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Full Length Research Paper

Pillars of TQM Implementation in Manufacturing Organization- An Empirical Study

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Abstract

A good quality management system is vital for a manufacturing organization to enhance its competitiveness. Over the years, TQM becomes a strategic tool for manufacturing organizations to grow and sustain in the highly competitive business environment. However, developing appropriate foundation for TQM implementation is still the real challenge for an organization. This paper deals with the implementation issues of TQM in manufacturing organizations. A comprehensive framework for TQM implementation was developed that engaged essential pillars, and their associated factors. The aim of the research was to examine the feasibility of the proposed framework initially developed based on the literature review and authors' experience working in the manufacturing organizations. The developed framework was verified in the practical settings in Ready Made Garments (RMG) Industry in Bangladesh. In the empirical investigation, 31 export-oriented organizations in the RMG sector were studied. The findings implied that the creation of quality management environment, development of teamwork, practice of quality control tools and techniques, closer supplier relationship and customer focus are the main pillar of TQM implementation. Majority of the proposed factors associated to the pillars were significantly apparent in the studied organizations. As a whole the study validated the proposed framework for TQM implementation.

Keywords: TQM, Pillars, Implementation, Manufacturing.

INTRODUCTION

Quality has been identified as an important business driver in today's international market. In this context, Total Quality Management (TQM) has been receiving global attention from both practitioners and researchers. Many manufacturing firms implement Total Quality Management (TQM) with the aim of delivering high-quality products to their customers. Some of them become successful and some are not. The concept, TQM, was largely influenced by the experience of high-quality products from Japanese manufactures (Zandin, 20011). TQM is defined as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization (Besterfield et al., 2009). TQM is the result of a long line of developments dating back to Frederick Taylor's efforts in the 1920s to evaluate and improve the quality of manufactured goods. Following Taylor's efforts, the next major improvement came with the introduction of statistical quality control procedures. This effort was, in turn, followed by Deming's work with quality assurance. Deming focused on continuous improvement and the elimination of waste (Kolarik, 1995). Ultimately, quality assurance efforts began to broaden so that they became a concern of all management and led to the Total Quality Management approach used today. TQM is the art of managing the whole to achieve excellence over product or service (Besterfield et al., 2009). The definition of TQM may sound simple, but the implementation of it in practice is challenging. Even, the definition of TQM is a source of confusion. There is no consensus on what constitutes TQM. However, researchers and practitioners define TQM as both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization (Bounds et al., 1994). In fact, TQM is enrichment to the traditional way of doing business. It is for the most part common sense. TQM refers to organization-wide effort to achieve quality. It can accurately be

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described as a philosophy about quality that suggest for involving everyone in the organization in a quest for quality. It extends to suppliers as well as to customers. If fact, in TQM, the customer is the focal point, as the business is driven by customers. As such, customer satisfaction is the main driving force. Everyone in the organization, form the top most chief executive, up to the bottom most workers, has to take part in this endeavor. Achieving world class quality is not just another program; it is an ongoing process (Kolarik, 1995; Hasin, 2007). An organization uses TQM as a long term approach to achieving customer satisfaction. TQM requires all employees of the organization in the endeavor of improving products, processes and services. TQM applications vary widely with product category, organizational settings, management philosophies and practices and so on (Bounds et al., 1994). In practical business settings, implementation of TQM requires a great deal of change in most organizations. For these change, some factors or associated activities are involved to implement TQM in organizations. The implementation of TQM in practice is not straight forward as TQM does not occur overnight. It takes a long time to build the appropriate emphasis and techniques into the culture. Indeed, it takes time and patience to complete the process. The results may not see for a long period of time. Some experts say that it takes up to ten years to fully realize the results of implementing quality management. Several steps must be taken in the process of shifting to quality management in an organization. Hasin (2007) highlights some unique characteristics of TQM, which include Continual improvement; Customer focus; Organization-wide activity; Employee empowerment; Team approach; Competitive benchmarking; Knowledge of quality control tools; Internal and external customers; and Long term relationship with suppliers. During the last two decade, many researchers have focused on the TQM factors and its dimensions. In this connection, several researchers have suggested some soft and hard factors for TQM, and frameworks (e.g., Shahin and Dabestani, 2011; Ross, 1993). Hard factors are related to the techniques and tools such as statistical process control and problem solving methods while the soft factors refer to the “management” part of the TQM which involves a set of principles as people, culture and improvement. These soft factors of TQM involves committed leadership, adoption and communication of TQM, closer customer relationship, closer supplier relationship, benchmarking, increased training, open organization, employee empowerment, zero-defect mentality and process improvement (Shahin and Dabestani, 2011). Ross (1993) explained TQM as a set of practices, continuous improvement, meeting customers' requirements, reducing rework, increased employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem-solving, constant measurement of results, and closer relationships with suppliers. Many of research works published on the implementation of TQM have identified teamwork and employee involvement as the key enablers of TQM (Crofton and Dale 1996 ; Kennerfalk and Klefsjo, 1995). Gunasekeran (1999) identified seven key enablers: Job satisfaction, Communication, Teamwork, Cross-functional teams, Empowerment and Training and Education.

