

Lean Production Practice: the Differences and Similarities in Performance between the Companies of Bangladesh and other Countries of the World

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Abstract: This paper discussed the practice of lean production in Bangladeshi garment firms to see the extent of use and the performance improvement. Then the result of the study has been compared to the other similar global studies to see the differences and similarities in the performance. The findings indicate that the result of Bangladeshi garment firms is positively related with the result of other global firms.

Key words: Lean production, Improvement, Bangladesh, Garment Industry, comparison.

INTRODUCTION

“Manufacturers are now a days forcing intensive global competition. They are becoming increasingly aware of the importance of modern management philosophy in providing them with a competitive advantage in a free market system” (Yeung and Chan, 1999, p.756). Since the industrial revolution quality has been considered as an important issue (Huang and Lin, 2002). “Now the key to competing in the international market place is to simultaneously improve both quality and productivity on continual basis” (Mannan & Ferdousi, 2007). Lean production philosophy aims to satisfy the customer by delivering the highest quality at the lowest cost in the shortest time (Manufactured Housing Research Alliance, 2005).

In the late 1980s the term “Lean Production” was introduced in a book titled *The Machine That Changed the World* written by Womack, Jones & Roos (1990). “The idea of lean thinking comprises complex cocktail of ideas including continuous improvements, flattened organization structures, team work, elimination of waste, efficient use of resources and cooperative supply chain management” (Green, 2000). This is a Japanese concept applied in manufacturing firms. The Japanese firms (firms in other countries as well) have been using this concept to reduce the cost of any process (be it service or manufacturing) by removing waste. The basic elements of the concept include waste elimination, continuous one piece workflow (EPA, 2003).

Lean production encompasses the total manufacturing chain from product design to product development, and it even embraces distribution (Cooney, 2002). According to the National Institute of Standards and Technology Manufacturing Extension Partnerships Lean Network, lean refers to systematically identifying and eliminating waste through continuous improvement using the pull production with a view to get perfection (Kilpatrick, 2003). Lean shortens the lead time between a customer order and the shipment of the products by elimination of

all forms of waste in the production processes. Simply said, “lean principles and methods focus on creating a continual improvement of culture that engages employees in reducing the intensity of time, materials and capital necessary for meeting customer’s need” (EPA, 2003, p.1). This operational strategy targets to achieve the shortest possible cycle time by eliminating waste. This strategy aims to increase the value-added work by reducing incidental work. This technique is used to increase profitability by reducing cost and by understanding the meaning of value to the customer because value is the major determinants of lean manufacturing. Companies are now convinced about the benefits of lean, and they are using this technique in both production and service functions.

The concept of lean production concept is still relatively new in Bangladesh. Some companies across the industry sector have been practicing lean production to remain competitive in global market. Having well established lean companies in USA, Europe, Japan etc., the performance gap between these companies and the companies of developing countries such as Bangladesh will continue to grow, unless such philosophies are embraced.

The purpose of this study is to highlight the differences and similarities of performance between the companies of Bangladesh and other countries of the world using lean or other similar philosophies such as lean production, JIT, TQM and leagile (combination of lean and agile) etc. Many elements of these philosophies are similar to each other such as leadership, employee involvement, cultural transformation, team work etc. For the purpose of this study a survey was conducted on nine garment firms with a semi- structured questionnaire to see the extent of lean implementation and the performance improvement. An interview was also conducted to gain a detail insight of the respondent. A checklist was used during the plant visit to observe the real scenario. The result of the present study then used to compare with other similar global studies. The information on similar

Table 1: Products of the companies

No.	Names of Companies Surveyed	Products Produced by the Companies
1	Fashion Point Ltd.	Pique Polo, Basic Fancy T-Shirt, Basic Tank Top, Fleece shirt with fancy design, Fleece Jacket, and Sweat shirt
2	Texas Fashion Wear Ltd.	All sorts of bottom and tops in Denim, Twill, Dress Pants and Denim Jackets
3	Beximco Fashions Ltd.	Men's dress and casual shirts and ladies blouses
4	Shanta Industries Ltd.	All types of woven Tops and Bottom
5	DADA (Savar) Ltd.	All kinds of headwear of different styles and designs
6	Shanta WashWorks Ltd.	Woven tops and bottoms for children/ladies/men as well as overalls and shortalls for infants and kids
7	Armana Fashions Ltd.	Woven garments (men's, ladies, and children's), woven Bottoms, and Tops
8	Shanta Denims Ltd.	All types of woven trousers, pants, shirts, shorts, blouse dresses, and overalls
9	PAXAR Bangladesh Ltd.	All sorts of labels (Tags) such as woven labels, printed labels, Hang tags, sticker items

global studies is the result of extensive literature review. The following section will provide an overview of the present study.

