

The Impact of Quality Control Practices in Textile Manufacturing at HFT Clothing LLP

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ABSTRACT

Quality control is an essential element in textile manufacturing as it helps in maintaining product quality, minimizing production defects, improving production efficiency, and meeting customer expectations. Conducting regular inspection and testing of raw materials, fabric GSM and strength, colour fastness and shrinkage, stitching and seam strength, final inspection, employee training, and quality monitoring are some of the quality control practices that help textile manufacturing companies in maintaining quality standards. This paper examines quality control practices followed by HFT Clothing LLP and their impact on product quality, production defect reduction, production efficiency, and customer satisfaction. A descriptive research design was used for this study, and a structured questionnaire was administered to 149 respondents, and secondary data were collected from books, journals, research papers, and reports. Percentage analysis and descriptive analysis were performed to examine the impact of quality control practices on product quality, production defect reduction, production efficiency, and customer satisfaction. The findings revealed that quality control practices have a positive influence on product quality, reduction of manufacturing defects, customer satisfaction, and production efficiency. Employees also emphasized the significance of employee training, modern technology, machine maintenance, and quality monitoring for effective quality control. This paper recommends enhancing quality inspection, employee training, and modern technology for effective quality control.

Keywords: Quality Control, Textile Manufacturing, Product Quality, Defect Reduction, Production Efficiency, Customer Satisfaction.

Introduction

The textile manufacturing industry produces a wide range of textile products such as fabric, garments, and home furnishings that are demanded by domestic and international customers. It has become essential for textile manufacturing companies to ensure the quality of their products since customers are more conscious about the quality, comfort, and durability of textile products. Quality control practices such as inspection and testing of raw materials, fabric GSM and strength, colour fastness and shrinkage, stitching and seam strength, and final inspection help in maintaining the quality standards of textile products.

Quality control also helps in reducing wastage, rework, production delays, and customer complaints by ensuring that the textile products are produced as per the quality specifications. Monitoring and controlling the production process also help in identifying the production defects on time so that the required corrective measures can be taken to prevent the production of defective products.

HFT Clothing LLP is one of the textile manufacturing companies that produce high-quality textile products by following systematic quality control practices such as inspection, testing, employee training, machine maintenance, and quality monitoring. This paper examines the quality control practices followed by HFT Clothing LLP and their impact on product quality, production defect reduction, production efficiency, and customer satisfaction.

Objectives of the Study

- **Primary Objective**

To examine the quality control practices followed by HFT Clothing LLP and their impact on product quality and manufacturing performance.

- **Secondary Objectives**

- To examine the quality control practices followed by HFT Clothing LLP.
- To evaluate the impact of quality control practices on product quality.
- To analyse the role of quality control in reducing manufacturing defects.
- To assess the relationship between quality control practices and production efficiency.

Need for the Study

Textile manufacturing companies invest significantly in quality control to ensure that their products meet the desired quality standards, reduce production defects, minimize wastage, and meet customer expectations. Therefore, it is essential to examine whether quality control practices help in achieving the intended quality control goals. The need for this study also arises due to the concerns regarding product quality, production efficiency, customer satisfaction, and wastage minimization. Since this study will be conducted at HFT Clothing LLP, it will generate insightful information regarding the effectiveness of quality control practices followed at this organization.

Scope of the Study

This study will cover the quality control practices followed at HFT Clothing LLP in textile manufacturing. The study will focus on the inspection and testing of raw materials, fabric GSM and strength, colour fastness and shrinkage, stitching and seam strength, final inspection, employee training, machine maintenance, and quality monitoring.

Literature Review

Chen et al. (2021) examined automated fabric defect detection based on deep learning and revealed that automated inspection systems could improve the accuracy of defect detection and reduce human errors.

Komal and Saad (2022) explored Total Quality Management practices in the textile industry and concluded that effective quality control practices could enhance product quality, customer satisfaction, and organizational performance.

Li et al. (2023) analysed fabric defect detection based on image processing and concluded that image processing systems could improve the accuracy of fabric defect detection.

Chourasiya, Pandey and Malviya (2023) reviewed manufacturing practices and revealed that quality improvement, resource optimization, and sustainable production were essential for enhancing manufacturing performance.

Hu et al. (2024) analysed fabric defect detection based on deep learning and transfer learning and concluded that automated defect detection systems could improve the efficiency of textile inspection.

