due to these problems. Besides shipment can't be possible due to not achieving the daily target. For this reason the factory has to accept the air shipment that is very costly. Table 1 represents the different problems that face different apparels manufacturing industry and also indicates the frequency of occurrence very often (V), often (O) or few times (F).

Table -1 Frequency of Problem Occurrence in Different Industries

Affecting Factors Name of the factories	Machine Problem	Sewing problem	Shad Variation	Late Come	Accessories Problem	Cutting Problem	Size Mistake	Delay in Input	Power Failure	5S Breaks	7 wastes Occurs	Target achievement (avg. %)	Factory efficiency (avg. %)
Fakir Apparels Limited, Narayangang.	V	O	F	F	O	O	F	F	No	O	O	85.60	51.08
Fakir Fashion Limited, Dhaka.	F	O	F	F	V	No	F	F	No	V	No	90.10	49.90
Epyllion Style Limited, Gazipur.	O	V	V	F	F	O	O	F	NO	O	O	88.50	52.50
Interstoff Apparels Limited, Gazipur.	V	O	O	F	O	No	F	O	No	F	F	91.20	52.80
Liz Fashion Limited, Gazipur.	F	V	No	O	F	F	F	O	F	O	O	90.05	51.08
Esquere Fashion Ltd. Gazipur.	O	O	F	F	O	No	F	F	No	F	F	92.20	51.50
Antim Group, Dhaka.	V	O	O	F	F	F	O	F	No	F	O	93.07	50.20
Talisman BD Ltd, Savar, Dhaka.	F	V	V	F	F	O	O	F	No	F	F	93.10	53.06

Table -2 Line Production Fluctuation due to the Different Problems

Prod. processes Prod. Problems	P/M	F/L	O/L	O/L	P/M	F/L	F/L	O/L	P/M	F/L	O/L	In QC Table	QC Pass (5% defective)
Capacity	120	120	120	115	110	120	110	100	105	110	105	105	100
Time waste due to m/c prob. (min) in 2 nd hour		20		15		15		10					
Material flow after m/c prob.	120	120	113	113	108	108	103	103	96	96	96	96	91
Time waste due to sewing prob. (min) in 4 th hour	15		10				20		10				
Material flow after sewing prob.	115	115	113	109	108	108	103	96	96	92	92	92	87
Time waste due to size mistake (min) in 5 th hour								30					
Material flow after size mistake	115	115	113	109	108	108	103	96	86	86	86	86	81
Time waste due to accessories prob. (min) in 7 th hour									40				
Material flow after accessories prob.	115	115	113	109	108	108	103	96	86	72	72	72	68

The problem that occurs very often should solve as soon as possible otherwise that result in bottleneck operation. Machines problem mainly occurs when the machines are used for a long time. The oldest machines what creates problem frequently should be changed. The top management should pay attention what are the root cause for hampering the production efficiency. There is creating a competition among the garments industries and also increasing the order quantity. The competitive environment and the increased buyer demand and the quality are enforcing to do better in production system and also the performance through the top management. Many industries are trying to develop lean manufacturing like Fakir Apparels Ltd., Fakir Fashion Ltd., FCI group etc. The frequency of the problem occurrence was greater compared to the present time of the above industries presented in Table -1 by the conversation of the top management and also improving the production efficiency.

Here, there is a Table -2 that shows the fluctuation of line production due to different production related problems of a line in Fakir Apparels Ltd. The table shows how the production is hampering due to different problems from hour to hour.

The line target is 100 pieces per hour for a basic T-shirt that SMV 3.05 minutes. For the line the different operators capacity are shown in the below Table 2. In 2nd hour machine problem occurred in two F/L machines & two O/L machines and the consumed time were 35 minutes and 25 minutes.

