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TQM practices in garments industry from the perspective of Bangladesh

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Abstract-The export-oriented RMG sector has made crucial contribution to this abovementioned transformation of theBangladesh economy. The export-oriented readymade garments (RMG) sector in Bangladesh started its journeyin late 1970s as a small non-traditional sector of export. Bangladesh exported RMG worth only US$ 69thousand when Reaz Garments exported its first consignment to USA in 1978. By FY2002, within a span ofabout two decades exports have gone up to US$4.5 billion. Over the past decade alone, the sector registered aphenomenal growth rate of 15 percent per annum, which is impressive by any standard. In fact, this was anexceptionally high growth rate for an emerging industry anywhere in the world. The industrial base whichsustained such high growths also enjoyed a robust expansion, from less than 50 factories in 1983 to more than3,400 in 2002, with the number of RMG workers reaching approximately 1.5 million.Labor unrest, political instability, scarcity of utilities is few major problems faced in RMG sector. However,RMG sector is improving productivity and efficiency with the help of skilled labor force and improvedtechniques. TQM is one of the major techniques which help to improve productivity. In this paper, how TQMtechniques are implemented in Bangladesh will be discussed. Primary data was collected from compliance factory as well as non-compliance factory according to TQMframework. Collected data was analyzed. Primary data was collected through observation method as it wasapparent that most of people who work in this industry are not aware about TQM techniques rather they areimplementing those as a practice. Sample size was 6. The factory which are dealing large bulk as well asinternationally recognized with certificate only considered.To assess the TQM practices in garments factory of Bangladesh is gigantic task. Sample size 6 is notappropriate to represent whole industry as there are different types of factory in terms of production of goods,capacity, and size. Uses of each technique carried point 1. As total number of techniques are 13 total points is 13. It is seemed thatthere is no company which used TQM techniques properly rather they are use some of them. From the selectedsample the Viyellatex Group is highest scorer they got 10 out of 13 and lowest user is Cordial Design Ltd.Mostly used techniques are Information Technology, Quality Management System, Products and ServiceLiability and Experimental Design. Lest used TQM techniques are Failure Mode & Effect Analysis, TotalProductive Maintenance, Taguchi's Quality Management. From the depth interview of Management and Ownerof the garments factory revel that they perceive implementation of TQM is expenditure as they could notmeasure the benefit of implication of TQM. So most they prefer conventional human management techniques. TQM is not destination rather it journey and it has not end. Organization is always trying to improve as well asdifferent techniques and tools are invented parallel customer expectation are enhanced. So definition of qualityis always evolving. In Bangladesh RMG is booming sector its growth is remarkable. To sustain the developmentand keep the growth rate high necessity of TQM is crucial. The owners and the professional of RMG shouldconsider the fact

Key Words: Garments factory, ISO, WRAP, Benchmarking, Quality management system, TQM, Quality, TQM practices in RMG sector of Bangladesh, TQM tools

Introduction

The export-oriented RMG sector has made crucial contribution to this abovementioned transformation of the Bangladesh economy. The export-oriented readymade garments (RMG) sector in Bangladesh started its journey in late 1970s as a small non-traditional sector of export. Bangladesh exported RMG worth only US$ 69 thousand when Reaz Garments exported its first consignment to USA in 1978. By FY2002, within a span of about two decades exports have gone up to US$4.5 billion. Over the past decade alone, the sector registered a phenomenal growth rate of 15 percent per annum, which is impressive by any standard. In fact, this was an exceptionally high growth rate for an emerging industry anywhere in the world. The industrial base which sustained such high growths also enjoyed a robust expansion, from less than 50 factories in 1983 to more than 3,400 in 2002, with the number of RMG workers reaching approximately 1.5 million. (Bhattacharya Debapriya, Rahman Mustafizur & Raihan Ananya :2002)

Labor unrest, political instability, scarcity of utilities is few major problems faced in RMG sector. However, RMG sector is improving productivity and efficiency with the help of skilled labor force and improved techniques. TQM is one of the major techniques which help to improve productivity. In this paper, how TQM techniques are implemented in Bangladesh will be discussed.