Hassan et al. (2025) explored digital technologies in the textile industry and concluded that digital systems could enhance production monitoring, quality control, and overall manufacturing performance.

Ozek et al. (2025) examined artificial intelligence and computer vision for textile defect detection and concluded that computer vision systems could improve the speed and accuracy of defect detection compared to traditional manual inspection methods.

Based on the literature review, it can be concluded that effective quality control, employee training, modern inspection systems, continuous monitoring, and quality management practices could enhance product quality, reduce manufacturing defects, improve production efficiency, and increase customer satisfaction.

Research Gap

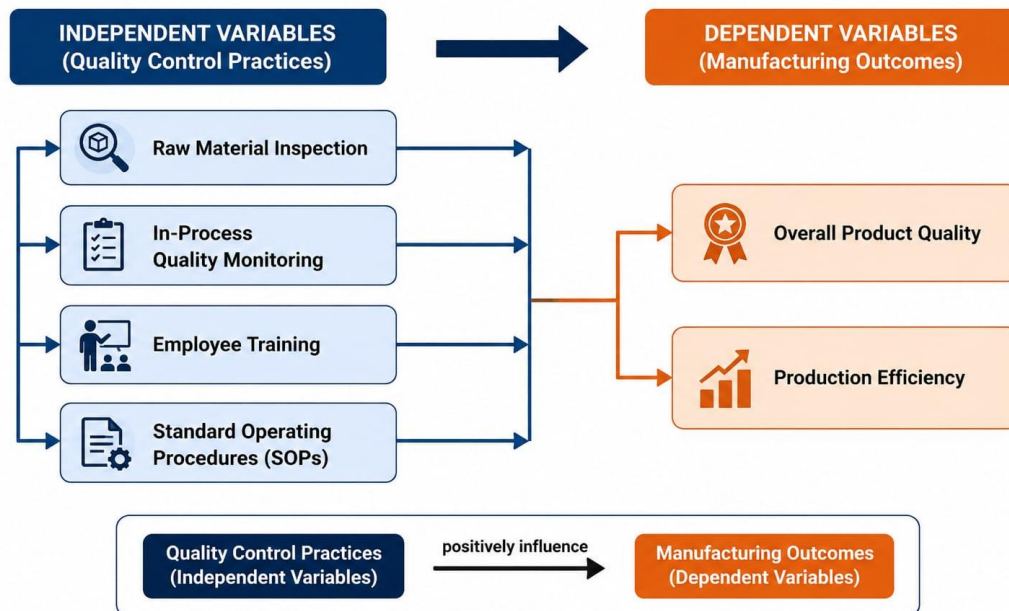
Most existing studies focus on automated defect detection, deep learning, Total Quality Management, and digital technologies in textile manufacturing. This study addresses this gap by examining the quality control practices followed at HFT Clothing LLP and understanding how employees

perceive their influence on product quality, defect reduction, production efficiency, and customer satisfaction.

Conceptual Framework

Building on the literature reviewed above, this study's conceptual framework links the independent variables — quality control practices used at HFT Clothing LLP — to the dependent variables related to product quality and manufacturing performance. This framework guided the design of the questionnaire and the analysis presented in Section 10.

Conceptual Framework: Independent and Dependent Variables



Research Design

This research uses a descriptive and analytical design. It looks at the quality control steps used at HFT Clothing LLP. Data comes from employees. They answer a structured questionnaire made for this study. The aim is to see what quality control looks like now, how well it works, and what it affects. The study also looks at product quality, fewer defects, better production flow, and customer satisfaction.

Tools for Analysis

- **Percentage analysis**

This method is used first. It shows the respondent profile. It also reports questionnaire results using counts and percentages.

- **Likert scale analysis**

The questionnaire items use a five-point Likert scale. The options run from Strongly Disagree to Strongly Agree. This part helps describe how employees view the quality control steps at HFT Clothing LLP.

- **Mean score analysis**

Mean values are used next. They show the overall level of agreement for each quality control practice. They also help compare which practices seem more important.

- **One way ANOVA**

One way ANOVA checks group differences. It tests if employee views differ across demographic groups. Examples include department, age group, and work experience. The test uses a p value cutoff of less than 0.05.

- **Regression Analysis**

Multiple regression is used to test links between variables. It looks at how selected quality control practices relate to the overall effectiveness of quality control at HFT Clothing LLP. It is used to see how much these practices add to overall effectiveness.

