CASE STUDY

Applying Cost of Quality to Total Quality Management

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APPLYING COST OF QUALITY TO TOTAL QUALITY MANAGEMENT

by

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1.0 THE IMPORTANCE OF QUALITY

1.1 THE DEFINITION OF QUALITY

Quality has been defined in a variety of ways:

- Quality is fitness for use ---------- Juran
- Quality is conformance to requirements ---------- Crosby
- Quality is correcting and preventing loss, not living with loss ---------- Hoshin
- Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market ---------- Deming
- The totality of features and characteristics of a product, service or process, which bear on its ability to satisfy a given need from the customer's viewpoint ---------- British Standard

1.2 THE REAL CHALLENGE OF QUALITY

The challenges in Quality Technology and Management are increasing yearly. In the 1990s, all organizations faced the issues of improving product and service quality and enhance innovation. The discipline of quality has evolved and expanded rapidly from inspection to company-wide quality management.

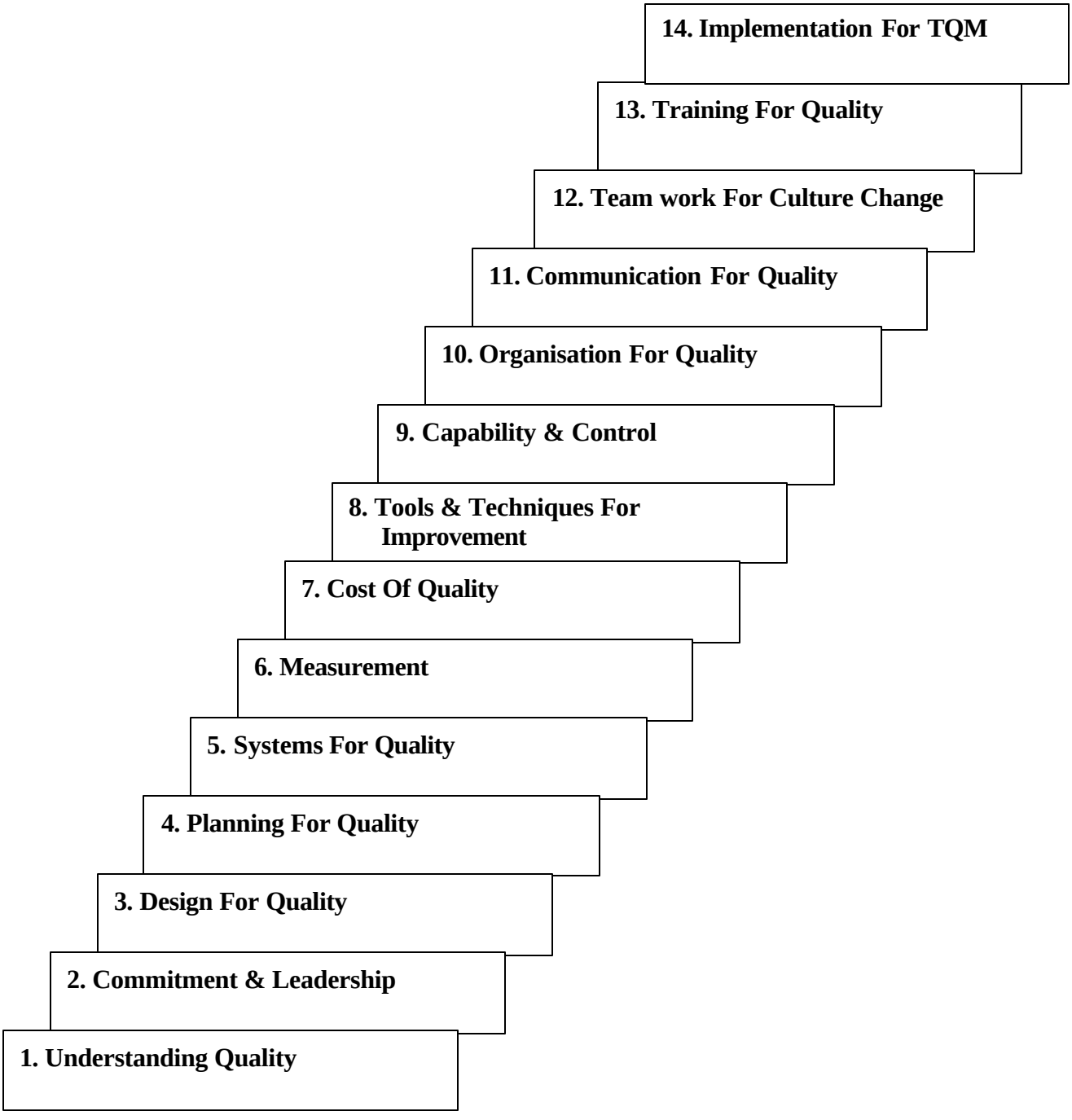
1.3 THE RETURN ON QUALITY

Globalisation is one of the key trends in the business world today. As business operating costs continue to rise and international competition grows more intense, all organisations will find it increasingly difficult to compete on price. They must maintain their cost competitiveness and ensure that the quality of their products and services are meeting their customer's requirements. COST OF QUALITY provides a means to gauge the RETURN OF QUALITY in an organisation, and how this return impacts the bottom line. It can serve as a useful platform to reduce business cost and increase competitiveness.