Although different authors on total quality management emphasize different techniques and use different terminology, all share three common ideas: quality, team-work and process improvement. Jablonski (1997) has identified three characteristics of TQM implementation: participative management; continuous process improvement; and utilization of teams. According to him, there are six attributes for successful implementation of TQM program that are Customer focus, Process focus, Prevention versus inspection, Employee empowerment and compensation, Fact-based decision making, Receptiveness to feedback. Ho (1999) proposes TQMEX model, which demands ten TQM commandants (management led, prevention not detection, total customer satisfaction, the costs of quality, right first time, ownership and commitment, continuous improvement, training and education, co-operation and teamwork, recognition and pride), four pillars, and four Cs (commitment, competence, communication and continuous improvement. The four pillars of the TQM implementation involve satisfying customers, system/process, people, and improvement tools. Building on the work of founders of the TQM approach, Creech identified what he called five pillars of TQM: Product (service), Process, Organization, Leadership and Commitment (Rowitz, 2003). Creech provide 16 guidelines for 5 TQM pillars. It was mentioned earlier that the implementation of TQM is not a quick fix. It takes time to be adapted and needs cultural change within the organization. Implementing TQM in fact increases the responsibility in the organizations and there is enough evidence that many organizations have tried to implement the TQM philosophy, but have either abandoned it or have not been able to gain expected benefits. Again, there are many companies that have not implemented TQM, fearing that it may require additional investment and result in a significant production loss. In fact, poor understanding of TQM and improper involvement of employees in TQM implementation may result in production loss. Therefore, an organization first needs to know how to launch the philosophy within the existing culture, how to practice it and finally how to sustain with it over the time. All these require a basic foundation of the implementation process.

Since the early 1990s, researchers have conducted empirical studies on the relationship TQM implementation and organizational performance. While previous studies have provided interesting insights into the role of hard and soft factors of TQM implementation in manufacturing industry, a few shortcomings in these studies emerge from the literature review. Earlier studies failed to explain which foundation is directly or indirectly associated with the successful implementation of TQM. Most studies examined only the direct relationship between necessary factors (hard and/or soft) of TQM implementation and expected benefits of the implementation. Most researchers have tended to identify whether some factors are positively related to the implementation of TQM (e.g., Shahin and

Dabestani, 2011; Ross, 1993; Crofton and Dale, 1996; Kennerfalk and Klefsjo 1995; Gunasekaran, 1999). Moreover, they have focused on the fundamental factors behind the philosophy of TQM. In authors' knowledge, a detailed examination of key factors and their association with major pillars of TQM implementation in manufacturing organizations is drawn a little attention in the previous studies. In other words, there are a few gaps in the literature to be filled in regarding the foundation of TQM implementation and the associated factors involved in each of the structural elements of the foundation. We propose that the foundation of TQM implementation should be built in eight pillars and each pillar should be composed of some specific factors. The purpose of this paper is to present and discuss the proposed framework for TQM implementation, which involves eight pillars and 25 key factors associated to the pillars. The proposed framework has been examined by multiple case studies conducted in 31 Manufacturing Organizations in RGM sector of Bangladesh.

Management leadership is an important factor in TQM implementation because it improves performance through influencing other TQM practices (Wilson and Collier 2000). The lack of commitment in the top management may lead to some problems in TQM implementation. Successful implementation of TQM requires effective changes in an organization's culture and it is somehow impossible without management leadership (Ho et al., 1999). Leadership must ensure that the principles of quality management are implemented continually (Yusuf et al., 2001). One of the most difficult tasks in the beginning phase of implementing TQM is to determine where to start and when to start. Organizations use a variety of approaches to find the potential causes of problems. The most popular, formal approach is probably the fishbone, or Ishikawa diagram. By this method we can find all of the potential causes. After finding potential causes, our main concern to find root or vital or dominating causes by using Perato chart. By identifying vital causes, one can begin to focus on what needs attention first. Focusing attention on these problems first, the organization would have bigger payoffs and could build momentum for the future. Communication is the most difficult subject, especially in the business. Workers usually complain that they are not part of it (Jefferson, 2002). Communication also plays a vital role in efficient producing of high quality products. The misunderstanding of procedures and instructions may negatively influence a production system. Written instruction for quality improvement may not be implemented, if communication amongst employee does not exist effectively (Aly, and Schloss 2003). Implementing TQM increases the responsibility of management to create a quality management environment first. This paper deals with the most significant factors involved in creating quality management environment in the organization.