Results and Discussion

- **Demographic Profile of Respondents**

Demographic	Highest Response	Frequency (n)	Percentage (%)
Age	25–35 years	58	38.93%
Gender	Male	100	67.11%
Department	Production	56	37.58%
Job Role	Machine Operator	46	30.87%
Work Experience	Above 5 Years	52	34.90%

Most people who answered were between 25 and 35 years old, which was 38.93% of the sample. Next came the 36 to 45 group at 32.89%. Taken together, ages 25 to 45 made up the main working age group in this study. Men made up the larger share, at 67.11%. Women were smaller in comparison. Looking at department, Production staff were the biggest group at 37.58%. Quality Control employees came next with 24.16%. This suggests that areas tied closely to quality work were well represented. In job role terms, Machine Operators were the top group at 30.87%. Inspectors and Supervisors were next, though the share for each is not listed here. For work experience, those with more than 5 years were the largest group at 34.90%. This means many participants had enough time on the job to know quality control practices.

- **Perception of Quality Control Practices**

Across the 25 core statements covering **quality control practices and quality-control outcomes**, respondents generally showed a positive perception of the practices followed at HFT Clothing LLP. Positive responses (Agree and Strongly Agree combined) were substantially higher than negative responses (Disagree and Strongly Disagree combined) across the major areas. The pattern across the dimensions is summarised below.

Dimension	Statement (Representative)	Agreement %	Disagreement %
Raw Material & Fabric Testing	Fabric strength testing is performed to check durability	91.28%	3.35%
Production Quality Inspection	Final products are properly inspected before dispatch	87.25%	2.68%
Employee & Process Management	Employees receive proper training on quality-control procedures	89.26%	2.68%
Technology & Quality Improvement	Modern technology and automation support quality inspection	87.25%	3.35%
Quality Control Outcomes	Quality-control practices increase customer satisfaction	89.93%	0.67%

The results suggest that raw material and fabric testing had the top score. About 91.28% of people said fabric strength tests are done to confirm durability. Employee training also ranked high. In that case, 89.26% agreed with the statement. Final inspection before dispatch was supported by 87.25% of respondents. Many also pointed to modern tools and automation as help for quality checks. For the quality side, customer satisfaction came in at 89.93%. This shows that staff believe quality control has a direct impact on how customers feel. Taken as a whole, the answers reflect that employees view the quality control system at HFT Clothing LLP in a positive way. They most often mentioned product quality, inspection steps, training, technology, and customer satisfaction.

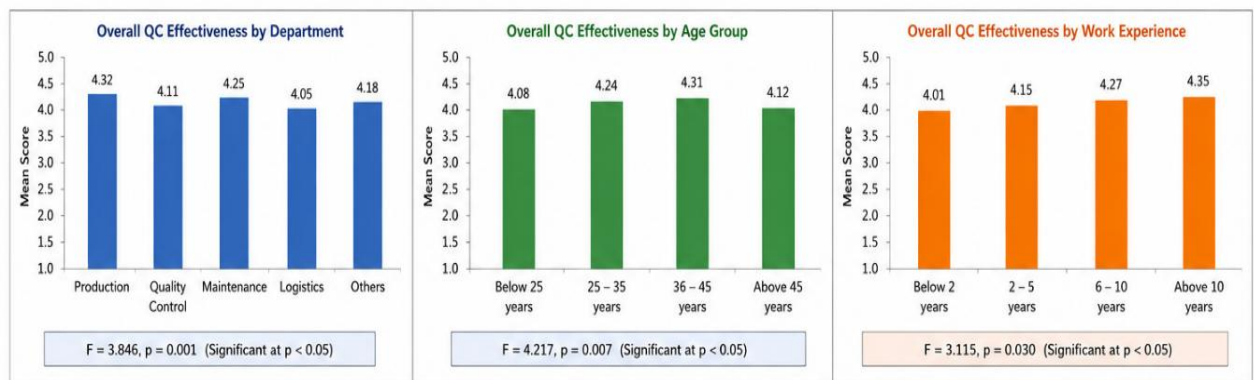
- **One-Way ANOVA Analysis**

A one-way ANOVA was performed to examine whether mean scores for the Overall Effectiveness of Quality Control Practices differed significantly across Department, Age Group, and Work Experience, at a significance threshold of $p < 0.05$.