1.4 COST OF QUALITY

Cost of Quality is recognised as a major tool used to quantify the qualitative improvements of an organisation during the TQM Implementation Process.

TQM IMPLEMENTATION PROCESS



COST OF QUALITY forms an integral part of an effective TQM Model

2.0 INTERPRETATION OF COST OF QUALITY

2.1 GENERAL INTRODUCTION

Cost of Quality is generally known as the sum of costs incurred to prevent non-conformances from happening (Cost of Conformance) and the costs incurred when non-conformance in products and system occurs (Cost of Non-Conformance). It was commonly known that poor quality costs can go as high as 40% of sales.

Planned improvement actions can be taken to prevent these quality problems and reduce the COST OF QUALITY significantly (COQ) through the adoption of such actions over a period of one to two years. The savings in COQ will boost the bottom line of the organisation.

2.2 MAJOR COMPONENTS OF COST OF QUALITY (COQ)

COQ is generally divided into costs associated with four categories of activities :

- PREVENTION COST

  These are the cost of any action taken to investigate, prevent or reduce the risk of non-conformity or defect.

  Example : Planning, Preparation, Training, Preventive Maintenance and Evaluation.

- APPRAISAL COSTS

  These are the costs of evaluating the achievement of quality requirements including the cost of verification and control performed at any stage of the quality loop.

  Example : Production Trial, Test and Measurement.

- INTERNAL FAILURE COSTS

  These are the costs arising within organisation due to non-conformity or defects at any style of the quality loop.

  Example : Costs of Scrap, Rework, Retest, Re-inspection, Modification, Downtime, Overtime, Corrective Action and Redesign.

- EXTERNAL FAILURE COSTS

  These are the costs arising after delivery to the customer due to non-conformities or defects.

  Example : Equipment Failure, Downtime, Warranty, Administrative Costs in dealing with Failure and Loss of Customer's Goodwill.

2.3 COST OF CONFORMANCE (COC)

Both Preventive and Appraisal Costs are known as the Costs of Conformance.

i.e. : The cost of doing things right the first time.

2.4 COST OF NON-CONFORMANCE (CONC)

Both Internal and External Failure Costs are known as the Costs of Non-Conformance.

i.e. : The cost incurred as a result of things not being done right the first time.

3.0 IDENTIFICATION OF COST OF QUALITY

3.1 IDENTIFICATION OF COST OF CONFORMANCE (COC) ITEMS

Step 1 : Develop and Prepare Cost of Conformance (COC) Checklist :

Prevention	**Appraisal**
• Planning and Writing of Procedures and Instructions	• In-coming Inspection
• Vendor Assurance	• In-process Inspection
• Process Capability Studies	• Final Testing and Inspection
• Quality Training	• Production Trial
• Quality Improvement Programs	• Materials consumed during Inspection and Testing
• Collection, Analysis & Reporting of Quality Data	• Field Performance Testing

Step 2 : Evaluate The Identified Cost of Conformance (COC) Items.

3.2 IDENTIFYING COST OF NON-CONFORMANCE (CONC) ITEM

Step 1 : Develop and Prepare Cost of Non-Conformance (CONC) Checklists -

Internal Failure	**External Failure**
• Rework	• Complaints
• Scrap	• Warranty Claim
• Obsolescence	• Bad Debts
• Downtime	• Returned Products
• Sub-contractor faults	• Concessions
• Replacement	• Loss of Sale
• Defect / Failure Analysis	• Product Liability
• Re-inspection and Re-testing	• Extended Warranty
• Downgradings	• Product Recall
• Accidents	• Overdue Accounts Receivable
• Improper Invoicing	

Step 2 : Evaluate The Identified Cost of Non-Conformance (CONC) Items.

4.0 QUANTIFICATION OF COST OF QUALITY (COQ)

Step 1 : Source of COC and CONC Data

- Production Records
- QC Records
- Operation Records
- Accounting Records

Step 2 : Develop and Formulate Accounting Basis

Step 3 : Execute Costing of COQ Items

- Whole Account

This method requires gathering existing financial data from company accounts. If accounts are set up to capture costs, such as training and rework, information from the accounts can be used to measure COQ.

- Unit Pricing

This method is effective when a defect or problem is recurring. To use defect pricing, simply multiply the cost of one defective unit by number of defective units.

- Whole Person

This method is used when people are employed strictly for the purpose of working on or handling defects.

- Labour / Resource Claiming

This method involves calculating actual expenditure on a specific activity, such as the amount of time spent by an employee performing a task or the amount of financial outlay for a one-time expense. This information might come from time sheet, vouchers or any other method for determining exactly how much was spent.