Every employee is a part of quality chain, from supplier to external customer, including both line and support functions (Lindborg, 2003). Therefore, those employees who do not have direct contact with outside customers are encouraged to view their colleagues as internal customers and to meet their requirements. Employees should work in teams. In other words, teamwork can enhance the coherence of employees to work together for customer satisfaction. The teams should be formed with cross functional employees. The importance of diversity is directly related to the variety of perspectives that are included when teams are composed of members across the organization (Jefferson, 2002). So, development of cross-functional teams need to encouraged for successful implementation of TQM. The decision making process requires that information be shared with everyone in the organization. If a team approach is to be used and if employees are expected to be involved in the decision-making process, it is imperative that information be shared with everyone. TQM supports that in decision making process information be shared with Top, middle, and frontline management people (Whalen and Rahim 1994). For proper information sharing, software related data base program can help. Software related data base helps for quick information sharing and make better decision quickly. The authors conclude that without developing teamwork culture within the organization, the success of implementing TQM will be far reaching.

Customer focus is generally regarded as the most important in TQM principle (Dean, and Bowen, 1994). From beginning to end, customer satisfaction should be the focal point of the quality management system. The relevance of customer satisfaction in the quality management literature is obvious. The measurement of customer satisfaction often has been based on a customer's perception of the quality of products and services (Aly, and Schloss 2003; Anderson et al., 1994). Appreciation of internal (employees), as well as external customers is viewed as fundamental for long-term organizational success. Maintaining close relationships with customers and regularly seeking feedback from them are common TQM practice (Lindborg, 2003; Nagaprasad and Yogesha 2009). The authors deal with the factors involved in developing customer focused organization.

An organization spends a substantial portion of every sales dollar on the purchase of raw materials. Supplier quality can substantially affect the overall cost of product. Defective raw materials can significantly hamper the production and the associated product cost. Therefore, a manufacturing organization needs to build long term trust-based relationship with its suppliers. There are three key elements to a partnering relationship including long-term commitment, trust and shared vision (Besterfield et al., 2009). For successful implementation of TQM, an organization should focus on the development supplier partnership.

Benchmarking is about setting goals and meeting them by improving processes (Besterfield et al., 2009). Benchmarking is a key component of the TQM process, profitability and growth (Ghobadian & Woo, 1996). The typical classification of benchmarking which are pinpointed in the literature includes internal benchmarking; competitive benchmarking; functional benchmarking; and generic benchmarking (Carpinetti, and Melo, 2002).

Benchmarking may contribute to an organization's ability to achieve competitive advantage by monitoring the best practices in the industry and diagnosing measure of performance. Although benchmarking is not a panacea that can replace other quality efforts or management processes, it can help organizations to identify their strengths and weaknesses to gain competitive advantage, which is what the ultimate aim of TQM implementation. The authors infer that the concept of benchmarking can be good platform for TQM implementation.

Process improvement is a key characteristic in TQM programs that starts with the process analysis with the aim of reduction or elimination of variance (Sinclair and Zairi, 1995). In a manufacturing system, usually there are five types of problems: *compliance* (deviation from set standard), *unstructured* (absence of standards), efficiency (unacceptable balance of inputs and outputs), *process design* (errors in design or obsolesce of technology) and *product design* (lack of product development strategy or improper development ignoring customer demand). The first three are performance problems and the last two are design problems that require a new or improved design (Zandin, 2001). To deal with problems, an organization should adapt the principle of PDSA (Plan-Do-Study-Act) cycle, which is an effective technique for continuous process improvement. For successful implementation of TQM, process improvement can play a vital role.