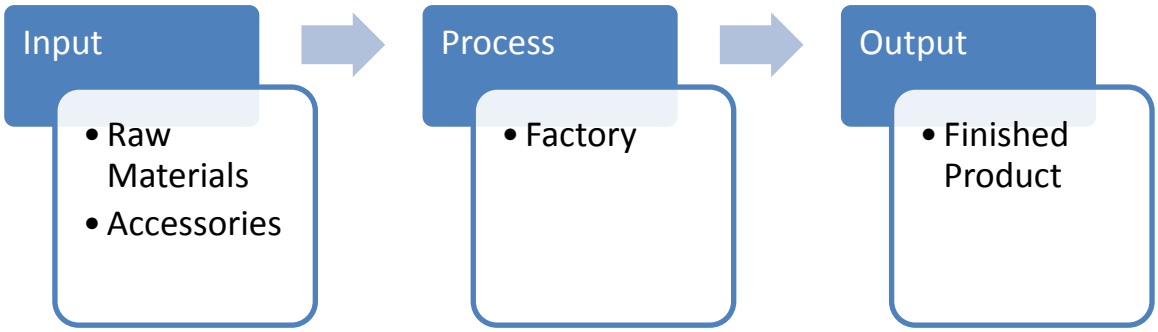

Figure: Production process of RMG

Methodology

Related articles were reviewed and TQM framework was found. Primary data was collected from compliance factory as well as non-compliance factory according to TQM framework. Collected data was analyzed. Primary data was collected through observation method as it was apparent that

most of people who work in this industry are not aware about TQM techniques rather they are implementing those as a practice. Sample size was 6. The factory which are dealing large bulk as well as internationally recognized with certificate only considered.

Limitation

To assess the TQM practices in garments factory of Bangladesh is gigantic task. Sample size 6 is not appropriate to represent whole industry as there are different types of factory in terms of production of goods, capacity, and size.

Critical Literature Review

Garment production system is a way how fabric is being converted into garment in a manufacturing system. Production systems are named according to the various factors, like- Number of machine are used to make a garment, Machines layout, Total number of operators or tailors involved to sew a complete garment and Number of pieces moving in a line during making a garment. As the fashion industry evolved and demand of ready made garments are increased, the need of mass production system becomes the primary path to meet the demand.

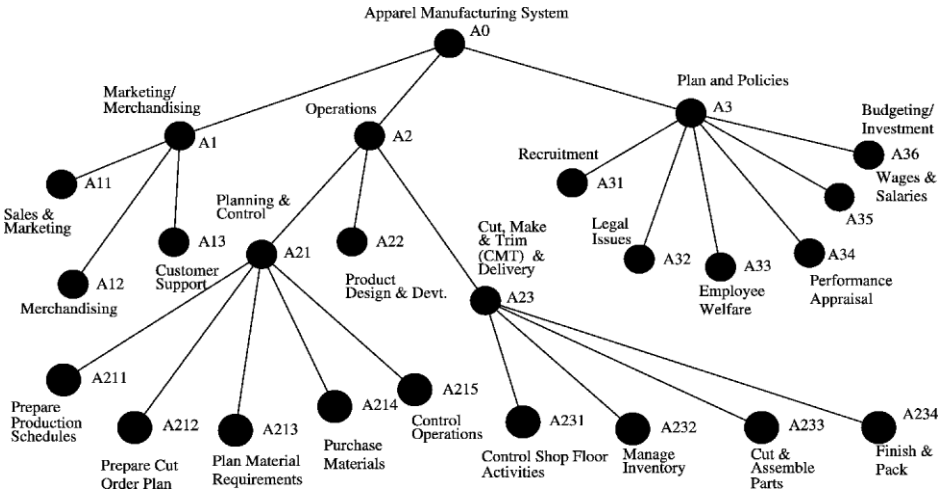

Figure- Apparel Manufacturing System

Certain quality related problems, often seen in garment manufacturing like sewing, color, sizing, or garment defects should never be over looked.

A. Sewing defects: Open seams, wrong stitching techniques, non-matching threads, missing stitches, improper creasing of the garment, improper thread tension etc. are some of the sewing defects.

