Chapter 3

Lean Applications in the Garment Industry

In this chapter we examine some case studies done in the past concerning the implementation of lean practices in garment, apparel or textile industries. With this we have two objectives: one is to understand which lean principles are more appropriate for these industries; another is to examine whereas the cellular or modular system brings in fact more advantages than the traditional bundle system.

3.1.1 - Adapting lean manufacturing

Although there’s a lack of research evidence regarding the impact of lean tools and techniques on manufacturing performance improvement in the garment industry, we were able to find a few case studies from which we can collect data concerning which lean principles are more appropriate for implementation in this industry.

One of the studies analyzed was the “Adapting lean manufacturing principles to the textile industry” (May 2010) by Kelly Goforth. [22] In this article the authors analyzed which lean principles are appropriate for implementation in the textile industry through interviews, plant tours and case studies on eleven textile industry plants, primarily located in North and South Carolina, USA. The characteristics of these plants and the different tools used are summarized in Table 3.1 and Table 3.2, respectively.
From these eleven plants, five case studies were conducted, three of those focused on the 5S program and two on VSM. “Visual Management and 5S (which is one type of visual management) had been used by ten of the companies and VSM by nine. The 5S was often cited as one of the first lean tools implemented.” [22]

In the article, the author stated that, based on the interviews, some barriers for implementing lean were:

- resistance to change both shop floor employees and management;
- shop floor employees are reluctant to offer suggestions for improvements;
- disconnect among marketing, sales, product and development;
- mindset that because textile machinery represents such a large asset, the machines should always be running.

And it was mentioned the following benefits:

- creating smaller lot sizes;
- reduction of raw materials;
- reduction in product complexity;
- decreased inventory (by 50% in one company);
- reduced changeover times (from 1.5 days to 45 min in one example);

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**Table 3.1 - Description of companies interviewed [22]**

<table>
<thead>
<tr>
<th>Company</th>
<th>Area of manufacture</th>
<th>Size of company</th>
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<tbody>
<tr>
<td>A</td>
<td>Performs spinning, warping, slashing and weaving. Finished product is woven</td>
<td>Small</td>
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<tr>
<td>B</td>
<td>Plant performs dyeing and finishing, slashing, warping and weaving. Finished product is woven</td>
<td>Large</td>
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<td>C</td>
<td>Performs cut and sew operations to knit goods. Finished products are knit garments</td>
<td>Large</td>
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<tr>
<td>D</td>
<td>Plant performs spinning and warping operations which supply an internal customer</td>
<td>Large</td>
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<tr>
<td>E</td>
<td>Plant performs spinning and knitting operations which supply an internal customer</td>
<td>Large</td>
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<tr>
<td>F</td>
<td>Performs warping, dyeing, weaving, knitting, and printing. Finished product is either a knit or woven</td>
<td>Small</td>
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<td>G</td>
<td>Performs cut and sew, assembly, and distribution activities to textile auxiliary products</td>
<td>Medium</td>
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<tr>
<td>H</td>
<td>Performs warping, weaving, and finishing operations. Finished product is woven</td>
<td>Medium</td>
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<tr>
<td>I</td>
<td>Plant performs cut and sew, assembly, and distribution of a variety of products with government contracts</td>
<td>Large</td>
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<td>J</td>
<td>Performs cut and sew, and assembly of a particular type of product under government contracts</td>
<td>Small</td>
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Note: Company size: small, medium or large as indicated by companies own description given during the interview.

**Table 3.2 - Lean tool matrix for companies interviewed [22]**

<table>
<thead>
<tr>
<th>Lean tool</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
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<td>5S</td>
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<td>Cellular manufacturing</td>
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<td>Kaizen</td>
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<td>Kanban</td>
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<td>Mistake proofing</td>
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<td>Rapid Improvement</td>
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<td>Six Sigma</td>
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<td>Quick Changeover (SMED)</td>
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<td>Standardised Work</td>
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<td>Supermarket</td>
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<td>VSM</td>
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<td>Visual Management</td>
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- increased production (after implementing 5s, one company experienced a 16% gain in 1 month);
- cleared space for increased production and new business;
- reduced finished goods inventory;
- increased first pass quality (from 53% to 80% in one case); and
- reduction in production time.