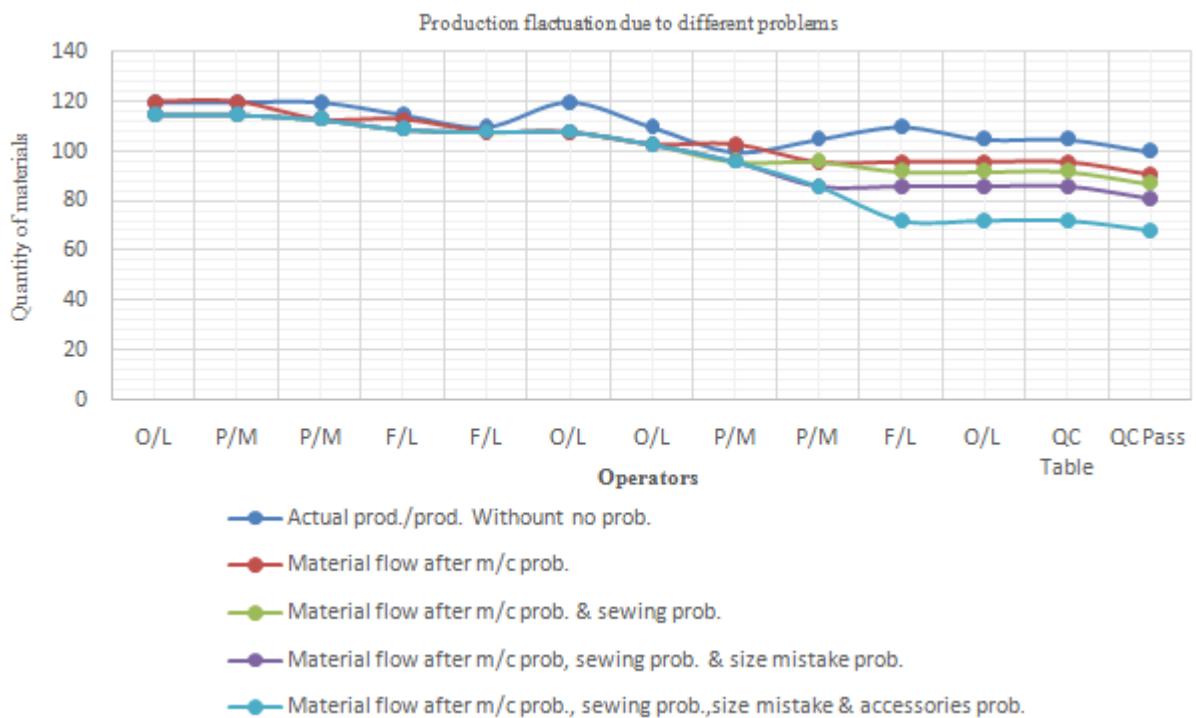


Fig.1 Fluctuation of production due to different problems from machine to machine