5.0 BENEFITS ACHIEVED IN IMPLEMENTING COST OF QUALITY SYSTEM

- Acts as method for assessing the overall effectiveness of the quality programmes
- Act as a method for determining problem areas and action priorities
- Provides a platform for measurement of return on investment
- Converts the various performance indicators used in the company into a single unit-dollar
- Act as a common method for quantifying qualitative improvements

6.0 DOCUMENTATION, TRAINING, COMMUNICATION AND IMPLEMENTATION

It is necessary to document the required changes of quality activities in a recognised Quality Assurance Model or ISO 9000 Quality System or an In-house TQM Manual with a view to train and communicate with all relevant personnel in implementing the changes effectively.

7.0 PERFORMANCE INDICATIONS AND MEASUREMENT

Step 1 : Outline the business processes and identify appropriate Performance Indicators

Step 2 : Establish and Define the proposed Performance Indicators

Example:

Performance Indicators
Common Performance Indicators are : ☆ General Indicators • Productivity • Labour Productivity • Capital Productivity • Space Productivity ☆ ISO – 9000 related indicators • No. of Complaints per Month • Internal Rejection Rate • External Rejection Rate • Production Yield • Cost of Quality ☆ ISO – 14000 related indicators • Waste Reduction / Minimisation • Increase Level of Recycling • Improve Energy Efficiency • Reduce Environmental Impact

Step 3 : Collect the necessary Data to evaluate the Performance Indicators

8.0 AUDIT AND REVIEW

Conduct quality audit and management review regularly in order to assess the effectiveness of the quantity system. Initiate appropriate corrective and preventive action as and when necessary.

9.0 A PRACTICAL APPROACH IN IMPLEMENTING COQ ACTIVITIES IN AN ORGANISATION

Phase 01:	Project Initiation and Preparation
Phase 02:	Assessment of Current Business Performance
Phase 03:	Project Organisation and Assignments
Phase 04:	Identification of Major Cost of Conformance (COC) and Cost of Non-Conformance (CONC) Items.
Phase 05:	Identification and Provision of Additional Training Needs.

Phase 06:	Collect, Compile and Process Cost of Quality Data
Phase 07:	Analyse Cost of Quality To Identify Opportunities for Improvements.
Phase 08:	Organise and Implement Quality Improvement and Cost Reduction Programmes.
Phase 09:	Establish Continuous Improvement of The Cost of Quality Performance.
Phase 10:	Conduct Quality Audits regularly and Initiate Document Changes In Response To Improvements made In Various Processes.

10.0 CONCLUSION

- The goal of using COQ is to increase prevention activities in order to eliminate internal and external failures and to reduce appraisal activities.

- Reduction of COQ must be part of a sustained quality improvement process in an organisation headed by top management through a TQM Programme.

11.0 REFERENCES

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- Quality Control
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- Total Quality Management
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BRIEF BIO-DATA OF THE AUTHOR
MR. JOHNSON TAN SWAN SAN

Holder of a Bachelor of Science (Chemistry), Singapore. Johnson also holds Post-graduate Qualifications in Advanced Diploma in Business Administration (UK) and ACCA Certified Diploma in Accounting and Finance (UK). He was certified as " Manufacturing Management Specialist" by Sanno Institute of Business Administration (Japan). He was also trained overseas in "US FDA Regulatory Compliance". He is a Registered Senior Auditor with IQA International Register of Certificated Auditors and qualified member for The Institute of Quality Assurance (UK), Singapore Quality Institute and The American Institute of Industrial Engineers.

Furthermore, he has completed a course of study in Asian Associate Environmental Auditors approved by Environmental Auditors Registration Association (UK). He is currently a Registered Associate Environmental Auditor with the Institute Of Environmental Management & Assessment (UK).

Johnson was awarded to attend The 1998 AOTS World Business Network Program For SME Entrepreneurs in Japan. He was also an appointed lecturer for The AOTS World Business Network Program in Singapore for Bangladesh & Nepal Enterpreneurs (WBNP – 05).

He has extensive industrial working experiences in various multi-national companies engaged in the manufacture of hi-tech medical, food, construction, electronics, plastic and chemical products and has held various technical and management positions. One of his notable achievements includes leading the first Diagnostics Biotechnology company in the Asia Pacific to obtain ISO 9002 Quality System Certification awarded by the Singapore Institute Of Standards and Industrial Research (SISIR) and British Standards Institute (BSI). He lectures part-time in Ngee Ann Polytechnic, Singapore Polytechnic and the National University of Singapore in the area of ISO 9000 Quality Systems and ISO / IEC 17025 Quality System.

To-date, he has more than 25 years of practical "hands-on" experiences in various technical, managerial and consulting practices, specialises in areas of Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP), Quality Assurance Management, ISO 9000 Quality Systems, QS 9000 Quality Systems Requirements, ISO 14000 Environmental Management System, EN 46000, ISO / IEC 17025 and Total Quality Management (TQM). In view of his extensive experiences, he is being engaged by several local enterprises as well as multi-national companies as their Management Consultant. He is also currently engaged by Third Party Certification Bodies to conduct certification audits in South East Asia.

Currently, he is being engaged by JQ Management Pte Ltd as Managing Director/ Principal Consultant in Singapore.