Employee involvement is "a process for empowering members of organizations to make decisions and solve problems appropriate to their levels in the organization". (Pace 1989). Employee involvement becomes meaningful when a strategic context has been established through leadership, systems, and processes which are supplemented with the appropriate tools (Hasin. 2007). Therefore, the employees involved in the TQM process must be motivated and satisfied (Gunasekaran, 1999). Recognition and rewards are the forms of employee motivation in which the organization publicly acknowledges the positive contributions of the individuals for organizational success (Besterfield et al., 2009; Powell, 1995). To get the maximum benefit of a quality program, the employee empowerment is necessary (Carpinetti, and Melo, 2002; Pace,1989; Lloyd et al., 1999). Employee empowerment include the degree of freedom for cross-departmental and team works; employee autonomy in decision making; employee interaction with customers; and employee suggestion systems in strategy formulation. An empowered employee is held responsible for accomplishing a whole task as he becomes the process owner. Employee empowerment is considered as an integral part of any successful quality improvement process which helps employees to make decisions about their own work and environment. This also encourages people to apply the most appropriate tools and techniques (McQuater et al., 1995). The term training refers to the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies. Training has specific goals of improving one's capability, capacity, and performance. Training and education are also necessary for teaching the TQM philosophy that requires permanent change in individual behaviors and attitudes and leads to strengthening the organization's culture (Shenawy et al., 2007). The authors conclude that the meaningful involvement of employees in TQM can be an important pillar for successful implementation.

Proposed framework for TQM implementation

All logical conclusions and a review of the literature indicate that for TQM implementation to be successful there must be some pillars to strengthen the foundation of strategic measures. We propose that the TQM implementation should be successful if it stands on eight pillars. The pillars should not be isolated they need to be bonded together for better cohesion. Once the implementation becomes successful, an organization can achieve its ultimate goal through TQM, which is to supply the quality product or service to its customers. The proposed framework of TQM implementation is depicted in Figure 1.

Pillar one (P1): Creation of quality management environment

Starting Part of the TQM philosophy should be the Creation of Quality Management (QM) environment for all employees to seek out quality problems and correct them and the environment must exist throughout the implementation period. An organization needs to have clear vision and mission about TQM implementation. This must be circulated to all employees in the organization. TQM is an organization-wide challenge that is everyone's challenge. An organization will not begin the transformation of TQM until it is aware that the quality of its product or service must be improved (Besterfield et al., 2009). Therefore, awareness program for TQM implementation is necessary to create organization-wide positive environment. At the beginning, this can be done through seminar, symposium or workshops within the organization. Later, it can be delivered through formal training and education program to the key employees of the TQM implementation teams.

Pillar two (P2): Development of Teamwork

For continuous improvement, customers' requirements must be consistently measured and satisfied. A company should be organized to obtain the necessary information for the identification of customer requirements and to obtain reliable and fast feedback on the quality levels of currently available products/services. The needs of customers' satisfaction should be considered by all employees. Therefore, it is necessary to involve frontline

