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Productivity in Indian Apparel Industry: Paradigms and Paragons

Rajesh Bheda, Professor

Garment Manufacturing Technology Department
National Institute of Fashion Technology

ABSTRACT

Labour costs are fast increasing in India and other Asian countries. To retain it's competitiveness, Asian apparel industry will have to pay increased attention to productivity improvement. The 1960's and 70's witnessed major research initiatives on apparel productivity in Western countries leading to a considerable improvement. The Asian apparel industry, however, shows much lower productivity performance. Studies have shown that the productivity performance of an average Indian apparel factory is one of the lowest in Asia. This paper discusses the productivity level in apparel manufacturing in India, the factors associated with productivity in Indian apparel industry and the scope for improvement.

KEYWORDS: Productivity, Apparel, Manufacturing, Improvement, India.

1 Introduction

In today's world, textile and apparel industry plays a significant role in the industrial growth of most of the countries regardless of the level of their economic prosperity. Increasing number of countries, including India, are using this industry for promoting the growth of their economy. This industry is vital for them due to its employment potential and export earnings. Apparel manufacturing activity has been shifting from developed to developing to least developed countries. International apparel trade is moving away from 'East to West' and 'South to North'.

The restraints imposed on world trade in textiles and clothing under Multi- Fibre Agreements (MFA) shall end by January' 2005, paving way to restraint-free global trade in textiles and clothing. The post MFA era is likely to witness growing competition mainly for the major consumption markets of North America and Europe. The developing countries like India and many other Asian countries, which earn valuable foreign exchange by exporting apparel, will now have to open up their domestic market to international players. The competitiveness of the industry shall, therefore, become critically important. Indian apparel industry will need to improve its performance on quality, productivity and technology front.

Indian apparel industry must be in a position to fully exploit its comparative advantages in terms of fabric availability, low wages and product development abilities. In this regard, the major stumbling block seemed to be low productivity performance of Asian, specially Indian apparel manufacturers. This necessitated an examination of the potential for productivity improvement in the Indian apparel industry .

The main objective of the study 'Productivity in Indian Apparel Industry: Paradigms and Paragons', was to:

1. examine productivity level achieved by Indian apparel manufacturers.
2. highlight the cases of excellence in productivity amongst the sample
3. Measure the productivity improvement potential for average Indian apparel manufacturer
4. Establish the factors associated with productivity
5. Suggest strategy for productivity improvement.

The scope of the study was limited to Indian apparel manufacturing industry involved in producing woven tops (shirts/blouse). To ensure certain minimum economies of scale, the sample was restricted to manufacturers having installed capacity of more than 35 sewing machines. Scope of the apparel manufacturers for domestic market was further restricted to national and regional brands only. This paper aims to discuss findings of the study limited to only first four objectives of the study.

2 Literature Review on Apparel Productivity

As per British Institute of Management Foundation[i] (1976), the term ' 'productivity' denotes the productiveness of the factors of production, i.e. labour and capital, in the creation of wealth. As regards selection of the right productivity indicators, physical measures like ratio of output to labour inputs is suggested for single or similar product industry. In an industry with multiple products of close similarity, output is converted in equivalent physical standard. The ILO action manual[ii] (1998) suggests use of 'partial productivity measures' like labour and machine productivity for plant level measurement of productivity in apparel industry.

Productivity performance of the apparel industry across the globe varies drastically. The report by Kurt Salmon Associates[iii](1999) provides productivity rating for apparel manufacturing industry in 55 countries. The report claims that the countries with highest productivity rating like Germany, USA, France and UK are 250% more productive than the least productive country covered in the study. The subject of apparel manufacturing productivity received major attention in the Western World during 1960's and 1970's. This was mainly due to the need to bring down the manufacturing costs to meet the international competition. Report by National Economic Development Office[iv] (1969),aimed at benchmarking the performance of British apparel industry vis a vis the European and American manufacturers, brought out useful insights on the productivity performances achieved then. Table 1 indicates the average productivity performance of the international and British sample for Jacket, trouser and shirt manufacture. As can be seen in the table 1, productivity of British manufacturers measured in terms of time taken per garment was substantially low, compared with the international sample. As regards shirts, British firms took on an average 34 minutes to produce men's shirt as compared to 18 minutes reported by the international sample.