MATERIALS AND METHODS

Brief Overview of the Present Study: The present study consisted of a survey and interview of the plant head or production head of 9 garment factories in Bangladesh. Seven companies have been selected from the EPZ (Export Processing Zone) while two are situated outside of the EPZ. These companies are all ready-made garment manufacturers and 100% export oriented. The study focused on the extent of lean production practices in the selected garment factories and manufacturing performance improvement as a result of lean implementation. Findings indicate that high competition and pressure from different sources such as parent companies and buyer companies led the garment manufacturers to introduce lean. Before lean the companies' encountered problems such as long lead-times, long manufacturing cycle times, long delivery times, and also long inventory holding times as well as several other forms of wastes.

Products, Customers and Markets: The surveyed companies manufacture various categories of garment products. Lists of products produced by different companies are presented in Table 1. The list shows that the companies in general produce such products as ready-made woven products (men's, ladies', children's), woven bottoms, tops, trouser, woven shirts for kids, ladies skirt, T-shirt, Polo shirts, Sweat shirt, Tank Top, Fleece Jacket, Caps and Hats, Woven levels, Printed Levels, Hang tags, Sticker items etc.

As evident from Table2, no companies sell their products directly to consumers in the domestic market; all of them are 100% export-oriented. The Majority of the companies have a distribution channel consisting of more than one channel-member such as agents and wholesalers. Some of them (11%-22%) sell their products to dealers, distributors and retailers.

The surveyed companies were originally established as fully export-oriented firms. Their export-only focus has a direct bearing on their operations. Export-orientation requires full compliance with the quality-requirements of the foreign buyers who are highly quality-sensitive and cost-conscious. They are large buyers and their requirements must be satisfied by the supplier of products

Table 2: Customers of the companies (multiple responses)

No.	Types of customers	Percentages
1	Dealers/distributors	22
2	Agents	45
3	Wholesalers	22
4	Retailers	56

Note: All companies are 100% export-oriented

Table3: The different lean techniques the companies have adopted (Multiple responses)

Lean techniques	Percentage
Kanban	66
Daily schedule adherence	100
Small lot size	100
Just-in-Time	100
Physical arrangement of equipment	89
Application of preventive maintenance	89
Pull production systems	100
Continuous improvement	78
5S	44
Other quality practices (QC)66	100

Table 4: Benefits from Lean Implementation

Areas of benefits	Percentages of responses
ancrease in sales and profits	89
Reduction in order processing errors and paper works	67
Reduction in manufacturing cost	100
Reduction of staff demands allowingthe same number of office staff to handle large number of orders	78
Increase in overall revenue without increasing labor or overhead costs	56

in Bangladesh. These buyers also have access to the wide-open global garment product market in China, Mexico, India, Sri Lanka, Vietnam etc. With a view to satisfy the customer need as well as improve the present situation, the companies have reported that they have adopted a wide variety of lean techniques such as kanban, JIT, small lot size, equipment layout, preventive maintenance, pull production system, kaizen, 5S, QC etc (Table 3).

By using these techniques, the companies reported to have gained several benefits (Table 4).

In this improvement program, several factors supported the implementation effort. These supporting factors mostly include:

- Training from BGMEA (Bangladesh Garments Manufacturers and Exporters Association)-the umbrella organization entrusted with the overall welfare of the garment factories in Bangladesh
- Positive attitude of workers
- Top management support
- Assistance from customers or parent companies
- Customer suggestions
- Pressure from government and buyer

Table 5: Three Stages of Improvement

	Phase I: The initial approach	Phase II: Beginning of Kaizen	Phase III: A Team Approach to Kaizen
Lead Time	Ten weeks	Six weeks	Four weeks
Inventory Holding	30% of sales	WIP reduced total 30% of sales	WIP reduced total 30% of sales
Involvement of People	5 % of staff	10% of staff	30% of staff
Skill development	None	Ad hoc	Workshops
Benchmarking	None	None	Two plant visits conducted
Team Orientation	None	None	Two cross functional teams set up

Source: Mazany (1995)

- Internal motivation and
- Pre-awareness about the lean system

However as with any programs of improvement or change a number of constraints were also identified:

- Resistance from workers,
- Political unrest, migration of trained personnel,
- Port problem, traffic and transportation problems,
- Disruption in the power supply and
- Inadequate knowledge among some employees about the lean system.
- Cultural barriers and the like.