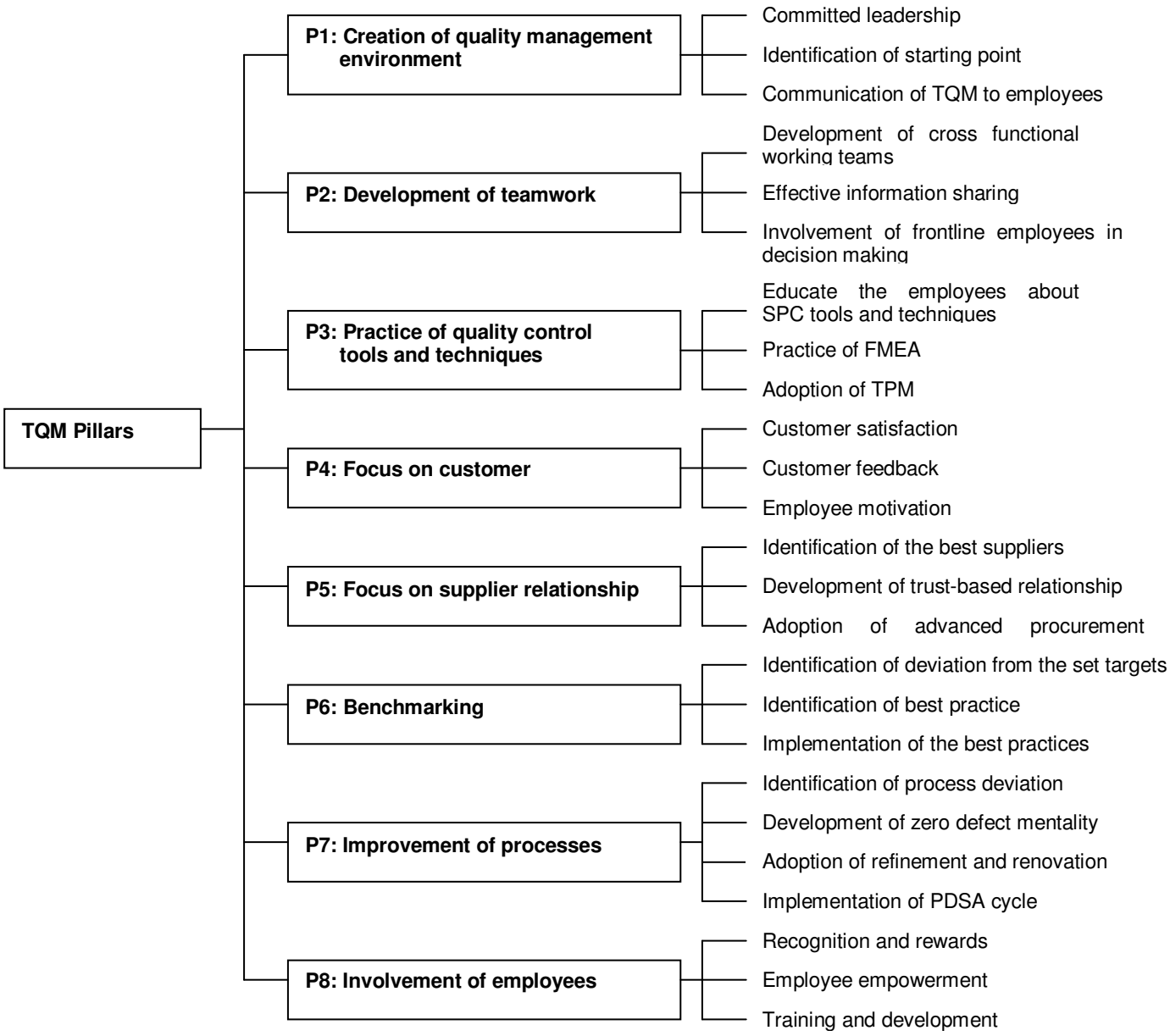

Figure 1. The proposed framework for TQM Implementation.

employees in decision making at their workplace. Establishing and valuing the input of teams is the important integral component of TQM (Keng-Boon et al., 2010). The essence of teamwork is the high value which is attached to collaboration. Collaboration can entail many partnerships and even include non-organizational members (e.g. suppliers). Solutions arrived at collectively are generally thought to be better, more creative, and foster commitment to the ultimate outcome. In order to realize the advantages of collaboration, however, teams must genuinely facilitate the participation and involvement of members, overcome hierarchical power deference's, and culminate in the actual solving of work problems. In many organizations that do not follow TQM philosophy, managers are often on the hunt for someone to blame for problems that are found. This type of environment creates unhealthy stress and discourages innovative thoughts and practices of employees. The combination of a team approach and QM means seeking to improve the system when problems arise. The reasons why Teamwork become successful are *flexibility* (easier to assemble, deploy, refocus and disband and help to enhance permanent structure and processes), *Commitment* (relies on people from different cross-functional circles working together in a practical way to develop a shared sense of direction), *Synergistic response to challenge* (able to respond synergistically to challenges, changing events and demands because of the combination of skills and experience), *Enhance work* (achieve results through overcoming barriers and establish trust and confidence in the ability of team members) and *Focus*

(offer people more room for growth and change than traditional structures) (Wilson and Collier, 2000; Islam, 1998).

Pillar Three (P3): Practice of quality control tools and techniques

TQM places a great deal of responsibility on all employees. If employees are to identify correct quality problems, they need to apply appropriate tools and techniques. For improving product and service quality, Statistical Process Control (SPC) is the best technical tool that comprises seven basic techniques namely Pareto diagram, Process flow diagram, Cause-and-effect diagram, Check sheets, Histogram, Control charts and Scattered diagram. This technical tool can be sued to control the process as well as to improve the process capability (Besterfield et al., 2009; Shahin. and Dabestani, 2011). Therefore, the introduction of the SPC tools to the employees will be very helpful in implementing TQM in practice. The involvement of SPC tool and the associated techniques for analyzing and solving problems can boost up the TQM implementation. Failure Mode and Effect Analysis (FMEA) is an analytical technique that combines the technology and experience of people in identifying foreseeable failure modes of a product or process and planning for its elimination. The implementation of design FMEA helps establish priorities based on expected failures and severity of those failures and helps uncover oversights, misjudgments and errors with the aid of reducing development time and cost of manufacturing process. On the other hand, process FMEA can identify potential process failure modes and help to establish priorities according to relative impact on the internal and external customers. Thus, implementing FMEA technique, an organization can reduce the potential failures in its product and process, which is what one of the targets of the TQM implementation. Good maintenance is fundamental to a productive manufacturing system. The practice of Total Productive Maintenance (TPM) keeps the current plant and equipment at its highest productive level through cooperation of all areas of organization (Besterfield et al., 2009). It is directed towards the elimination of unplanned equipment and plant maintenance. TPM is considered as an extension of the TQM philosophy to the maintenance function.

