Performance Improvement of Textile Sector by Implementing Quality Six Sigma (QSS)

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ABSTRACT

The textile industry occupies a unique place in our country. One of the earliest to come into existence in India, it accounts for 14% of the total Industrial production and is the second largest employment generator after agriculture. It contributes 4% to the Gross Domestic Product (GDP), Accounts for 17% of total Exports, Market size of the Textile industry (exports & domestic) is US$ 52 billion. The textile industry is important in the business sector of India and it has to face cut throat competition in market due to decentralized sector and also has the opportunity in the world market. There is need to adopt new improvement technologies to not only manage supplies, but also control production and enhance productivity.

The proposed concept is of implementing a new C.I. methodology Quality Six Sigma (QSS). It is integration of Six Sigma - DMAIC steps with and as a part of company’s existing QMS. QMS / ISO practices and Six Sigma have their own benefits but if they both are implemented they complements each other and the overall productivity is improved. Hence integration of QMS / ISO and Six Sigma practices is the need of Indian Textile Industries business improvement. A research work is proposed on the fact that there are no any studies or research done in the field of textile industry on the possibility of integrating ‘QMS + Six Sigma’, i.e. QSS. QSS (QMS + Six Sigma) as an effective approach to provide an improved C.I. This paper focuses on how to explore the capacity of QSS (QMS + Six Sigma) in the textile sector for improving performance.

Keywords: QSS - Quality Six Sigma, QMS, Six Sigma, ISO.

1. INTRODUCTION

International trade in textiles and clothing has played an important role in the development process of many countries and has also facilitated their integration in to the world economy. In the Developed Countries, the process of industrialization and subsequent prosperity in a way commenced with the mechanization of textile production in the early 19th Century. In the Developing Countries, on the other hand, the sector has come to occupy an important place in terms of its contribution to national output, employment and exports. Developing countries as a group, account for more than one half of world exports of textiles and clothing.

As the latest WTO report (2006) states “In no other category of manufactured goods do developing countries enjoy such a large net exporting position” as they do in the textile sector [1]. The global textile industry is likely to grow from USD 309Bn to USD 856Bn [2]. India has a huge opportunity to capitalise on a much larger portion of this growth.

2. HISTORY OF TEXTILE:

The history of textile is as old as that of human civilization. The oldest recorded in the 6th and 7th century BC using fiber comes with the invention of flax and wool fabric. In India the culture of silk was introduced in 400AD, while spinning of cotton traces back to 3000BC. In China, the discovery and consequent development of sericulture and spin silk methods got initiated at 2640 BC, while in Egypt the art of spinning linen and weaving developed in 3400 BC. The discovery of machines and their widespread application in processing natural fibers was a direct outcome of the industrial revolution of the 18th and 19th centuries. The discoveries of various synthetic fibers like nylon created a wider market for textile products and gradually led to the invention of new and improved sources of natural fiber. The development of transportation and communication facilities facilitated the path of transaction of localised skills and textile art among various countries [3].

India’s textile industry since its beginning continues to be predominantly cotton based with about 65 percent of fabric consumption in the country being accounted for by cotton. The industry is highly localised in Ahmedabad and Bombay in the western part of the country though other centers exist including Kanpur, Calcutta, Indore, Coimbatore, and Solapur.

3. IMPORTANCE OF TEXTILE INDUSTRY IN INDIA:

The Textile industry in India occupies an important place in the economy as shown below:

- Contributes 4% to the Gross Domestic Product (GDP),
- Accounts for 17% of total Exports,
- Is the largest employment provider after Agriculture (82 million people direct & indirect),
- Market size of the Textile industry (exports & domestic) is US$ 52 billion,
- Expected to reach US$ 110 billion by 2012 [5].
3.2 THE INDIAN TEXTILE INDUSTRY:

3.2.1) Existence of Indian Textile Industry in world trade:
India's trade in textiles and its share in world trade can be represented as given below based on financial data provided by WTO (World Trade Organisation) [4]:

![World market share (%)](image)

The world market share

Figure No: 3.2.1

China had captured 65% of the global market share in total textile exports. Major textile exporting nations include USA, Germany, Hong Kong, Italy, Malaysia, Pakistan, Thailand and India. Important textile trade statistics are presented below [10].