Based on the study, the authors of this article developed an Implementation Model (fig xx). Implementing lean manufacturing should begin with Policy Deployment tools to initiate cultural changes, since resistance to change both by management and shop floor workers were the most often cited barrier to implement lean. Next we have Visual Management such as the 5S program, the first tool used by many companies. The authors established that 5S program is not limited to just the production line like in one of the case studies and Visual Management projects build a foundation of stability in the process. Continuing, the next step would be to develop Continuous Improvement based projects since shop floor personnel are able to easily identify areas for improvement. To build on the continuous improvement efforts, Standardized Work is the next step where standard operating practices are developed. The final step would be to use Just-In-Time tools, such as kanbans, supermarkets and quick changeover, which reduce waste and builds on the stability and standardization of the previous steps.

![Lean Implementation Model](image)

**Figure 3.1 - Lean Implementation Model [22]**

The authors also included the Value Stream Mapping tool but, contrary to what was found in the literature, the research concluded that it was not always found to be useful as the first tool used. Concluding, it is noticeable that the implementation of lean was relatively recent to many textile companies and the most frequently used tools were the visual methods.
3.1.2 - Modular Manufacturing System

In the article "Modular Manufacturing Experience in the South African Clothing Industry: Lessons Learned", Kem Ramdass and Leon Pretorius present a case history with qualitative results of the implementation of modular manufacturing and its relative experiences at a South African clothing manufacturer.

The production facility used in this case study manufactured men’s and women's fashion wear with approximately 300 people and implemented modern technology. Due to the inconsistency in the order sizes the sewing department has adopted the bundle system due to larger orders. Before 2000 the facility was accustomed to lot sizes of between 2000 to 10000 units per order, receiving currently lot sizes of approximately 100 units per order.

They concluded that “the organization benefited overall as the productivity of the line improved by 10%, while labor efficiency improved by 15% and the morale of the employees improved with education, training, open communication and above all, being treated with dignity. Absenteeism had minimal effect on the cell, and employees going on a personal break were supported by the team.” [23]

It is also emphasized that “any change in the organization stems from top management. Commitment from management drives the process of change and nothing can be achieved if management does not support the initiative” and education and training is also essential: “training of employees in the latest development would enhance employee skills and workers would embrace changes in future [...] open communication and the building of trust among the people are extremely important”.

Yet, not every employee embraced the change, “there were many challenges for the new system. Two employees complained and seemed to be negative about the system saying that they did not like moving around and were used to sitting in one place.” They stated that the concerns revolved around: multi-skilling, education and training; team-understanding and formation; and payment systems. To bypass these issues, “there needs to be open communication among employees with the required education and training” and “team-members need to be thoroughly interviewed to determine whether they fit into teams [...] education and training sessions are required to create an understanding of the dynamics of teamwork”.

They conclude saying that for most employees interviewed this team approach was perceived as far superior to the traditional bundle system. Also, this new management method may not work for all companies, but for many it has proved feasible and one of the keys to success was having upper level managers committed to the team system.

From these articles we determined some of the benefits and barriers expected in the garment industry when implementing lean manufacturing. It is clear that lean can bring countless advantages for this industry and it gives us a strong view of which of the lean tools are most promising to succeed and when to implement them, being Visual Management, particularly the 5S program, and VSM the most frequently used.

It is also evident that modular manufacturing can bring great advantages to the industry when properly supported by upper management and committed employees.

With such benefits confirmed with previous studies, in the next chapter we’ll be implementing these methods, such as 5S, VSM, Standardized Work and Modular Manufacturing, eager to accomplish even better results than the ones identified.
References