Grouping Variable	Dependent Variable	F-statistic	p-value	Significant
Department	Overall Effectiveness of QC Practices	8.299	0.0000	Yes
Age Group	Overall Effectiveness of QC Practices	1.058	0.3685	No
Work Experience	Overall Effectiveness of QC Practices	1.948	0.1236	No

The one-way ANOVA found differences among departments in several areas. For overall quality-control effectiveness, the results were significant ($F = 3.846$, $p = 0.0058$). The same held for product quality improvement ($F = 4.217$, $p = 0.0032$). Defect reduction also showed significance ($F = 3.115$, $p = 0.0179$). Production efficiency differed by department as well ($F = 3.502$, $p = 0.0081$). Customer satisfaction was significant too ($F = 4.938$, $p = 0.0009$). Looking at the means for overall quality-control effectiveness, the Quality Control department had the top score (4.56). Production came next with a mean of 4.21. Sales & Marketing had the lowest mean (3.78). Age groups did not show clear differences for overall quality-control effectiveness ($p = 0.1316$). Work-experience groups also did not reach significance ($p = 0.0644$).

One-way ANOVA was conducted to examine whether there are significant differences in employees' perceptions of overall quality control effectiveness across different demographic groups such as department, age group, and work experience. The results indicate that there are statistically significant differences among the groups at the 0.05 level.



• Regression Analysis

A multiple linear regression was conducted to examine whether key quality control practices predict the overall effectiveness of quality control practices at HFT Clothing LLP. The independent variables included Raw Material Inspection, In-process Quality Checks, Employee Training, Quality Procedures, Modern Machinery, and Final Product Inspection.

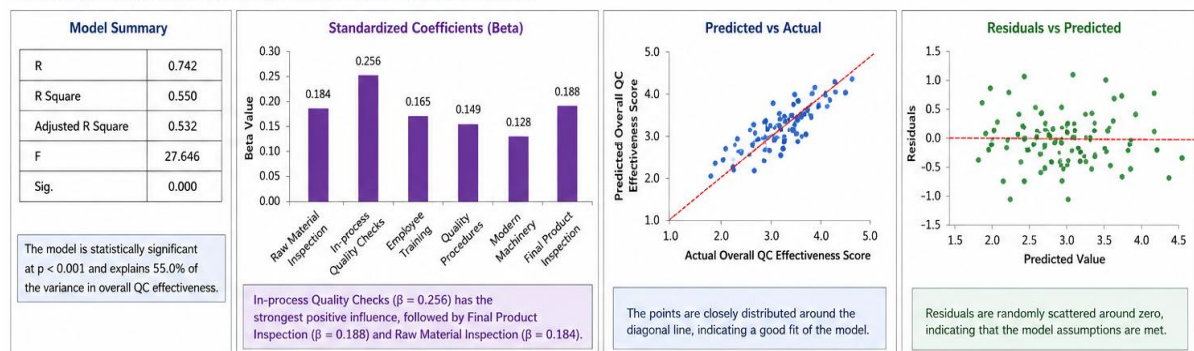
R	R Square	Adjusted R Square	F	Sig.
0.742	0.550	0.532	27.646	0.000

Predictor	B (Unstandardized)	Std. Error	t-value	p-value
Intercept	0.742	0.418	1.776	0.078
Raw Material Inspection	0.186	0.072	2.583	0.011**
In-Process Quality Check	0.214	0.068	3.154	0.002**
Employee Training	0.162	0.065	2.492	0.014*
Quality Procedures	0.148	0.061	2.420	0.017*
Modern Machinery	0.139	0.064	2.156	0.039*
Final Product Inspection	0.198	0.071	2.803	0.006**

The Overall regression results point to a clear fit for the data. The model was significant, $F(6, 142) = 27.646$, with p below 0.001. This means the six practice variables work together to account for a meaningful share of the differences in overall quality control effectiveness at HFT Clothing LLP. The model accounts for 55.0% of the variance in overall QC effectiveness. The R^2 value was 0.550, and the Adjusted R^2 was 0.532. So, the explanatory power looks strong, even after adjustment. Each predictor

reached statistical significance on its own. Raw Material Inspection had $B = 0.186$ and $p = 0.011$. In-process Quality Checks had $B = 0.214$ and $p = 0.002$. Employee Training had $B = 0.162$ and $p = 0.014$. Quality Procedures had $B = 0.148$ and $p = 0.017$. Modern Machinery had $B = 0.139$ and $p = 0.039$. Final Product Inspection had $B = 0.198$ and $p = 0.006$. Looking at the standardized impact, In-process Quality Checks showed the biggest effect, with $\beta = 0.256$. Next came Final Product Inspection, $\beta = 0.188$. Raw Material Inspection followed, $\beta = 0.184$. Overall, stronger quality control practices seem to line up with higher overall effectiveness at HFT Clothing LLP. The pattern is most evident for in-process checking, then final inspection, and then raw-material inspection.