As regards apparel productivity in the US, the American Apparel Manufacturers Association[v] (1976) report illustrates productivity improvement potential estimated by consultant members of the association in six standard garments, between the years 1960 and 1975. These garments were assumed to have been

Table 1: The average scope for improvement in labour productivity in sewing and finishing among British jacket, trouser and shirt manufacturers

Sr. No.	Description	Time taken per garment (minutes)		
		Jackets	Trousers	Shirt
1	Average performance of firm in British	260	66	34
2	Average performance of firms in the international sample	176	36	18
3	Estimated average achievable performance in the British Industry	180	40	23
4	Estimated potential productivity Improvement in the British industry on average*	45%	65%	48%

*Defined as the potential increase in output from a given number of Man- hours
Source: Attainable Production Targets, NEDO

produced with the most modern equipment and construction techniques available in 1960 and 1975. As regards dress shirts, direct labour productivity estimates of 3.76 and 5.50 pieces per hour were quoted for 1960 and 1975 respectively. Capelin vi reports that the methods engineering and mechanical development in 1950's made a significant contribution to bring down the standard minute value of dress shirts to 12 minutes. This performance still remains a productivity benchmark after almost four decades.

As regards research on apparel productivity in Asian countries,. Khannavii (1993) established productivity gaps between garment industry in India and the neighbouring countries. . As regards Gents Shirts, machine productivity was 9.12 pieces/shift for Indian industry compared to 20.87 pieces reported by Hong Kong manufacturers. The NIFT study**viii**(1997) carried out by the author, while investigating apparel productivity in Asian region, covering India, Hong Kong, Indonesia, Malaysia, Sri Lanka, South China and Bangladesh, arrived at an average productivity of 9.99 shirts per sewing machine per shift in case of Indian apparel manufacturers and 17.47 shirts in case of other Asian countries. This productivity performance of Indian apparel industry is drastically lower than, productivity performance reported by the Western industry in the studies discussed earlier. These studies also identified the factors associated with apparel manufacturing productivity, which are summarised as below::

Factor's affecting productivity	Studies
Level of technology	AAMA
Product style, price point and production volume	NEDO
Training of work force and management	NEDO, NIFT
Motivation level of work force & management	AAMA
Awareness of optimal productivity level	AAMA
High rate of non-first quality production.	NIFT,
Labour turnover and absenteeism	NIFT,
Production scale	NIFT
Lead time	NIFT
Industrial Engineering	NIFT, AAMA, NEDO
Labour relations	NIFT

3 Research Methodology

Development of Research Instrument

It was decided to use interview schedule for the purpose of data collection. This was done due to the extremely poor response to the questionnaire method as reported by the earlier studies on Indian apparel industry. The interview schedule was designed at gaining data on the current productivity performance of the factory, their perception of improvement potential and suggestions for improvement. The schedule also attempted to get data on the scale of operations, product-market orientation, human resource management practices, data on production and quality system and the technology level deployment. An attempt was made to cover all the variables that had shown association with productivity in the studies featuring in the review of literature. The interview schedule was also discussed with subject experts, before testing the same and incorporating the modifications,

The experience of previous research studies with interview schedule involving collection of extensive data on staff/ labour strength and practices; plant and machinery; production; quality control and productivity; has been that only progressive manufacturers respond and share such data. Therefore, it was decided to go in for 'judgement-- cum-- quota' sampling. As the study aimed to investigate the factors affecting apparel productivity in Indian factories, the quota for the sample was decided on the basis of the share of the regions in country's apparel exports. The sample was drawn from the shirt and blouse manufacturers among the 3000 active garment exporters and 36 manufacturers of national and regional brands of shirts in the domestic market. Primary data was collected from major apparel manufacturing centres of India, namely Delhi, Mumbai, Bangalore and Chennai, through personal interviews using structured schedule.