Pillar Four (P4): Focus on customer

TQM recognizes that a perfectly produced product has little value if it is not what the customer wants. Therefore, we can say that quality is customer driven. This means that the goal of customer satisfaction must be incorporated in the planning processes and then maintained day in and day out. For continuous improvement, customers' requirements must be consistently measured and satisfied. The company should be organized to obtain the necessary information for the identification of customer requirements and to obtain reliable and fast feedback on the quality levels of currently available products/services (Islam, 1998). Employee motivation plays a vital role to focus on customer satisfaction. Motivated employee can perform better than de-motivated ones (Bernardin, H. and Russell 1998). Customer expectations often vary from one customer to the next. For this purpose organization now utilizes an organized system to identify and prioritize customer demands and then align an organization's products or services to meet those priorities. To do this it uses adaptations of Quality Function Deployment (QFD), a strategic tool in which the voice of the customer is captured in a series of matrices that facilitate the analysis of product/service quality characteristics, costs, reliability, and the use of new concepts and technologies for improvement in light of customer requirements. The purpose of this Element therefore is to ensure that TQM efforts are customer-focused and aligned (Anderson, 1994).

Pillar Five (P5): Focus on supplier relationship

Management needs to allow sufficient time for the purchasing department to identify several low cost, qualified suppliers and to analyze the information they submit. An unrealistic deadline can lead to poor selection based on incomplete information about supplier qualifications. In addition, improved communication between purchasing and other departments, such as engineering and quality control, is needed when those departments must provide information to assess supplier qualifications and the suppliers manufacturing process (Lee, 2002). It is difficult to develop the level of creditability and trust needed to establish tight working relationships. Companies should apply appropriate tools, techniques and systems to make a suitable relationship with suppliers. Some of these systems include 'procurement systems'; 'advanced planning and scheduling'; and 'transportation planning systems' (Hugos, 2003). Standard procurement systems can allow company to compare the price and performance capabilities of different suppliers. In this way, it is possible to identify better suppliers so that relationship can be established with them. The routine transactions that occur in the purchasing process can then be largely automated as the information technology is available at the door steps.

Pillar Six (P6): Benchmarking

Benchmarking is a systematic method by which an organization can measures its performance against the best industry practice. It is a tool for continuous improvement. Basically, it is process of borrowing ideas and adapting them to gain competitive advantage. The need of benchmarking may start from the identification of the deviations from set targets of the existing process and practices and it can end with the achievement of desired improvements set according to the best practices. As

benchmarking is not a strategy nor is it intended to be business philosophy, it must be used properly to gain expected benefits. Benchmarking is time and cost efficient because the process involves imitation and adaptation rather than pure invention (Besterfield et al., 2009). So, for TQM implementing organization can benchmark the strategies and policies adopted by the benchmarked organization.

Pillar Seven (P7): Improvement of processes

The process improvement can be done by the training of production employees and adapting new technologies, if required. Process improvement can be the beginning of a quality program. Most authors support a 'zero defect' and a 'do it right the first time' attitude towards the quality program, which require zero defect mentality of the employees (Yusuf et al., 2007; Powell, 1995; Motwani, 2001). Refinement involves activities that continually improve a process that is not broken. It improves efficiency and effectiveness. Everyone in the organization can adapt this strategy with the aim of doing things just a bit quicker, better, easier or with less waste. Innovation and technological advancements are key factors in strategy of renovation, which results in major improvements. To be successful in TQM implementation, refinement and renovation for process improvement can play vital roles (Besterfield et al., 2009).

Pillar Eight (P8): Involvement of employee

Involving employees, empowering them and bringing them into the decision-making process provide the opportunity for continuous process improvement, which is what one of the goals of TQM implementation. Indeed, it improves quality and increases productivity. It becomes obvious that there is a need for employee involvement in any change process including quality management practices (Kim et al., 2012). Discovering the best factor that motivates the team and designing the reward system accordingly can act as a positive feedback to keep TQM alive. Employee should be involved in the planning and implementation of the recognition and reward program. Rewards to teams and individuals should be provided to show that their efforts and contributions are much appreciated by management. A major reward system based on team accomplishments may be considered. To implement a well-established recognition and reward system, performance appraisal is necessary as it will let employees know how they are doing, and will provide a basis for promotions, salary increase, counseling, and other purposes related to an employee's future (Besterfield et al., 2009). Empowerment is an environment in which people have the ability, the confidence, , and the commitment to take the responsibility and ownership to improve the process and initiate necessary steps to satisfy customer requirements within well-defined boundaries in order to achieve organizational values and goals (Besterfield et al., 2009). All members involved in the TQM implementation process must receive training in group dynamic and communication skills, quality awareness (TQM in particular), specific problem solving techniques such as SPC, safety, and technical aspects of the job (Keng-Boon et al., 2010; Islam, 1998).