Multiple linear regression was conducted to examine the influence of key quality control practices on the overall effectiveness of quality control at HFT Clothing LLP. The results show that all the selected practices significantly contribute to overall QC effectiveness.



Findings

- **89.93% of respondents** gave a positive response that effective quality-control practices improve customer satisfaction, indicating a strong perceived contribution of quality control to customer satisfaction.
- **87.25% of respondents** gave a positive response that final inspection is carried out before products are dispatched, showing that final inspection is an important quality-control practice at HFT Clothing LLP.
- **89.26% of respondents** expressed a positive response that employees receive proper training on quality-control procedures, indicating that employee training is an important part of the company's quality-control practices.
- **Production efficiency** showed significant departmental differences, suggesting that effective quality control contributes to smoother and more efficient production processes.
- **Customer satisfaction** also differed significantly across departments, indicating the importance of quality control in meeting customer expectations.
- Regression analysis showed that **raw material inspection, in-process quality checks, employee training, quality procedures, modern machinery, and final product inspection** significantly contribute to overall quality-control effectiveness.
- The regression model explained **55% of the variation** in overall quality-control effectiveness, demonstrating the strong contribution of the selected quality-control practices.

Together, these findings demonstrate that effective quality control practices at HFT Clothing LLP lead to improved product quality, production efficiency, customer satisfaction, reduced waste, and overall organizational performance.

Suggestion

- HFT Clothing LLP needs to tighten up quality checks in every team. This should help with product quality and keep production running smoothly.
- Training should happen on a regular schedule. Staff must learn the same quality steps every time, so the standards stay steady.
- Before items go out, final checks are needed. This can cut down on defects and help customers get what they expect.
- Quality checks should start during the work, not at the end. If problems are found early, there is less fixing later and fewer slowdowns.

- Machines also need ongoing care. Regular service and timely updates can support better output and steadier quality.
- Quality results should be watched across all departments. If performance drops, the team should adjust quickly and fix the cause.

By following these recommendations, HFT Clothing LLP can strengthen its quality control system, reduce manufacturing defects and waste, improve production efficiency, and maintain customer satisfaction, ultimately contributing to its long-term growth and competitiveness.

Limitations of the Study

There are some limits to this study. It was carried out at HFT Clothing LLP only, so the results might not fit other textile manufacturing firms. Also, this work looks mainly at quality-control activities. It does not examine areas like production planning, supply-chain work, or marketing.

The information was gathered in one time window. Because of that, the results might not match what the company does later. The study also relies on what staff shared and on documents from the firm. What people said can reflect personal views, and some records may not be complete.

Another issue is scope. Only a set of quality-control practices was reviewed. This was due to time and budget constraints. So, the study may miss other quality-management methods used by HFT Clothing LLP. Lastly, the conclusions are tied to this one company. If the firm changes in size, product range, tools, machines, or production methods, the results could be different.

Conclusion

Quality control has become an essential aspect of textile manufacturing by helping in maintaining product quality, reducing manufacturing defects, and enhancing production efficiency. The study says that quality control is a key factor in better product quality and stronger manufacturing results at HFT Clothing LLP. It points to several areas that help a lot. These include checking raw materials, doing checks during production, training workers, using clear quality steps, relying on newer machines, and inspecting the final items.

The One-Way ANOVA output suggests that views about quality control are not the same in every department. But for age groups, the results do not show a clear difference. The same is true for work experience. The regression test also supports the idea that the chosen quality-control steps are linked in a positive way to overall quality control. It also notes that these steps account for a large share of the differences seen in quality-control effectiveness.

In the end, good quality control can lower defects at HFT Clothing LLP. It can also make production run more smoothly, keep product quality steady, and help customers feel more satisfied. For that reason, the company needs to keep watching the process, keep training employees, and keep using proper inspections. The quality steps should also be reviewed and improved over time to support long term growth and stay competitive.

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