

Estimation of Cost of Quality in an Indian Textile Industry for Reducing Cost of Non-conformance

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ABSTRACT *This case study reflects the importance of estimating quality-related costs to diagnose and redress quality-related problem areas. It is only possible to eliminate the costs of non-conformance if they can be identified. In today's business environment of global competition, reduction of the cost of non-conformance strengthens one's competitive position by focusing on customer orientation. Quite naturally, this facilitates survival and further growth of the company. And, of course, reduction of cost of non-conformance is much more preferable to increasing the volume of sales turnover, especially in a competitive market or a recession. The distinguishing feature of this study is the simultaneous increase in sales turnover as well as the reduction in cost of poor quality over a span of three years.*

KEY WORDS: Cost of quality, textiles, non-conformance

Introduction

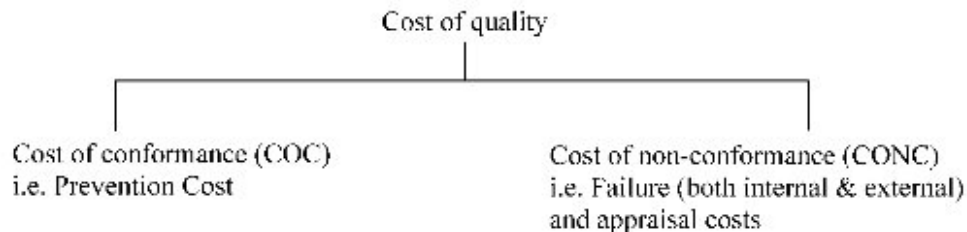
Since 1951, when Dr J. M. Juran first published his *Quality Control Handbook*, the need for estimation of quality cost is highlighted as a stimulant for reducing the cost of non-conformance. However, very rarely does one find the application of quality costs in industries. This case study demonstrates how estimation of quality costs helped an Indian textile industry reduce its costs of non-conformance (CONC) over a period of three financial years.

In the Indian textile industry, while average companies earn a profit of about 4 to 5% of turnover, good companies earn a profit of about 10% of turnover. This case study pertains to an average company. Hence, it highlights the scope to bridge the gap between an average company and a good company, particularly in this era of global competition when how to exist and how to grow in a business of one's core competence area are of paramount importance.

What is the Cost of Quality?

It is the cost associated with preventing, finding and correcting defective work. One of the most useful ways of classifying quality-related costs is to distinguish

between the costs of conformance (COC) and the costs of non-conformance (CONC).



It is only possible to reduce the CONC by investing in prevention activities. Investing in prevention of errors enables failure and associated appraisal costs to be minimized. This is a fundamental driving force behind quality improvement. However, prevention inevitably involves some costs. These are preventive costs, or the costs of conformance (COC). This includes all the costs associated with any activity designed to ensure that the right activities are carried out right first time.

Costs of non-conformance (CONC) are all the costs incurred because failures occur. Had there been no failure, there would have been no requirement for appraisal and correcting activities.

It is noteworthy that normal work (NW), comprising routine activities such as marketing, purchasing, manufacturing, selling and distribution, financial management etc and prevention (P) add value to the company while appraisal (A) and failure (F)—whether internal or external—add cost to the company.

Prevention Costs

A few of the prevention costs are:

- Preparing quality manuals, procedures, different specific plans etc.
- Reviewing the quality specifications of new products
- Evaluation of suppliers and survey etc.
- Market research and studies to identify customers' requirements
- Developing, conducting and maintaining training programmes
- Studying process capabilities and developing process control devices
- Formal quality improvement programmes.
- Auditing of the quality system.
- Calibration and maintenance of inspection and test equipment used in production departments and laboratories to evaluate quality.

Appraisal Costs

This includes the costs involved in various activities, a few of which are:

- Inspection and testing of quality of purchased products.
- Inspection and testing of in-process products.
- Inspection and testing of finished products.

- Materials consumed or destroyed during inspection and testing.
- Evaluation of stock for its degradation and evaluation of product at customer end.

Internal Failure Costs

Some of these costs are explained below:

- Scrap
- Rework, repair and reprocessing
- Re-inspection and retest to verify the quality requirement after rework or reprocessing
- Failure analysis
- Losses
- Downgrading of product
- Downtime, i.e. idle facilities due to quality failures.

External Failure Costs

These are the costs associated with defects that are found after the product is shipped or handed over to the customer. For example:

- Settling customer complaints due to poor quality.
- Product rejected or returned.
- Loss of sales.
- Marketing errors.
- Product recalls and product replacement.
- Warranty claims.
- Allowances, i.e. cost of concessions made customary due to poor quality.

Strategic Business Units

This study has been conducted in the Indian textile industry, keeping in view the strategic business units or departments given in Table 1.

Table 1. Strategic business units

Strategic business unit /Department	Product
Flax	Flax yarn
Worsted	Worsted yarn
Polyester Viscose	Polyester viscose yarn
Rubber Reinforced Lining	Hose pipe
Weaving	Fabric made of polyester viscose or worsted or flax fibre
Wet Processing	Bleached and dyed fibre, yarn and fabric

Estimation

The quality costs are estimated by forming cross-functional teams involving people from accounts, purchasing, marketing, flax, worsted, polyester viscose, rubber reinforced lining, weaving, wet processing, quality assurance, maintenance and—last but not the least—the world class manufacturing cell. The personnel from the world class manufacturing (WCM) cell of the company played the facilitator's role.