Table No: 3.2.1 Exports of Apparels in 2009

<table>
<thead>
<tr>
<th>Country</th>
<th>US $ Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>8,260.921</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1,723.210</td>
</tr>
<tr>
<td>Italy</td>
<td>1,353.586</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1,255.069</td>
</tr>
<tr>
<td>Germany</td>
<td>669.130</td>
</tr>
<tr>
<td>Pakistan</td>
<td>618.830</td>
</tr>
<tr>
<td>Thailand</td>
<td>597.758</td>
</tr>
<tr>
<td>USA</td>
<td>595.171</td>
</tr>
<tr>
<td>India</td>
<td>522.463</td>
</tr>
</tbody>
</table>

3.2.2) Textile Industry in Maharashtra:
Maharashtra has the advantage of being in close proximity of sources of both Natural and Man-made fiber and fabric as well access to imported fiber through excellent ports.

The Maharashtra Textile industry has several key strengths [6],

![Key Strengths](image)

However, there are several inherent weaknesses as well [6],

![Weaknesses](image)

The structure of the Indian textile industry is extremely complex and Maharashtra has extremely fragmented industry with significant section of the industry in the Power Loom Sector in centers like Solapur [7].

Table No: 3.2.2 (Degree of Fragmentation in the Textile Industry)

<table>
<thead>
<tr>
<th>Power Loom Sector</th>
<th>Hosiery Sector</th>
<th>Handloom Sector</th>
<th>Mill Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>63 %</td>
<td>19%</td>
<td>14%</td>
<td>4%</td>
</tr>
</tbody>
</table>
3.3 **Research done in the area of improvement in performance by implantation of QMS / ISO in the Indian Textile Industry:**

3.3.1) **Data of QMS / ISO implementation in the Indian Textile Industry:**

286 Units secured ISO-9000 certificate, 19 units in ISO 14000, 16 units in SA 8000 and 09 units in OHSASc18000 under the Textiles Committee [11].

3.3.2) **ISO 9000 Certified Textile Units in Maharashtra:**

There are 286 ISO Certified Textile Manufacturing Organisations out of which 25 are situated in Maharashtra, and there are 9 Textile Manufacturing Organisations from SOLAPUR [11].

3.3.3) **Improvements in productivity textile industries after implementation of QMS / ISO:**

The case study by Mr. R.R. Gorakhia, (Director, TQM Division, Textiles Committee, Ministry of Textiles, Government of India) at Goski Industries, Banda Industries & Venkataranga Textiles, shows the benefits felt by implementation of QMS / ISO as [11]:

- Rejection % of the products has come down; Range: 12-23 %
- Productivity has gone up; Range: 20- 32 %
- Reduction in cost of inventory; Range: 7.8-12.3%
- Rework level in garment sector is reduced by 50%.
- Adherence to delivery schedules is improved.
- Significant improvements in working condition.
- Improvement in work culture, operational efficiency, house keeping and management functions.
- Improvement in inventory control & cost saving.

Similar results were seen at other Textile Industries, which results in overall productivity improvement.

3.4 **Research done in the area of improvement in performance by implantation of Six Sigma in the Indian Textile Industry:**

3.4.1) **Six Sigma implementation in the Indian Textile:**

Any specific statistical data is not found about implementation of Six Sigma in Indian Textile Industry, only few are found which are about the scope of implementing Six Sigma in Indian Textile Industry. There are number of research papers were found which tells about the importance of Six Sigma implementation in Textile Industries for improvement in overall production [21]. The various efforts are made to overcome different problems in manufacturing by implementation of Six Sigma such as problem of shade variation of dyed fabrics, yarn contamination reduction, Reduction of Downgrade Losses, are resolved and resulted in increase in the productivity [16].