B. Color defects: Variation of color between the sample and the final garment, wrong color combinations and mismatching dyes.

C. Sizing defects: Wrong gradation of sizes, difference in measurement of various parts of a garment like sleeves of XL size for body of L size garment can deteriorate the garments beyond repair.

D. Finished garment defects: Broken or defective buttons, snaps, stitches, different shades within the same garment, dropped stitches, exposed notches, fabric defects, holes, faulty zippers, loose or hanging sewing threads, misaligned buttons and holes, missing buttons, needle cuts, pulled or

loose yarn, stains, unfinished buttonhole, short zippers, inappropriate trimmings etc. all can lead to the end of a brand name even before its establishment. (Rahman, Baral,Chowdhury:2009)

Methods of quality control

Basically two methods are used for garments quality control –

A. Testing

1. Shrinkage Test: The test is conducted to predict dimensional changes that may occur during automatic laundering of garments at home. Generally 7% maximum shrinkage allowance is acceptable. The test method is AATCC# 135: Demensional changes in automatic home laundering of woven & knit fabrics.

2. Colorfastness: the test is conducted to verify colorfastness of fabric to home washing, to crocking, to perspiration, etc. Rating of color fading is given in a scale of 1-5.1 indicates severe fading & 5 shows no fading. Rating of 4 & above is considered acceptable. Test Method: 1AATCC#61: colorfastness to washing, domestic, and laundering commercial; 2.AATCC#8: colorfastness to crocking; 3.AATCC# Colorfastness to perspiration; 4.AATCC #135 to measure fading.

3. Azo free test

B. Inspection

(Rahman, Baral,Chowdhury:2009) describe Quality Control System is followed by all concerned in the company from piece goods inspection to the final statistical audit.

1. Piece goods quality control: On receipt of fabrics in the ware house, at least 10% are inspection as per "4 Points" system/10 Points system/2.5 Point system/6.0 Point system. The most commonly used 4 Points system as per below –

SIZE OF DEFECT	PENALTY
3 Inches or less	1 Point
Over 3, under 6 Inches	2 Point
Over 6, under 9 Inches	3 Point
Over 9 Inches	4 Point

A maximum of 4 points are changed in one linear yard.

2. Cutting quality control: In cutting section quality is insure in two stages.

a) Spreading quality control: Following the point are checked during spreading

I. Table marking.

II. Ends

III. Tension

IV. Leaning

V. Narrow Goods

VI. Counts

VI. Ply height

VII. Remnants

VIII. Fabric flaws

IX. Market placing

b) After cutting quality control: After each cutting blocks and bundles are checks on the following points.

I. Mis cut

II. Ragged cutting

III. Pattern checks

IV. Matching Plies

V. Notches

3. In process quality control (Sewing): During the swing "In process quality control" is done by the line QC's through 7 pcs inspection system. For critical operations 100% process inspection are carried out. The following parameters are also checked in sewing process –

a) Machine check.

b) Tension.

c) SPI checks

d) Needle check.

e) Cleanness.

d) Table inspection.

f) Inspection before wash.

4. Washing section

a) Garments handling

b) Wash standard.

c) After wash thoroughly inspection.

5. Quality control of finishing sections: Following inspection/audit is done to attain AQL (1.5/2.5/4.0 etc).

a) Process inspection: Garments are checked process wise in the finishing section to identify defects and pass only the passed garments.

b) Two hourly audit: Every after two-hours audit is done on finishing lot to attain AQL the required AQL.

c) Days final audit: At the end of the day accumulated lot of finished garments are statistically audited to attain required AQL.

d) Lot final audit: On completion of packing of one complete lot of garment, QA manager conduct statistical audit based on required AQL garments. Garments are offered for final inspection by buyer /clients for shipment only when these are through in this audit.

The following parameters are also checked in sewing process –

a) After wash garments must be keep in the box /table covering.

b) Thread sucking.

c) Iron inspection.

d) Measurements inspection.

e) Poly inspection of top of garments.

f) Inspection before cartooning.