According to the proposed framework, the implementation of TQM requires basic foundation, which can be built in eight pillars. Again, each of the pillars should be composed of some key factors supportive to the inherent philosophy and guiding principles of TQM. All the pillars support each other, leading to creating an organizational culture for continuous improvement which is what the TQM implementation aims for.

MATERIALS AND METHODS

For the verification of the proposed framework, we have conducted multiple case studies with questionnaire based structured interviews with the managers (in the top management level) at 31 organizations involved in readymade garments (RMG) manufacturing in Bangladesh. Direct observation and the verification of documents were applied to supplement the findings, when required. Theoretical sampling has been chosen purposefully. All the selected organizations are in the same business activities representing the population of their level. All are exporting their products to international markets, in Europe and in the USA in particular. Seemingly, they are conscious enough about TQM as they need to be quality conscious, creative and highly competitive as they are satisfying the international buyers based on the work on order system. The demography of participated organizations is presented in Table 1. The number within the bracket indicates the number of organizations.

There were two parts of the questionnaires. In the first part, the key questions were directly related to the proposed pillars of TQM and in the second part, the questions were related to the key factors associated to the pillar. The managers of the participated organizations were asked to put the relative values against each pillar out of 10 point scale, where 1 represents unimportant and 10 represent very important value. They were provided the opportunity to choose any value within the continuous scale. The Cronbach's Alpha of the data for TQM pillars is found 0.74, which confirm the reliability level of the data.

RESULTS AND DISCUSSION

The descriptive statistics about the eight pillars in the proposed framework are presented in Table 2.

According to the mean values, we could conclude that the studied organizations emphasize more on the supplier relationship and give less priority on benchmarking as the pillar of TQM implementation. Other pillars are placed in between. The grand average of the pillar mean is found

Table 1. Demography of organizations

Year of establishment	1982-1999 (13)		2000-2007 (18)	
ISO certification holders	Yes (18)		No (13)	
Involvement in social activities (internal and external)	Yes (16)		No (15)	
Number of employees in the organizations	Management level		Working level	
	10-250 (19)	251-480 (12)	170-6000 (25)	6001-12000 (6)
	Total number of organization = 31			

Table 2. Descriptive statistics of the TQM pillars

TQM Pillars	Mean	Std. deviation	Maximum	Minimum
Pillar one: Creation of quality management environment	8.52	2.13	10	2
Pillar two: Development of Teamwork	7.66	1.57	10	5
Pillar Three: Practice of quality control tools and techniques	6.77	3.77	10	0
Pillar Four: Focus on Customer	8.17	1.89	10	3.5
Pillar Five: Focus on supplier relationship	9.14	1.48	10	6.5
Pillar Six: Benchmarking	2.24	1.57	3.5	0
Pillar Seven: Improvement of Processes	4.48	3.45	10	0
Pillar eight: Involvement of Employees	6.13	3.58	10	0

6.64, which is pretty good. However, further analysis is performed to identify the significant differences of mean values of all pillars. For this, one tailed T-test has been performed for paired comparison. The results of the T-test are presented in Table 3.

Judging the results of T-test, we can conclude that Pillar 5, focus of supplier relationship, places itself at the top rank among all pillars. P6 is in the bottom rank and the others pillars are in between the ranking scale. The overall ranking of the pillar is presented in Table 4. The Table 4 shows that the organizations chooses closer supplier relationship as the top ranked pillar for TQM implementation, while they choose benchmarking as the bottom ranked pillar. As stated earlier the studied organizations work on the basis of customer order. Their customers offer the specifications of the products and the manufacture must ensure that specifications. This might be the reasons of the organization to focus more on raw materials' quality and the availability of the raw materials in time. This may make them more cautious about the closer relationship with their suppliers.

The surprising result is found regarding the position of benchmarking. Although all experts of TQM implementation suggest that benchmarking could be the important choice for TQM implementation, the result in this research does not support it. Benchmarking has the lowest mean value of 2.24 amongst the all pillars. One reason may be highlighted here that the organizations are highly competitive and they prioritize their secrecy of customized products and operations. Further study in the other manufacturing sector might give us different result. From this result we can conclude that the studied organizations are in better position in focusing on the creation of quality management environment, while they work on TQM implementation.