3.4.2) **Improvements in productivity after implementation of Six Sigma philosophies:**

The research paper by Krishnaraj G., Asst. Professor, NIFT, New Delhi [12], shows achievements gained by implementing Six Sigma for Case Study 1:

- Introduction of Quality Checking Systems or Formats and constant monitoring by a trained Quality Inspector has brought about drastic reduction in quality defects level.
- There is a significant decrease in Defects per Million Opportunities (DPMO) in both Jacquard (65.5% reduction) seat covers before and after quality system implementation.
- The Process Sigma level has also improved for both the product types. In percentage terms, there is a jump in Process Sigma level by 22.48% in Jacquard product.
- Estimated increased sale in Jacquard is Rs. 5, 31,028/- per month.

3.5 **Need for improvement:**

The textile industry is important in the business sector of India and it has to face cut throat competition in market. The Indian textile industry is rapidly repositioning itself as a global player. Towards this end, Indian manufacturers are increasingly integrating their operations, both vertically and horizontally. There is need to adopt new improvement technologies to not only manage supplies, but also control production and enhance productivity.

India is facing two important problems of

(i) Utilization of resources, and
(ii) Unemployment.

The unemployment is increased continuously year after year. Textile Industry is the 2nd largest Industry of India giving huge direct and indirect employment opportunities. Hence to overcome the problem of unemployment along with other
benefits, it is needed to take all possible efforts. Hence to improve the productivity and performance of the Textile Industry, the present project is undertaken.

3.6 Proposed Concept:
The concept is proposed on the fact that there are no any studies or research done in the field of textile industry on the possibility of integrating ‘QMS + Six Sigma’, i.e. QSS. QSS (QMS + Six Sigma) is as an effective approach to provide an improved C.I. [14]. So it is decided that to explore the capacity of QSS (QMS + Six Sigma) in the organisation for improving performance.

3.7 Research Done to Compare QMS / ISO with Six Sigma:
The application of new management techniques for improving the productivity and performance in the business will bring long term stability in the market and better company reputation. The paramount need for a paradigm shift is essential for today’s business scenario. The success of an organisation is directly related to effective implementation of continues improvement (CI). It is worldwide accepted that QMS and Six Sigma philosophies are the new management techniques for the success of the industry [9].

3.7.1) Difference between QMS and Six Sigma:
The literature review analysis resulted in identification of difference between two approaches w.r.t. some important parameters, presented in the table,

<table>
<thead>
<tr>
<th>Parameters</th>
<th>QMS</th>
<th>Six Sigma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Customer satisfaction through high quality products</td>
<td>Monetary benefits through increased productivity and customer satisfaction.</td>
</tr>
<tr>
<td>Strategy</td>
<td>Arranging business processes according to requirements of standards</td>
<td>High quality level/low failure rates in all business processes by reducing the dispersion priority for those characteristics that are essential for the customer satisfaction.</td>
</tr>
<tr>
<td>Management</td>
<td>Listing of management responsibilities</td>
<td>Commitment and clear objectives for projects, creating an organisational structure which pursues the objectives.</td>
</tr>
<tr>
<td>Organisation</td>
<td>Process owner; management representative (responsible for QMS)</td>
<td>Clear responsibilities such as: process owner (green belts); project officer (black belts), project sponsor i.e., top management (master black belts).</td>
</tr>
<tr>
<td>Training</td>
<td>Required, but not specified.</td>
<td>Required in all areas of an organisation, different levels of qualification dependant on the functional and in process requirements.</td>
</tr>
<tr>
<td>Improvement method</td>
<td>PDCA (model for continuous improvement) but voluntary</td>
<td>DMAIC/DMADV (continuous improvement result oriented approach)</td>
</tr>
<tr>
<td>Process approach</td>
<td>Model of a process-based QMS</td>
<td>SIPOC* (approach for describing single processes).</td>
</tr>
<tr>
<td>Documentation</td>
<td>Listing of requirements</td>
<td>No specification</td>
</tr>
</tbody>
</table>

