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Study on Machine Stoppage Time in the Garments Industries in Bangladesh

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Abstract

The work reported in this paper is the outcome of a study on stoppages of sewing machines during production on the sewing floor. The study was conducted in three 3 different but highly reputed garment industries in Dhaka, Bangladesh. For the sake of confidentiality, the name of the garments industries was not disclosed, however, denoted as A, B, and C. There are various reasons for which sewing machine stops, the reasons were categorized as (i) Cut panel was not supplied, (ii) Lack of power supply, (iii) Absent of operator, (iv) Machine problem, and (v) Lack of accessories. These five categories were then again classed into two classes; a. Controllable, (Interrupted supply of cut panel and accessories) and b. Uncontrollable (Machine problem, lack of power supply, and absenteeism of operator). It was found that the most important cause of stops (duration wise) was interrupted supply of garment parts from cutting to sewing section followed by mechanical problems, lack of power supply, and absenteeism of operators. It was also observed that the reasons for stoppages varied among the factories.

Keywords: Sewing Machine, Stoppage Time, Absenteeism, Cut Panel, Accessories, Garments Production.

I. Introduction

Everywhere in the world, the industry sector has been the driver to change the economy of the country. Bangladesh is one of the leading exporters of RMG products in the world. In Bangladesh, the average growth of the industry is higher than in agriculture. In recent garments, many industries have been suffering from various types of uncertainties from the point of view of productivity and costing. One of the important causes for this is potential competitors in the global market. It is widely believed that the profit margins of the garment manufacturers lie in a very narrow range. From a logical point of view, both productivity and costing are closely related. Productivity may mainly refer to the output from the sewing floor. Hence stoppages of the sewing machine are the most important causes of loss of garments production. The present paper deals with a study on the stoppages of the sewing machines for various reasons. An investigation was conducted in three renowned garments factories of Dhaka. In each factory 150 sewing machines were targeted; thus 450 machines were under observation. Employing a stopwatch duration of stoppage of sewing machines and corresponding causes were recorded. The causes were then categorized as follows; (i) Cut panel was not supplied, (ii) Lack of power supply, (iii) absence of operator, (iv) machine problem, and (v) Lack of Accessories (M. Yunus and T. Yamagata, 2012)

The RMG sector of Bangladesh enjoyed very rapid growth for a long period, still, the RMG industries are facing several problems e.g. insufficient inputs from the local market, insufficient focus on the product and market, the poor performance of the backward linkage industries, possible trade diversion from various regional trade agreements, production of low value-adding products, labor compliance, infrastructure constraints, etc. (N. Ahmed, 2009). Bangladesh would be going to face tough competition from many apparels producing countries e.g., China, Vietnam, India, and Pakistan. In all cases, the cost of the product is the main concern. The cost of product or production depends on several factors but machine stoppage during production is an important reason that affects the cost of production directly (A. K. M. Masud *et al*., 2007). Uninterrupted and smooth operation of a manufacturing industry depends on a great extent on the reliability of man, machines, and materials. Methods of material handling and other value-adding processes and functioning of a

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health management system throughout the manufacturing system. To maintain the production performance steady, an assimilated harmonious method consisting of man, machine, process, and management is inevitable, but this is not always achieved as expected. Though all types of modern technology and techniques are available even then most manufacturing organizations still facing undesirable consequences and unwanted setbacks e.g., machine breakdowns, machine stoppages, material shortages and supply, accidents, and absenteeism, etc. that make the system unreliable and unpredictable (M. A. Islam and D. Tedford, 2012; A. Mital and A. Pennathur, 2004; L. Monostori *et al*., 1997).

II. Methods

Three knit garments factories were chosen from the greater Dhaka area. For the sake of confidentiality, the factories were denoted as A, B, and C. At each factory, 150 machines were selected at random for the study. Using a stopwatch, the stoppage time was recorded and for each stoppage, the causes of stoppage were identified and recorded. The observations were made for 7 days at each factory for 4 hours per day. Thus, altogether 7×4 = 28 hours were spent at each factory. The stoppage data obtained from the three garment factories are shown in Tables 1, 2, and 3 respectively.

The causes of the stoppages data obtained from the three factories (shown in table 1, 2, and 3) were then summarized and categorized as (i) Cut panel was not supplied (X), (ii) Lack of Accessories (Y) (iii) Lack of power supply (Z), (vi) absent of operator (Abs) and (v) machine problem (MP) and shown in Table 4. The summarized stoppages categories shown in table 4 were further categorized as Controllable, Uncontrollable, and Maintenance related stoppages. Maintenance-related problems were categorized separately because if the factory people are careful some of the maintenance problems can be minimized to some extent, but some mechanical problems may not be possible to avoid at all due to wear and tear. Therefore, maintenance related problems were not categorized as controllable or uncontrollable. There were 450 sewing machines under observation and during the study 96 machines were found to stop for various reasons. The stoppage times of those machines were expressed as the percentage of total production time.