Findings based on the previous chapter indicate that although the organizations have several misconceptions about lean production techniques, their initiatives toward this technique brought several improvements for the companies, such as:

- Improvement in productivity 10%-60%,
- Improvement in quality 10%-60%
- Reduction in lead time 26.7%,
- Reduction in manufacturing cycle time 26.1%,
- Reduction in per unit cost US \$1.10,
- Reduction in inventory holding time 30.1%

These results suggest that lean production can bring significant performance improvement for garment manufacturers within the EPZ.

RESULTS

The results of the present study will be compared to the similar studies globally to highlight the positive association of the results. This association can provide a view to whether the Bangladeshi companies are experiencing similar barriers, enablers and results to previous similar efforts.

A study conducted by Mazany (1995), on a small knitwear manufacturer focused on how progressive implementation of Just-in-Time (JIT) can bring improvements in performance. It was a New Zealand based company producing approximately 90,000 garments per year both in local and foreign markets (export markets). The company produces an extensive product range which is seasonal in nature and annually revised with regard to styles, colors, patterns and yearns. The company encountered several problems due to the traditional manufacturing philosophy and observed high

levels of inventory, long lead time, poor communication and traditional layout. The selected garment manufacturers of the present study also encountered similar sort of problems such as long lead-time, long inventory holding time, long delivery times, several kind of manufacturing wastes etc. High competition and pressure from different sources such as parent company, buyer companies, led the surveyed companies to introduce lean. But in the study by Mazany (1995), the initial objectives of the company were to reduce lead time and inventory levels by 50% without any compromise in quality. These objectives were approached through three phases. Table 5 shows the summary of the improvements of the three phases:

Through gradual introduction of kaizen, multi-skilling and team approach. this company reduced the lead-time from 10 weeks to 4 weeks, and increased employee involvement from 5% to 30%. The company also introduced workshop to develop skills of the employees and conducted two plant visits for benchmarking. Under the present study the companies also introduced several lean tools such as JIT, kaizen, pull production, TPM, 5S etc and gained several benefits. These companies reduced lead-time, inventory holding time, manufacturing cycle time etc. compared to pre-lean period. Overall, the companies gained improvement in productivity and quality, reduction in lead time by 26.7%, inventory holding time by 30.1%, manufacturing cycle time by 26.1% and also reduced delivery time. The best company obtained a 50% reduction in lead-time which is consistent with this survey. While the companies under the present study introduced lean production to overcome the problems, the company of this study introduced JIT. JIT is a fundamental element of lean production. This indicates that in both the studies the companies used a number of similar tools and experienced many similar improvements. It is revealed that not all but the supporting and hindering factors were also common in many cases. Quality circle and awareness of employees are common in both the cases. In both the studies, the hindering factors showed similarities such as acceptance by the organization, management approach and philosophy (culture and traditional autocratic nature—top down decision making), cultural barriers etc. This means that similar methods across different countries can result in similar improvements.

Another study by Bruce *et al.* (2004) on the textiles and clothing industry of UK focused on how lean, agile and leagile initiatives work on supply chain management in the textile and clothing industry and improves lead-time

as well as help to achieve quick response. The study also shows the necessity of supplier's relationship in supply chain management.

The study indicated that textile and apparel is a volatile market where holding small quantities of stock is not a viable option and companies need to be very responsive to the customers' demand. The lean and agile approaches to supply chain effectively manage the manufacturing process and in turn reduce lead times. This paper reported about four case studies on four apparel manufacturers. Company 1, a fashion producer for the high street, used a combination of lean and agile (leagile approach) approach. It invested in CAD/CAM and ICT, those served to shorten lead times. The company recognized that good supplier relationships are essential to exploit this technology and to obtain premium service from suppliers to meet the changing demands.