Quality Management System

Department of Trade and Industry of United Kingdom defined Quality in the manual of QMS "A set of co-coordinated activities to direct and control an organization in order to continually improve the effectiveness and efficiency of its performance."

These activities interact and are affected by being in the system, so the isolation and study of each one in detail will not necessarily lead to an understanding

of the system as a whole. The main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced.

The benefits of a QMS

A fully documented QMS will ensure that two important requirements are met:

• The customers' requirements –confidence in the ability of the organization to deliver the desired product and service consistently meeting their needs and expectations.

• The organization's requirements –both internally and externally, and at an optimum cost with efficient use of the available resources – materials, human, technology and information.

Management systems are needed in all areas of activity, whether large or small businesses, Manufacturing, service or public sector.

A good QMS will:

• Set direction and meet customers' expectations

• Improve process control

• Reduce wastage

• Lower costs

• Increase market share

• Facilitate training

• Involve staff

• Raise morale

In a survey conducted by the Defense Evaluation Research Agency (DERA), ca.96% of respondents said they believed their system contributed to meeting the business goals. However, ca.72% responded that their organization did not measure this contribution.

International Organization for Standardization (ISO)

ISO is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is carried out through ISO technical committees, in liaison with international organizations, governmental and non-governmental bodies. ISO's most recent family of standards for quality management systems are currently in their final draft (FDIS) form, and comprise:

• ISO/FDIS 9000:2000 - Quality management systems – Fundamentals and vocabulary

• ISO/FDIS 9001:2000 - Quality management systems – Requirements

• ISO/FDIS 9004:2000 – Guidelines for performance improvement

WRAP

WRAP is an independent, objective, non-profit team of global social compliance experts dedicated to promoting safe, lawful, humane, and ethical manufacturing around the world through certification and education.

Total Quality Management

TQM Framework begins with the knowledge provided by gurus of quality. According to the chart they contributed to development of principles and practices and/or tools and techniques of TQM.

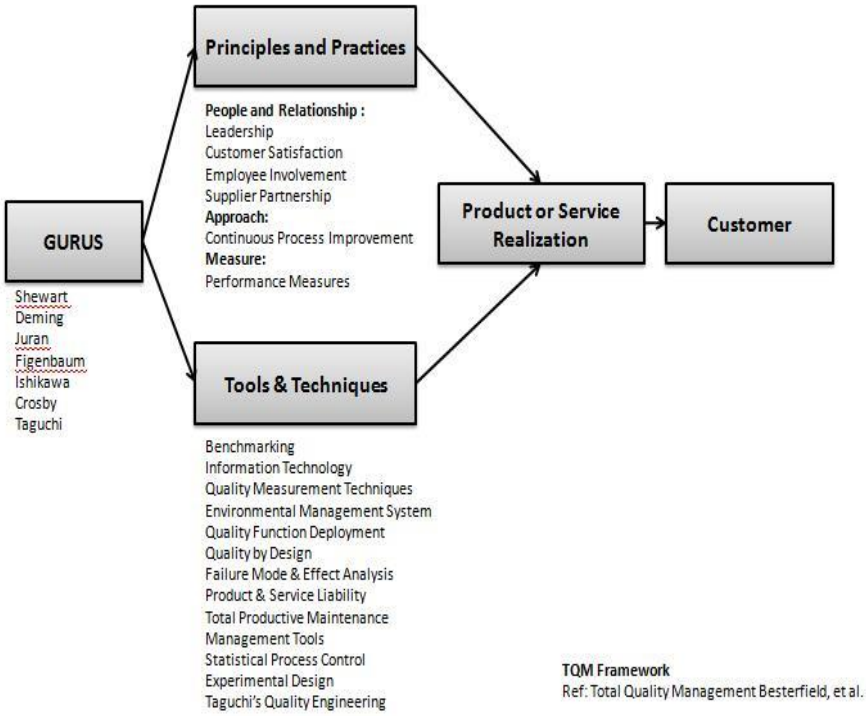

Figure- TQM framework

TQM GURUS

Shewhart (1931) authored Economic control of Quality of Manufactured Product, which is regarded as a complete and through work of the basic principles of Quality control. He also developed the PDSA cycle for learning and improvement.