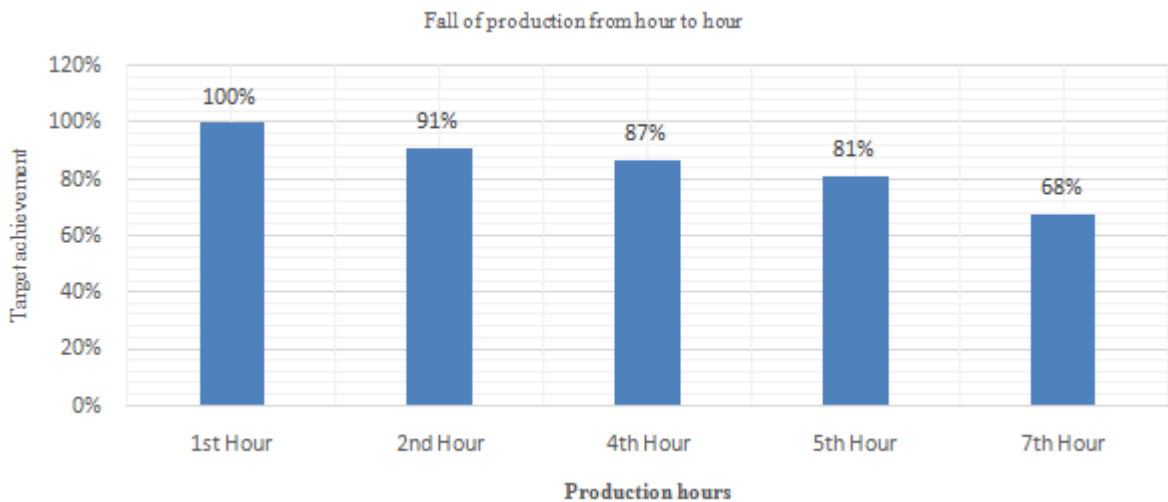


Fig.2 Fluctuation of target achievement in different hours

The problem was occurred in the F/L machine that decreases 7 garments i.e. 113 pieces garments flow towards the next O/L machine, the next O/L machine decreases 5 garments i.e. 108 pieces garments flow towards the next P/M machine, the next F/L machine decreases 4 garments i.e. 103 pieces garments flow towards the next F/L machine and the last O/L machine also decreases 4 garments i.e. 96 pieces garments flow towards the next P/M machine. This is the only production hamper due to m/c problem in 2nd hour. Besides there were others reasons that occurred respectively in 4th hour, 5th hour and 7th hour that affected on the line production severely. Table 2 also represents the production fluctuation due to sewing problem, size mistake and accessories problem. Due to these reasons the line production efficiency stood respectively 91%, 87%, 81% and 68%. Besides there are others reason of production hamper like shad variation, 5s breaks, 7 wastes, power supply, cutting problem, delay input and others that affect the production.

How target achievement in a line falls from hour to hour in a day due to different problems is shown in fig.2. In first hour target achievement is 100% without any problem where in 7th hour 68% due to sewing problem, machine problem, shad problem and size mistake problem. Top management strike rules and conscious of the production team can save from such kind of production fall.

EFFECTIVE WAYS TO REDUCE PRODUCTION PROBLEMS

- Providing a proper training system for helper, operator and supervisor. The failure rate of the new employees is too much not only in the production line but also everywhere in the factory like in planning, merchandising, supply chain and others without any training. If the management of the factory provide a training system, the failure rate will be reduced.
- Every line should have an industrial engineer. How to reduce bottleneck problem, m/c exchange for a new layout, time study, method study, line graph and others tasks by an industrial engineer helps to increase production efficiency.
- The machines that are manually operated and failure rate high have to change. There are many garments industries where there are numerous manually operated machines that occurs frequently breakdowns that is another great reason for the decreasing of production efficiency. The top management should change these by new ones that will also be a positive impact on quality.
- The alter percentage and the reject percentage must be reduced. It is better to keep the alter percentage below 5% and for reject 2%.
- The cutting department problem like failure to supply input in the sewing line in due time, size mistake, label mistake, bundle size has to be reduced.
- The dying department problems like shad problem, chemical composition problem have to be reduced.