Field work/ Data collection

Eighty-eight manufacturers identified from the selected sample frame, were sent the communication inviting their participation in the study. Seventy-five companies responded with positive answers. The schedules received were then edited for completeness and accuracy of data. Sixty two interview schedules were finally selected for analysis. This accounted for 86% of the target sample size of 72 factories.

The interview schedules received and edited were suitably coded to facilitate data entry. A random check of accuracy of data entry was done. After completion of data entry and random check of all interview schedules, the master data file was ready for basic statistical analysis.

Data Analysis Techniques Used

The preliminary analysis involved the measures of central tendency, frequency distribution and cross tabulations. Correlation analysis was used to establish association between parametric independent variables and dependent variables. In case of non-parametric independent variables, ANOVA was used. Appropriate tests like 't' test and 'test of similarity of proportion' were used to evaluate the significance of the results. Statistical software 'Statistica' was used for the purpose of analysis.

4 Results

Out of the total sample size of 62 factories, as many as 57 factories provided actual productivity data. Rest five respondents, however, did provide most of the data excluding actual productivity figures. As the estimated machine productivity figures were available for these five factories, it was decided to predict productivity data, based on estimated productivity, using regression analysis. Estimated machine productivity showed a significant positive correlation with machine, operator and labour productivity with coefficients of 0.58, 0.58 and 0.41 respectively. Hence, after the estimation through regression, the

productivity data could be made available for all the 62 cases.

The findings on the performance of apparel factories showed an average productivity of 10.03 shirts per sewing machine, per shift. As evident in Table 2, the machine productivity and operator productivity figures were fractionally different, where as labour productivity mean was 8.03 shirts per shift. As the machine productivity and operator productivity had a perfect positive correlation of 1.0 and their values were quite similar, it was decided to use machine productivity data alternatively for both the measures of productivity.

Factors Associated with Productivity

The analysis for identifying the factors associated with productivity had to rely mainly on correlation in the case of parametric variable and ANOVA in the case of non-parametric variables. In case of non-parametric variables, it was considered essential to examine whether the difference in the mean value of productivity between populations divided based on category

Table 2.: Descriptive Statistics of Productivity Variables

Measure of Productivity	Valid N	Mean	Minimum	Maximum	Standard Deviation
• Machine	62	10.03	3.24	19.79	3.36
• Operator	62	9.99	3.24	19.79	3.47
• Labour	62	7.98	2.16	13.62	2.62

variable was by chance or there was a significant difference. It was decided to use one way ANOVA to examine the association of each category variable with productivity, the dependent variable.

Results of ANOVA

In the case of following variables, the null hypothesis that 'there is no significant difference in the population mean' was rejected. This means that the alternative hypothesis of 'there was significant difference in the means of populations' was accepted, thus establishing that the variables stated below were associated with productivity:

1) Production location
2) Organisation type.
3) Market orientation.
4) Major exports destinations.
5) Major product category
6) Education level of operators
7) Production system
8) Payment system
9) Presence of industrial engineering cell
10) Rewarding creative suggestions
11) Training for supervisors/ managers
12) Operator training
13) Induction training
14) Method of setting production standards

Table–3, provides summary results of Analysis of Variance (ANOVA) for all the variables indicated above. The table provides data on sum of square, degree of freedom, mean square, F-ratio, and the

tabulated F-value. A brief interpretation of these results is provided below:

- Factories located in Bangalore and Chennai were more productive than those located in Mumbai and Delhi.
- Factories owned by limited companies were more productive than private limited, partnership, and proprietary firms.
- Export manufacturers were more productive than the domestic manufacturers.
- Among the export destinations, manufacturers with USA as major market were more productive compared to those exporting to EU and Non-quota markets.
- Factories with shirts as major product category were more productive than blouse and other ladies' garment manufacturers.
- Workers with higher education were more productive.
- Progressive bundle system of production showed higher productivity as compared to line-and-sectional system.
- Factories using performance based payment system were more productive.
- Factories using scientific methods of setting production standards were more productive.