W.Edwards Deming (1950) taught statistical process control and the importance of quality to the leading CEOs of Japanese industry. He is credited with providing the foundation for the Japanese quality miracle and resurgence as an economic power. Deming is the best – known quality expert in the world. His 14 points provide a theory for management to improve quality, Productivity, and competitive position. He has authored a number of books including Out of crisis and Quality, Productivity, and Competitive position as well as 161 scholarly studies.

Joseph M.Juran,PhD worked at western Electric from to 1941.There he was exposed to the concepts of Shewhart. Juran traveled to Japan in 1954 to teach quality management. He emphasized the necessity for management at all levels to be committed to the quality effort with hand-on involvement. He recommended project improvements based on return on investment to achieve breakthrough results. The Juran Trilogy chapter for managing quality is carried out by the three interrelated processes of planning, control, and improvement. In 1951, the first edition of Juran's Quality Control Handbook was published.

Armand V.Feigenbaum, PhD, argues that total quality control is necessary to achieve productivity, market penetration, and competitive advantage. Quality begins by identifying the customer's

requirements and ends with a product or service in the hands of a satisfied customer. In addition to customer satisfaction, some of Feigenbaums quality principles are genuine management involvement, employee involvement, first-line-supervision leadership and company-wide quality control. In 1951, He authored Total Quality Control.

Kaoru Ishikawa,PhD, studied under Deming,Juran and Feigenbaum.He borrowed the total quality control concept and adapted it for the Japanese.In addition ,he authored APC texts in Japanese and in English.Ishikawa is best known for the development of the cause and effect diagram ,which is sometimes called an Ishikawa diagram.Hedeveloped the quality circle concept in Japan,whereby work groups,including their supervisor,were trained in SPC concepts.The groups then met to identify and solve quality problems in their work environment.

Philip B.Crosby authored his first book, Quality is Free, In 1979,which was translated into 15 languages. It sold 1.5 million copies and changed the way management looked at quality. He argued that "doing it right the time" is less expensive than the costs of detecting and correcting nonconformities. In 1984.he authored Quality without Tears, which contained his four absolutes of quality management. These absolutes are: quality is conformance to requirements; prevention of nonconformance is the objective not appraisal. The performance standard is zero defects not "that's close enough,'' and the measurement of quality is the cost of nonconformance.

Taguchi: Genichi Taguchi, PhD, Development his loss function concept that combines cost, target, and variation into one metric. Because the loss function is reactive, he developed the signal to noise ratio as a proactive equivalent. The cornerstone of Taguchi' philosophy is the robust design of parameters and tolerances. It is built on the simplification and use of traditional design of experiments.

TQM Tools and Techniques

Benchmarking: Benchmarking is a methodology that is used to search for best practices. Benchmarking can be applied to strategies, policies, operations, processes, products, and organizational structures. By finding and adopting best practices that can improve the organization's overall performance. Best practices can be found either within your own organization or within other organizations. It usually means identifying organizations that are doing something in the best possible way and then trying to emulate how they do it. There are at least two types of external benchmarking: competitive benchmarking and generic benchmarking. Competitive benchmarking involves comparing how you do things with how your competitors do things while generic benchmarking involves comparing yourself with organizations in unrelated sectors.

Information Technology: Information Technology (IT) is a tool like other TQM tools; it helps the TQM organization achieve its goals. Over the past few decades, computers and quality management practices have evolved together and have supported each other.

Information Technology is defined as computer technology (either hardware or software) for processing and storing information, as well as communications technology for transmitting information.

Quality Management System: Quality Management System (QMS) is a set of interrelated techniques, measures and management system designed to prevent defects from occurring or if they do not recur.QMS takes recourse to preventive as well as remedial measures.

Quality Management system in the apparel industry: A number of systems, measures & techniques are used so that only quality goods are produced in the first place and defects do not originate all,If they occur at all, there must be corrective action so that they are eliminated in the preliminary stage and would not reappear.

Environmental Management System: The International standards (ISO) completed the quality Management System (ISO9OOO) in 1987.its worldwide success, along with increased emphasis on environmental issues, were instrumental in ISO's decision to develop environmental management standards. In 1991, ISO formed the Strategic Advisory group on the Environment (SAGE), which led to the formation of Technical Committee (TC) 207 IN 1992.