III. Results and Discussions

For analytical purposes and better clarity, the data shown in several tables. Here Tables 1, 2, and 3 denote various stoppage reasons with the responsible department for factory A, B & C. Table 4 were used to make several pie charts and were denoted as Figures 1-6. Figure 1 represents the machine stoppage due to an insufficient cut panel. Figure 2 represents the machine stoppage due to the lack of accessories. Figure 3 represents machine stoppage due to power failure. Figure 4 shows the machine stoppage due to the absenteeism of workers. Figure 5 represents stoppage due to maintenance related problems. Finally figure 6 represents the Summary of the distribution of controllable, uncontrollable, and maintenance-related stoppages in the three factories.

Table 1: Details of various types of stoppages (in min) and their causes for 150 machines in factory A (For seven days, four hours every day)

No. of M/Cs Stops	Duration	Reason	Responsibility	NS	TNS (Day wise)	TST
01	40	No cut panel	Cutting dept.	4	8	84
01	44	Power failure	Electric dept.	4		
03	120	No cut panel	Cutting dept.	12	24	167.32
01	44	Change the looper	Operator	4		
01	3.32	Machine problem	Mechanical Dept.	8		
01	48	Elastic supply delay	Lineman	4	24	304
02	72	Mechanical problem	Mechanical Dept.	8		
01	100	No cut panel	Cutting dept.	4		
01	20	Absence of an operator	Operator	4		
01	28	Machine problem	Mechanical dept.	4		

03	13.32	Machine problem	Mechanical dept.	12	16	44.4
01	31.08	No cut panel	Cutting dept.	4		
01	44.88	Piping not supply	Operator	4	8	96.88
01	52	Power failure	Electric dept.	4		
01	52	Absence of worker	Operator	4	12	62.36
02	10.36	Machine problem	Operator	8		
01	62.68	Machine problem	Mechanical dept.	4	8	68.8
01	6.12	Looper change	Operator	4		

[N.B: Total 24 machine stopped due to various reason, TNS= Total number of Stop, TST= total stop time, NS= No. of stop]

Table 2: Details of various types of stoppages and their causes for 150 machines in factory B (For seven days, four hours every day)

No. of M/Cs Stops	**Duration**	**Reason**	**Responsibility**	**NS**	**TNS**	**TST**
02	92	Power failure	Electric dept.	12	12	92
01	44	No cut panel	Cutting dept.	4	28	184
01	36	Operator' absence	Operator	4		
02	48	Drop stitch	Mechanical dept.	8		
2	4	Single needle machine problem	Operator	8		
01	52	Elastic supply delay	Lineman	4		
02	72	Mechanical problem	Mechanical dept.	12	28	368
01	36	Operator' absence	Operator	4		
02	120	No cut panel	Cutting dept.	8		
01	140	Elastic supply delay	Lineman	4		
01	240	No cut panel	Cutting dept.	4	32	291.4
01	16	Needle breakdown	Operator	4		
04	35.4	Skip stitch s/n machine	Operator	24		
02	28	Power failure	Cutting dept.	8	20	220
01	48	Drop stitch	Mechanical dept.	4		
02	144	No cut panel	Supervisor	8		
01	48	Drop stitch	Mechanical dept.	4	40	236
02	84	Power failure	Electric dept.	8		
01	40	Piping does not supply	Operator	4		
04	48	Machine problem.	Operator	24		
01	32	No cut panel	Supervisor	4	20	128
01	20	No sewing thread	Lineman	4		
02	64	Drop stitch	Mechanical dept.	8		
01	12	Lace not available	Supervisor	4		

[N.B: Total 39 machine was stopped due to various reasons]

Table 3: Details of various types of stoppages and their causes for 150 machines in factory C (for seven days, four hours every day)