Table - 3 : Factors Associated with Productivity : Summarised Results of ANOVA (p= 0.05)

Factor	Sum of square between	Sum of square Within	Degree of freedom Between	Degree of freedom Within	Mean square Between	Mean square Within	Calculated F	Tabulated F
Production Location	39.3	177.3	4	57	9.8	3.1	3.20	2.57
Organisation Type	27.1	149.9	3	56	9.0	2.7	3.33	2.79
Market Orientation	11.4	92.8	2	58	5.7	1.6	3.56	3.18
Export Destination	57.1	341.2	2	47	28.5	7.2	3.96	3.21
Product Specialisation	109.4	419.4	3	45	36.46	9.3	3.92	2.84
Education Level	61.8	412.1	2	56	30.9	7.4	4.20	3.18
Method of Setting Production Standards	26.4	133.3	3	52	8.8	2.6	3.38	2.8
Payment System	69.4	363.1	3	56	23.1	6.5	3.19	2.79
Industrial Engineering Cell	30.6	359.1	1	56	30.6	6.4	4.78	4.03
Reward Suggestions	14.7	148.3	1	54	14.7	2.7	4.66	4.04
Training to Supervisors & Managers	15.1	128.3	1	43	15.1	2.9	5.44	4.08
Operator Training	25.3	216.7	1	50	25.3	4.3	5.88	4.06
Induction Training	58.1	451.5	1	50	58.1	9.0	6.44	4.06
Production System	55.8	172.5	3	53	18.6	3.3	5.60	4.04

Variables Associated with Productivity: Results of Correlation Analysis

The results of correlation analysis were as below:

Table 4: Correlation between Independent Variables and Machine/ Operator Productivity
(Limited to variables showing significant correlation at p=0.05)

Independent Variables	Correlation Coefficient with Dependent Variable: Machine Productivity (Valid N)
• Age	-0.30 (59)
• Rejection Level	-0.42 (53)
• Work In Process	0.37 (37)
• No. of Sewing Machines Installed	0.32 (62)
• Sewing Technology Index	0.30 (62)

5 Discussion

The study attempted to analyse the current paradigms in relation to productivity in the Indian apparel industry. The data as discussed in the results, suggests that machine/operator productivity is 10.03 shirts per shift. It must also be noted that the productivity level as reported by Bheda based on 1996 data, also had a very close figure of 9.99 shirts per shift for Indian apparel manufacturers. This indicates that the current productivity paradigm is about 10 shirts per shift per machine / operator. As regards the paradigm for improvement potential, the mean value reported by the respondents was 36%.

As regards, Paragons, the top performer factory demonstrated that a performance level of over 95% higher than the average industry performance, was possible to achieve. Hence, the Paragon of productivity reported in the study was 19.79 shirts per machine / operator shift. As regards improvement potential in the next two years, five respondents placed it at 100% while one respondent reported 110% improvement potential in productivity vis-à-vis 36%, the mean of improvement potential. The performance of the top performer (19.79 shirts) and the maximum improvement potential as reported by these six respondents, clearly indicate that an average Indian garment factory has about 100% productivity improvement potential.

When the factors associated with productivity are further analysed, it becomes clear that majority of these factors can be controlled by proactive and enlightened techno-managerial team.

6 Conclusions

Apparel productivity level achieved in India is substantially lower than the productivity performance of the Western industry. The study has established almost 100% productivity improvement potential for average Indian garment factory. When the factors associated with productivity are reviewed, it becomes clear that most of the factors are of techno-managerial nature and apparel manufacturers can improve the productivity performance substantially by implementing best practices in the area of operator and management training, industrial engineering, production planning and scheduling, industrial relations and productivity linked incentive scheme. Even though the study is based on the data drawn from Indian shirt manufacturers, the findings in terms of productivity improvement potential and factors affecting productivity, could be equally applicable to the industry in other Asian countries with similar industry profile.

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Author's Information:

Rajesh Bheda
Professor
Garment Manufacturing Technology Department
National Institute of Fashion Technology,
Hauz Khas, New Delhi, India
E Mail: rajeshbheda@bol.net.in