The EMS is [part of a comprehensive management system that addresses how the overall business activities, including its products and services, impact the environment. The EMS maximizes company participation in environmental performance now and in the future. Processes for obtaining registration closely resemble those involved with ISO 9000 and related quality standards.

Quality Function Deployment: Quality function deployment is a planning tool used to fulfill customer expectations. It is a disciplined approach to product design, engineering, and production and provides in depth evaluation of a product. An organization that correctly implements QFD can improve engineering knowledge, productivity, and quality and reduce costs, product development time, and engineering changes.

Quality Function Deployment focuses on customer expectations or requirements, often referred to as the voice of the customer. It is employed to translate customer expectations, in terms of specific requirements, into directions and actions, in terms of engineering or technical characteristics, that can be deployed through:

- Product planning
- Part development
- Process planning
- Production planning
- Service industries.

Quality by Design: Qualities by Design principles are changing the way U.S. managers think and conduct business. Loosely defined, quality by design is the practice of using a multidisciplinary team to conduct conceptual thinking, product design, and production planning all at one time. It is also known as concurrent engineering, simultaneous engineering, or parallel engineering. The team is composed of specialists from business, engineering, production, and the customer base. Supplier of process equipment, purchased parts, and services are also included on the team at appropriate times. Quality by design has recently encouraged changes in management structures .some managers claim to have used it informally before it became popular.

Failure Mode and Effect Analysis: Failure mode and Effect Analysis (FMEA) is an analytical technique(a paper test) that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination. In other words, MEA can be explained as a group of activities intended to Recognize and evaluate the potential failure of a product or process and its effects.

Identify actions that could eliminate or reduce the chance of potential failures.

Document the process.

Product Liability: The marvels of technology have provided needed and useful new products. Competition among competition sometimes forces the marketing of products before they have been adequately tested. Indeed, unproved technology creates hazards that are unknown prior to product use. There are reasons why the manufacturers liability for product injury has increased .Manufacturers are in the best position to know what are the safest designs, materials, construction methods, and modes of use.

The safety and quality of products has been steadily improving. Manufacturers have met the challenge admirably: for instance, using safety glass where previously glass shards caused many severe injuries, placing safety guards around lawn mower blades to prevent lacerations and amputations, redesigning hot water vaporizers to reduce the risk of burns to children, and removing sharp edges on car dashboards to minimize secondary collision injuries.

Total Productive Maintenance: Good maintenance is fundamental to a productive manufacturing system; try running a production line with faculty equipment. Total Productive Maintenance (TPM) is keeping the current plant and equipment at its highest productive level through cooperation of all areas of the organization.

The total maintenance function should be directed towards the elimination of unplanned equipment and plant maintenance. The objective is to create a system in which all maintenance activities can be planned and not interfere with the production process.

Management Tools: Management Tools is very simple, it is effective. It can be a key to finding the root cause of a [problem by focusing on the process rather than on people. The procedure is to describe the problem in Specific terms and then ask why. This tool is very beneficial in developing critical thinking. It is frequently a quick method of solving a problem

Statistical Process Control: One of the best technical tools for improving product and service quality is Statistical process control (SPC).There are seven basic techniques. Since the first four techniques are not really statistical, the word statistical is somewhat of a misnomer. Furthermore, this technical tool not only controls the process but has the capability to improve it as well. The seven basic techniques are given bellow-

- Pareto Diagram
- Process Flow Diagram
- Cause and Effect Diagram
- Histogram
- Statistical Fundamentals
- Introduction of Control Charts

Experimental Design: Industry has become increasingly aware of the importance of quality. It is being used as a business strategy to increase market share. Organizations are achieving world-class quality by using designed experiments .Experimental design is one of the most powerful techniques for improving quality and increasing productivity. Through experimentation changes are intentionally introduced into the process or system in order to observe their effect on the performance characteristics or response of the system or process.