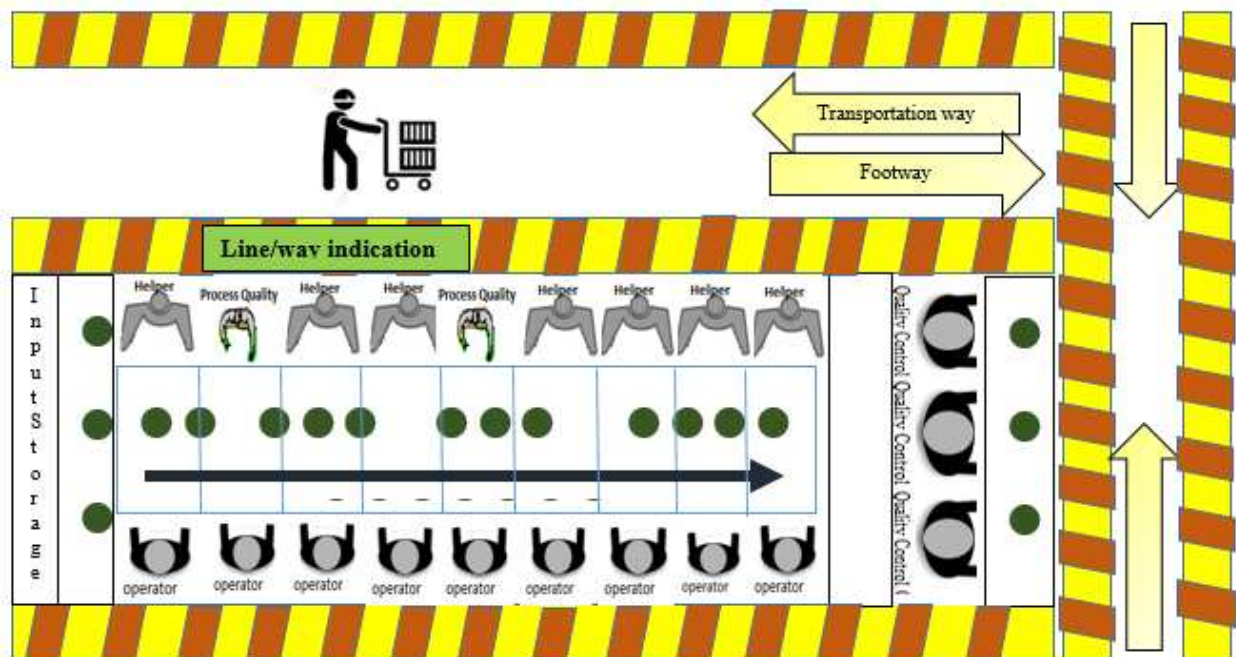


Fig.3 Design of a proposed production line

The fig. 3 is a proposed production line, among the different production lines analyzing different garments industries that will minimize the waste, shows the position of operator, helper, input storage, quality inspection, process quality, line gap, ways for materials transportation, production line size and all others. Every line should have a line

supervisor, line quality, an industrial engineers, a mechanics and a technician. The survey in many garments results into that many garments follow different types of production line where the production line and the quality inspection table are in different position that sometimes creates problems and consumes time. The above production line will increase the production efficiency and also save the time.

DISCUSSION

Different problems that reduce the production efficiency and also reduce the product quality have been integrated together in this paper. The summary of problem occurring and the frequency of problem occurrence of different industries are analysed and finally represented by table. How production efficiency falls from machine to machine due to these problems has also been analysed graphically. In a garments industry problems may occur from different departments have also been integrated. This paper will reflect these problems and the mitigation ways to the top management of the industries and also be effective to take actions against these problems. Finally this paper provides the mitigation ways against these problems and also a production line.

CONCLUSION

Due to having some production problems the garments sector of Bangladesh can't reach the desired position. To centre these problems this paper integrated these problems and also shows some effective ways to recover them. There are many factories that follow line production and some follow group technology. For the top management for both production process this paper will be very effective because (1) they can easily identify their root causes of production loss because this paper listed all the problems of production (2) can realize the production fall from process to process (3) will provide training for all the departments to make them conscious and finally (4) will be helpful to take actions against the production loss from the list of effective ways to mitigation production problems. Besides to go ahead in the competitive world it has gone very necessary to eradicate the problems to achieve the maximum FOB. This paper will be very effective to the top management of any garments industry to take challenges in the competitive world and to increase factory efficiency.

REFERENCES

- [1] Devkumar S Callychurn, K Soobhug and Dinesh K Hurreeram, Key Success Factors for the Apparel Manufacturing Industry: A Case Study at Company X, *Proceedings of the World Congress on Engineering*, **2014**, 2.
- [2] G Gereffi and O Memedovic, *The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries*, United Nations Industrial Development Organization, Vienna, **2003**.
- [3] Dirk Willem Te Velde (ed.), Enhancing productivity in Bangladesh's Garment Sector, *Current Policy and Research Debates*, Bangladesh, **2014**.
- [4] Shaheen Ahmed, Mohammad Zahir Raihan, Health Status of the Female Workers in the Garment Sector of Bangladesh, *Journal of the Faculty of Economics and Administrative Sciences*, **2014**, 4 (1), 43-58.
- [5] Jussi Heikkila, From Supply to Demand Chain Management: Efficiency and Customer Satisfaction, *Journal of Operations Management*, **2002**, 20, 747-767.
- [6] Shibbir Ahmad, Al Amin B Khalil, CAA Rashed, Impact of Efficiency in Apparel Supply Chain, *Asian Journal of Natural and Applied Sciences*, **2012**, 1 (4), 36-45.
- [7] Frederick H Abernathy, John T Dunlop, Janice H Hammond and David Weil, A Stitch in Time: Lean Retailing and the Transformation of Manufacturing-Lessons from the Apparel and Textile Industry, *Oxford University Press*, **1999**.
- [8] Gary Gereffi, Outsourcing and Changing Patterns of International Competition in the Apparel Commodity Chain, *Responding to Globalization: Societies, Groups, and Individuals*, Boulder, Colorado, **2002**.
- [9] Sanchita Banerjee Saxena, Competitiveness in the Garment and Textiles Industry: Creating a supportive Environment: A Case Study of Bangladesh. *The Asia Foundation*, Occasional Paper No. 1, **2010**.