No. of M/Cs Stops	Duration	Reason	Responsibility	NS	TNS	TST
02	35.28	Over Lock machine problem	Operator	8	24	227.28
04	192	No cut panel	Supervisor	16		
01	32	No cut panel	Supervisor	4	24	121.44
02	63	No sewing thread	Lineman	12		
02	26.44	Machine problem	Operator	8		
01	18	Lock stitch machine problem	Mechanical dept.	4	16	106.4
02	56.4	Power failure	Electric dept.	8		
01	32	Overlock machine problem	Operator	4		
02	45.08	No cut panel	Lineman	8	20	93.64
01	16	Worker's Absence	Lineman	4		
02	32.56	Stitch problem	Operator	8		
01	44	No cut panel	Lineman	4	16	78.76
02	18.64	Overlock machine Problem	Operator	8		
01	16.12	Faulty Stitch	Operator	4		
02	52.72	Button attach machine problem	Mechanical dept.	8	24	122.2
01	40	Absence of an operator	Operator	4		
03	27	Machine problem	Operator	12		
01	18.04	Single needle machine problem	Mechanical dept.	4	12	85.56
01	8.52	Looper thread change	Operator	4		
01	60	No cut panel	Lineman	4		

[N.B: Total 33 machine was stopped due to various reasons]

Table 4: Summary of the Number of stoppages (min) and their causes of the three factories

Factory	Controllable				Uncontrollable				Maintenance	
	X		Y		Z		Absenteeism		M/C Problem	
	No.	Time	No.	Time	No.	Time	No.	Time	No.	Time
A	24	291.08	16	159	08	96	08	92	44	189.68
B	28	568	20	264	28	204	08	72	96	399.4
C	36	373.08	12	63	08	56.4	08	56	72	287.8
Total	88	1232.16 (0.16%)	48	486 (0.06%)	44	356.4 (0.047%)	24	220 (0.020%)	212	876.88 (0.11%)
Total Stoppage time (min)		**429.54**				**144.1**				**219.22**
% of stoppage time		**4.76**				**1.58**				**2.43**
Grand total stoppage time:				**792.86**						
Grand total % of stoppage time				**8.77**						

[N.B: Calculation total machine 450, so total hour 450*7*4*60 = 756000 min]