Taguchi's Quality Engineering: This technique is introduced the loss function concept, which combines cost, target, and variation into one metric with specifications being of secondary importance. Furthermore, he developed the concept of robustness, which means that noise factors are taken

into account to ensure that the system functions correctly. Noise factors are uncontrollable variables that can cause significant variability in the process or the product

Principles and Practices

Leadership
Dr. W. E. Deming summarized his views on management and its relationship with quality in his 14 points for management. Altogether, the 14 guidelines describe a fundamental basis for an organization's culture. They define a process by which managers seeks out bad practices and habits and replace them with better, more effective practices. Deming used his 14 points for the management to emphasize the critical role of managers in TQM. He saw managers rather than workers or equipments as the real obstacle to TQM. Feigenbaum had talked about proactive quality leadership. (Dr. W. E. Deming,2000)

Customer Satisfaction Dr. Deming said that quality also means anticipating the future needs of the customers to satisfy them James Teboul illustrated with his model regarding customer satisfaction where the product/service square offered by the organization must match with the customer's needs circle. Thereby satisfaction is achieved.

Employee Involvement Maslow had discussed the needs of employee into Survival, Security, Social, Esteem and Self-actualization. Frederick Herzberg labeled motivating factors and dissatisfying factors for the employees.

Deming and Scholtes has been criticized that traditional performance appraisal system. Deming stated that 85% of the problems are the results of the system. Harold Koontz, Heinz Weihrich (2006)

TQM practices in RMG sector of Bangladesh

Tool/Technique	Ahsan Group	Ananta Apparels Ltd	Viyellatex Group	Dird Composite Ltd	Cordial Design Ltd	Babylon Group	Total
No of Employees	5500	12500	20000	4000	1348	11500	
Certificate	WRAP	ISO	ISO 14001:2004	WRAP, ISO	WRAP	ISO, WRAP	
Benchmarking			1	1		1	3/7
Information Technology	1	1	1	1	1	1	7/7
Quality Management System	1	1	1	1	1	1	7/7
Environmental Management	1		1	1		1	4/7

System							
Quality Function Deployment	1			1	1		3/7
Quality By Design	1	1		1			3/7
Failure Mode & Effect Analysis		1					1/7
Products and Service Liability	1	1	1	1	1	1	7/7
Total Productive Maintenance			1				1/7
Management Tools	1		1	1	1		4/7
Statistical Process Control		1	1			1	3/7
Experimental Design	1	1	1	1	1	1	7/7
Taguchi's Quality Management			1				1/7
Total	8/13	7/13	10/13	9/13	6/13	7/13	

Table- TQM techniques used in Bangladesh

Uses of each technique carried point 1. As total number of techniques are 13 total points is 13. It is seemed that there is no company which used TQM techniques properly rather they are use some of them. From the selected sample the Viyellatex Group is highest scorer they got 10 out of 13 and lowest user is Cordial Design Ltd. Mostly used techniques are Information Technology, Quality Management System, Products and Service Liability and Experimental Design. Lest used TQM techniques are Failure Mode & Effect Analysis, Total Productive Maintenance, Taguchi's Quality

Management. From the depth interview of Management and Owner of the garments factory revel that they perceive implementation of TQM is expenditure as they could not measure the benefit of implication of TQM. So most they prefer conventional human management techniques

.

Findings

- Lack of Commitment to implement TQM
- Lack of Motivation
- Communication gap between different parties of within organization and beyond
- Insufficient of Backward and Forward linkage
- Scarcity of skilled human resources
- Expensive to implementation
- Insufficient SCM (supply chain Management.
- Political instability

Recommendations

- Training to understand TQM and enhance commitment through out the organization.
- Building efficient supply chain Management with collaborations of supplier and other market intermediaries.
- Establish efficient communication chain for flow of information with the help of information technology
- Provide proper motivation to the supplier and customer

Conclusion: TQM is not destination rather it journey and it has not end. Organization is always trying to improve as well as different techniques and tools are invented parallel customer expectation are enhanced. So definition of quality is always evolving. In Bangladesh RMG is booming sector its growth is remarkable. To sustain the development and keep the growth rate high necessity of TQM is crucial. The owners and the professional of RMG should consider the fact.

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