3.7.2) Study of Relationship between QMS and Six Sigma:
Patrick Dey, Senior Consultant, Excel Partnership, evaluated relationship between Six Sigma and QMS (ISO 9000:2000) as discussed below [11]:
The ISO family of standards is based on eight quality management principles which, when applied can help a company to realize greater benefits:

i. Customer Focus:
Six Sigma shows how to align the organization through customer-focused measures of performance.

ii. Leadership:
Senior leaders sponsor six sigma projects through active involvement. Six Sigma includes training in the selection, coaching and leadership of six sigma projects.

iii. Involvement of People:
Six Sigma projects are specifically designed to involve all stakeholders. The program includes training in facilitation techniques and team development.

iv. Process Approach:
A six sigma project maps and analyses the business processes in order to improve them.
v. System Approach to Management:
Successful six sigma projects recognize that people and processes are connected in an interdependent system. They achieve significant breakthroughs by striving for measurable stretch goals which span the end-to-end system.

vi. Continual Improvement:
Six sigma organizations understand what Intel’s Andrew Grove meant by “Only the Paranoid Survive”. They improve, constantly, seeing Quality as competitive edge that bites.

vii. Factual Approach to Decision Making:
Six Sigma project teams focus their energy on collecting and analysing data, to slice through opinions and arguments and win collaborative understanding.

viii. Mutually Beneficial Supplier Relationships:
Six Sigma sees customers and suppliers as a connected system, each with needs that must be satisfied.

Six Sigma offers a proven management framework (including processes, techniques and training) which satisfy ISO 9001:2000 requirements in these areas [11]:
- Demonstrating top management commitment to continually improving the effectiveness of the quality management system.
- Competence, awareness and training in statistical techniques and quality Management
- Continual improvement of the quality management system.
- Monitoring and measurement of customer satisfaction.
- Monitoring, measurement and improvement of processes and product
- Analysis of data.

4. LITERATURE GAP:
The research done and data on the implementation of QMS / ISO and its benefits gained by textile industry are found as discussed earlier. The observed literature gaps are presented as,

(i) Research papers found about the study of relationship, differences and compatibility between QMS and Six Sigma. But research and data about the implementation of Six Sigma by integrating it with existing QMS / ISO practices is not found.

(ii) It is observed that very limited effort to apply Six Sigma and very few textile units have thought to improve the productivity / performance.

(iii) It can be concluded that no efforts are made for studying and developing new continuous improvement (CI) tools.

(iv) No work has been done on the concept of QMS + Six Sigma (QSS) for any of the sub sectors of textile sector.

5. OBJECTIVES:
a. Concept Development: Development of concept of Quality Six Sigma (QSS) as an integration of exiting QMS and Six Sigma philosophy for continuous improvement (CI) tool in textile industry.
b. To find out the effects of QMS / ISO implementation in textile industry.
c. To find out effects of Six Sigma implementation in textile industry.
d. Identifying productivity problems in field of manufacturing of textile plant.
e. Implementation of QSS (In any one of the Spinning, Yarn Dyeing, Processing, Ginning & Pressing, Weaving, Knitting, Fabrics, Knitted Apparel, Readymade Garments, Terry Towel type of textile industries).
f. Analyzing effect of QSS implementation on productivity and performance of Textile industry.
g. Preparation of guidelines / recommendations for improvement in productivity of textile industry.

6. METHODOLOGY:
The methodology consists of following steps / studies:

b. Case study of effects of implementing Six Sigma practices in textile industry.
c. Implementation of QSS and case study after QSS implementation in textile industry.
d. Survey work for QSS implementation / effects of implementation.
   d.1) Preparation of Questionnaire,
   d.2) Collection of data,
   d.3) Data analysis.
7. CONCLUSION:
Textile Industry is the 2nd largest Industry of India giving huge direct and indirect employment opportunities. 286 textile units secured ISO-9000 certificate. Various benefits felt by implementation of QMS / ISO. Any specific statistical data is not found about implementation of Six Sigma in Indian Textile Industry. Both the QMS / ISO practices and Six Sigma have their own benefits but if they both are implemented they complements each other and the results are improvement in overall productivity. Integration of QMS / ISO and Six Sigma practices is the need of Indian Textile Industries business improvement.

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