The key costs considered for the study are as follows:

- (i) Direct labour—standard and overtime rates for employees directly involved in the activity.
- (ii) Indirect labour—costs associated with the management and supervision of direct labour.
- (iii) Direct materials—costs of materials used in the activity (raw materials and consumables).
- (iv) Occupancy costs—cost of light, heat and power associated with the activities.
- (v) Administrative support services—costs associated with payroll, stores, and other support services associated with the activity in question.
- (vi) Equipment—depreciation on equipment used in the activity.

Estimated Figures (Rupees in Lakhs)

Based on the above discussion the quality costs are estimated for three financial years. Each financial year starts from the month of April and ends in the month of March. The quality costs show a decreasing trend over the years because of the reduction in failure costs. The relevant figures are furnished in Tables 2–6.

Table 2. Estimated prevention costs (Rupees in lakhs)

Serial No.	Description	1999–00	2000–01	2001–02
1	Purchase			
	Evaluation of suppliers of raw materials based on 3% time of 2 buyers	0.08	0.17	0.20
	Evaluation of suppliers of raw materials based on 5% time of 8 buyers	0.50	0.56	0.49
2	Quality assurance	15.49	17.04	18.74
3	Quality system audit (ISO related expenses)	0.71	5.00	0.38
4	Quality circle expenses	2.51	0.89	0.50
5	Training on quality	7.80	0.57	0.50
6	Market research	4.57	4.79	5.36
7	Plant maintenance	878.33	1088.60	1196.40
8	WCM meeting	3.54	1.45	1.21
9	Customers' requirements based on 50% of travelling expenses	85.62	100.57	96.54
Total		999.15	1219.64	1320.32

Table 3. Estimated appraisal costs (Rupees in lakhs)

Serial No.	Description	1999-00	2000-01	2001-02
1	Supplier monitoring			
	Raw material—6% time of 2 buyers	0.16	0.35	0.40
	Other purchases—20% time of 8 buyers	0.75	0.74	0.84
2	Following up suppliers for delayed deliveries			
	Raw material—6% time of 2 buyers	0.16	0.35	0.40
	Other purchases—20% time of 8 buyers	0.75	0.74	0.84
3	In-process inspection	9.83	10.36	11.97
4	Final inspection and testing	5.09	5.35	6.10
Total		16.74	17.89	20.55

Table 4. Estimated internal failure costs (Rupees in lakhs)

Serial No.	Description	1999-00	2000-01	2001-02
1	Stores write-off for damaged obsolete items	13.60	24.43	12.52
2	Production of second's quality	6.12	—	—
3	Rework	48.00	62.00	62.00
4	Machine idle hours	1016.53	756.14	476.10
5	Excess inventory levels			
	Raw material and components	249.70	325.20	204.25
	Work in process	6.14	10.59	4.66
	Finished goods (above 60 days)	730.27	280.51	245.40
6	Accounts receivable (beyond 180 days)	161.67	177.54	50.45
Total		2232.03	1636.41	1055.38

Table 5. Estimated external failure costs (Rupees in lakhs)

Serial No.	Description	1999-00	2000-01	2001-02
1	Goods returned	301.49	392.37	357.03
2	Discount/rebate	15.82	23.41	36.07
3	Claims	382.96	283.92	164.14
4	Travelling expenses for handling complaints	85.61	100.57	96.54
Total		785.88	800.27	653.78

Conclusions

- (i) It can be seen from Table 6 that, in three years, there is a significant reduction in failure costs from 3017.91 lakhs to 1709.16 lakhs. Therefore, the extent of gain is 1308.75 lakhs for reduced failure. The additional

Table 6. Summary of quality costs

Item	1999–2000		2000–2001		2001–2002	
	Rs. In lakhs	% of sales turnover	Rs. In lakhs	% of sales turnover	Rs. In lakhs	% of sales turnover
Prevention cost	999.15	5.09	1219.64	3.93	1320.32	4.08
Appraisal cost	16.74	0.09	17.89	0.06	20.55	0.06
Internal failure cost	2232.03	11.37	1636.41	5.27	1055.38	3.26
External failure cost	785.88	4.00	800.27	2.58	653.78	2.02
Total quality cost	4033.80	20.54	3674.21	11.83	3050.03	9.42
Sales turnover	19638 lakhs		31052 lakhs		32370 lakhs	

expenses incurred for prevention cost is $1320.32 - 999.15 = 321.17$ lakhs, while that for appraisal cost is $20.55 - 16.74 = 3.81$ lakhs. Thus, the total additional expenses incurred is 324.98 lakhs.

- (ii) It is noteworthy that there has been an increase in sales turnover from Rs. 19638 lakhs to Rs. 32370 lakhs along with a reduction in failure costs.
- (iii) One significant achievement of carrying out this study is the reduction of idle hours of machines in monetary terms from 1016.53 lakhs to 476.10 lakhs (Table 4), possibly due to an increase in plant maintenance expenses from 878.33 lakhs to 1196.40 lakhs (Table 2) during the same period, with due emphasis on preventive maintenance. Reducing the idle hours of machines in turn increases the chances of meeting the delivery schedule of the customers.

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