X: Cut panel was not supplied, Y: Lack of Accessories, Z: Lack of power supply

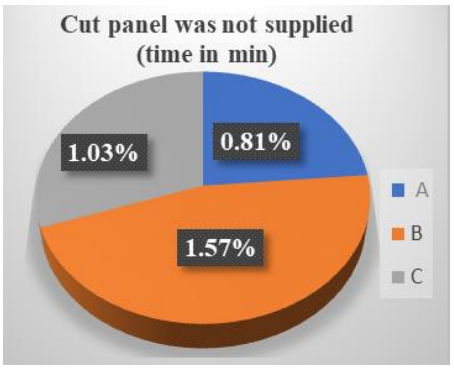

Figure 1: Stoppages due to insufficient cut

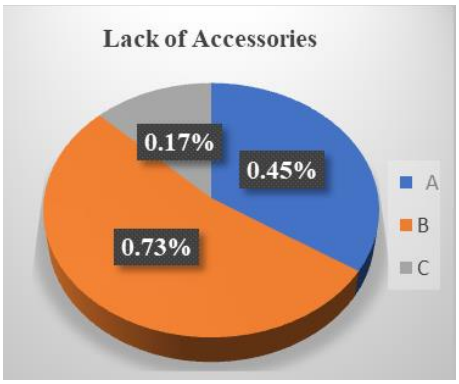

Figure 2: Stoppages due to lack of panel accessories

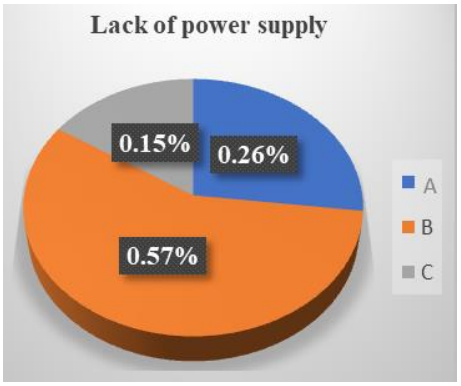

Figure 3: Stoppages due to power supply

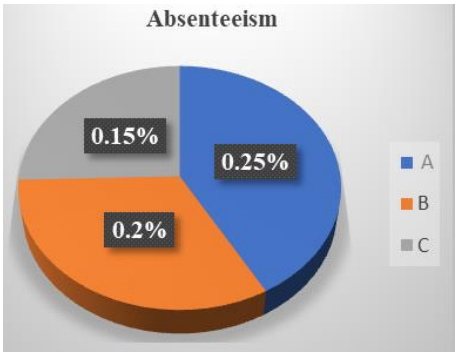

Figure 4: Stoppage due to absenteeism

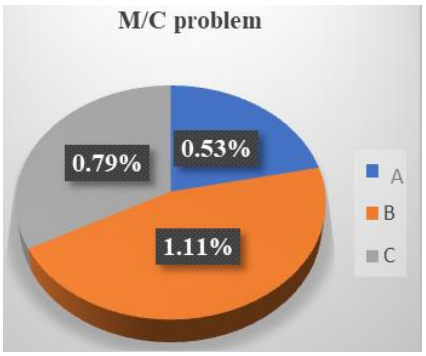

Figure 5: Stoppage due to maintenance-related problems

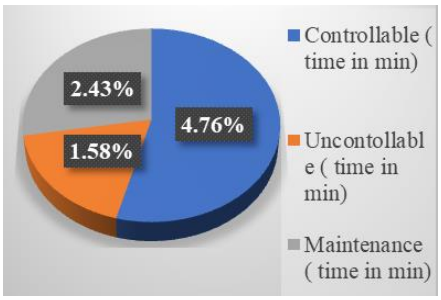

Figure 6: Summary of distribution of controllable, uncontrollable, and maintenance related stoppages in the three factories

During the study, a total of 96 out of 450 machines (150 machines in each factory) were found to stop due to various reasons. So, the total effective considered time for calculation is 150 hours (9,000 minutes).

A. Production loss due to machine stoppage in the three factories

Table 4 shows that the overall production loss due to machine stoppages was on average 8.77% which is somewhat significant if it is considered for round the year. Because most of the problems for which the machines were stopped were found to be controllable. As was mentioned in section 2, the various causes of machine stoppages were categorized as controllable, uncontrollable and maintenance it can be seen in table 4 that only 0.99% of stoppages were occurred due to power failure which was uncontrollable by the factory management. Stoppage due to absenteeism (0.61%) is also related to management's motivational ability, rest of the stoppages e.g., an insufficient supply of cut panels (3.42%), lack of spare parts (1.35%), and maintenance related problems (2.44%) which could have been easily controllable if the factory management were serious about preventive measures.

B. Major causes of stoppage in the three factories

Tables 1-4 and show that the supply of insufficient cut panels was the most important cause of machine stoppage and production loss in the three factories. The percentage of machine stoppages or production losses were 0.81, 1.57, and 1.03 percent of the total production time of the three factories, respectively. Some of the main reasons for the interruption of cut panel supply were poor planning before starting production of a new product. If the required amount of fabric is not ready, then at some stage there will be a shortage of cut panels. Sometimes shortage of cut panels occurs due to poor quality i.e., defective fabric leading to rejection of cut panels. In cases of printed, embroidered, and washed cut panels, the shortage may occur due to defect in printing, embroidering, and washing of the cut panels.

The next important cause of machine stoppage and production loss was maintenance related problems and were 0.53, 1.11, and 0.79 percent of the total production time in the three factories, respectively. Other important causes of machine stoppage and production loss were lack of supply of accessories (0.45, 0.73 and 0.17 percent respectively), power supply (0.26, 0.57 and 0.15 percent respectively), and absenteeism (0.25, 0.20 and 0.15 percent respectively) and. Among these three causes, lack of supply of spare parts is also an important cause of machine stoppage which the factories could have avoided by adopting proper inventory plan well ahead, stoppage due to power supply was higher but it absolutely depends on the local power supplying authority and the factories can do extraordinarily little about it. Absenteeism is indirectly related to the management's motivational ability. Some recommendations can be added to reduce the stoppage time in different sections. Delay in cut panel supply may be minimized by adopting some steps such as a bag system. The cut panel as well accessories can be packed together to reduce stoppage time as well as to ensure the availability of all required parts to workers. Another noticeable problem is the negligence of the worker. The motivation for work is important to reduce stoppage time. Proper counseling and periodical training can motivate workers. As a result, workers will complete their tasks with appropriate attentiveness that has a direct impact to reduce stoppage time. The maintenance section is also important to reduce stoppage time. Recruitment of educated & skilled people in the maintenance section will minimize the stoppage of the machine. As a result, machine stoppage will be reduced due to mechanical problems.

IV. Conclusions

Machine stoppages and corresponding production losses during manufacturing are inevitable but must not exceed the limit. So far, authors are concerned there are no guidelines or standards for machine stoppages. The machines under investigation were suffered 8.77% stoppages for various reasons. It seems that these percentages were too high. Interestingly it was found that 7.19% of stoppages occurred due to supply of cut panel, lack of accessories and maintenance were controllable by the factory management/people while only 1.58 % stoppages occurred due to power failure and worker absenteeism were beyond the scope of the factory authority and were uncontrollable. Therefore, it seems that there is a particularly good scope of increasing production of the three factories. If production is creased, then definitely the cost of production will decrease, and profit will also increase.

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