Company 2, a fiber producer worked to reduce long lead times and dealt with large production runs which reflected lean perspective. On the other hand in response to competition and dynamic demand, the company was proactive in forming "pull" product into market place quickly. This exhibited company's agile approach. Company 3, the producer of accessories to the sportswear, used a mixed supply base approach. And company 4 focused on building relationships to achieve leagility in the supply chain. In summary, all the four companies in the textile and apparel sector used the aspects of both agile and lean to respond quickly to changing markets. The leagility approach helped the companies in the reduction of lead time of supply, as well as meeting the customer demand on time. In both the studies, the companies recognized that good supplier relationships are essential to obtain premium service from suppliers to meet the changing demands.

As a whole, all of the companies under this study had problems such as long-lead time, long response times, large production runs etc. those are similar to the present study. With a view to reduce the problems mentioned above, the companies under this study introduced either lean, or agile or a combination of these two (leagile) and improved the situation. The present study also showed substantial improvements in such areas through implementing lean. In both the studies, the companies highly emphasized the supplier relationship which indicates its importance in the garment industry. This comparison shows the positive association of the present study to this study.

A study by Kapuge and Smith (2007) focused on implementation of TQM among apparel companies in Sri Lanka and its impact on business strategy, management practices and performance reporting. Like the previous studies the Sri Lankan apparel industries encountered problems such as long lead-time, lack of product development, weak marketing and low labor productivity partly due to out dated technology. This industry in Sri Lanka has advantages like cheap labor cost, high labor standards, a literate labor force, investment friendly

government policies and strategic shipping lanes. The Bangladeshi garment companies under the present study are also enjoying many facilities like the above. Cheap labor is always a plus point for Bangladeshi companies as in Sri Lanka. In the present study the companies under EPZ are also performing under investment friendly government policies. The study by Kapuge and Smith (2007) showed that the companies with TQM philosophy have more developed quality practices than non-TQM apparel companies with significant differences in customer focus, process improvement, supplier linkage and physical and financial quality measures than non-TQM firms. The Bangladeshi garment companies also showed more customer focus, better supplier relations, improved process with lean philosophy. While employee empowerment is the most important element of TQM but this study indicates its lacking in both TQM and non-TQM firms. In the present study the Bangladeshi firms highly recognized the importance of employee empowerment.

From the above comparison it is established that the performance results of the present study have a positive association with other studies using similar philosophies. All of the companies under comparison are either garment or textile in nature. These studies showed many similarities in problems and in the resulted performance. Different approaches such as lean, JIT, leagile, TQM etc. were used by the companies under different studies to solve the similar types of problems. These philosophies have common characteristics such as team based work, employee involvement, importance of leadership, cultural transformation etc. From this comparison Bangladeshi companies can take lesson that due to these common characteristics not only lean but also these companies have the potential to implement the other approaches like TQM and leagile. It is not possible to quantify the significant improvement in these companies because the studies were conducted under different organizational settings and conditions. As found in the comparison of the results of the present study to other studies, world class improvements can happen in the Bangladeshi firms. But this requires the right environment. If these selected Bangladeshi companies can achieve performance improvement then other garment companies of Bangladesh can also get the same by giving the right environment. Therefore, work lies in extending this training to all industries. It is important to create the right environment for all industries to realize these improvements.

CONCLUSION

In order to obtain information about the extent of lean production practices and manufacturing performance improvement in the selected Bangladeshi garment firms, the study examined the adoption of various lean tools and the benefits derived from these lean practices. The study also identified the supporting and hindering factors in lean

implementation. An analysis of the available data indicate that, in the selected garment firms in Bangladesh, lean practices have a significant relationship with a number of positive outcomes. These outcomes include: decrease of unit production cost, up-scaling quality of products, reduction of lead time in the production process, reduction of manufacturing waste in all forms, reduction of manufacturing cycle time, reduction of inventory of raw materials and finished goods. When compared to similar studies, the results of the present study demonstrates that the Bangladeshi garment firms are experiencing similar barriers, benefits, as well as improvements etc. to the implementation of improvement initiatives. This indicates that the companies in the EPZ represent the best possible environment for Bangladeshi companies and so represent the best case scenarios and a benchmark for other companies in Bangladesh.

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