The Pearson correlation test is also performed and the results are presented Table5. According to the results of the test, there are correlations amongst all TQM pillars but the significant positive correlations are just related to a few of the pillars.

It is found that the Pillar1 is significantly correlated to Pillar 3 and 5. That means the organizations that concern more on the creation of quality management environment essentially give significant emphasis on the practice of quality control tools and techniques and focus on supplier relationship. Again, Pillar 2 is significantly correlated to Pillar5. This means that the organizations that care for customer satisfaction that emphasize more on the development of teamwork. Pillar 3 is significantly correlated to Pillar 5 and 8. This implies that the organizations that are customer focused generally give special attention to closer relationship to the supplier and the use of SPC tools in their production processes. Pillar 4 is positively correlated to Pillar 8. It means that the organizations that are customer focused generally emphasize on employee involvement. Pillar 6 is strongly correlated to Pillar 7 and Pillar 7 is significantly correlated to Pillar 8. The organizations that focuses more on process improvement are generally engaged themselves in benchmarking. Again, the organizations that are found serious about process improvement commonly emphasize on employee involvement through motivational and training

Table 3. The results of the T-Test (1-tailed)

	P2	P3	P4	P5	P6	P7	P8
P1	0.025* P1 > P2	0.001** P1> P3	0.280	(0.029*) P1< P5	6.98E-14** P1> P6	6.38E-06** P1> P7	0.000** P1> P7
P2		0.104	0.116	(2.15E-06)** P2 < P5	1.11E-16** P2 > P6	3.54E-05** P2 > P7	0.012* P2 > P8
P3			(0.033)* P3 < P4	(0.000**) P3 < P5	5.38E-07** P3 > P6	0.011* P3 > P7	0.177
P4				(0.008**) P4 < P5	1.24E-16** P4 > P6	7.54E-07** P4 > P7	0.001** P4 > P7
P5					2.77E-17** P5 > P6	2.33E-07** P5 > P7	5.381E-05** P5 > P8
P6						(7.67E-05**) P6 < P7	(6.00E-07**) P6 < P8
P7							(0.010*) P7 < P8

*** Significant at the 0.05 level**
**** Significant at the 0.01 level**

Table 4. Ranking of the Pillars

Pillars	**Rank of the pillar** 1- Top rank 8- Bottom rank
Pillar Five: Focus on supplier relationship	1
Pillar One: Creation of quality management environment	2
Pillar Four: Focus on Customer	3
Pillar Two: Development of Teamwork	4
Pillar Three: Practice of quality control tools and techniques	5
Pillar Eight: Involvement of Employees	6
Pillar Seven: Improvement of Processes	7
Pillar Six: Benchmarking	8

Table 5. Status of correlation between the pillars

	P1	P2	P3	P4	P5	P6	P7	P8
P1	1	.223	**.588(***)**	**.310***	**.568(***)**	.094	.144	.227
P2		1	.161	.102	**.538(***)**	**.309***	.036	.188
P3			1	.080	**.381(**)**	.042	.078	**.463(***)**
P4				1	.213	.102	.280	**.314***
P5					1	.092	.226	.084
P6						1	**.570(***)**	.221
P7							1	**.420(**)**
P8								1

*** Correlation is significant at the 0.1 level (2-tailed).**
**** Correlation is significant at the 0.05 level (2-tailed).**
**** *Correlation is significant at the 0.01 level (2-tailed)**

program. The results suggest that the Pillars are positively related to each other. Four out of eight pillars have significant positive correlations with other pillars. In fact, all pillars are correlated to each other, at least indirectly. For example, Pillar 1 is related to Pillar 3, Pillar 3 is related to Pillar 5, Pillar 5 is related to Pillar 2, Pillar 5 is related to Pillar 8, Pillar 8 is related to pillar 7, Pillar 7 is related to Pillar 6 and Pillar 4 is correlated to Pillar 1 and 8. Closer supplier relationship is found as the most vital pillar of TQM implementation in this study.

Further verification has been done to identify the status of the factors related to the pillars of TQM implementation in the proposed framework. The key findings are discussed here. Overall scenario about the elements of creating quality environment is depicted in Figure 2.

It is found that 77.42% of the studied organizations arrange seminar on quality management regularly, 93.55% conduct training programs on quality management. In the context of quality culture, 74.19% of the organizations prepare different inspiring quality slogans and display them

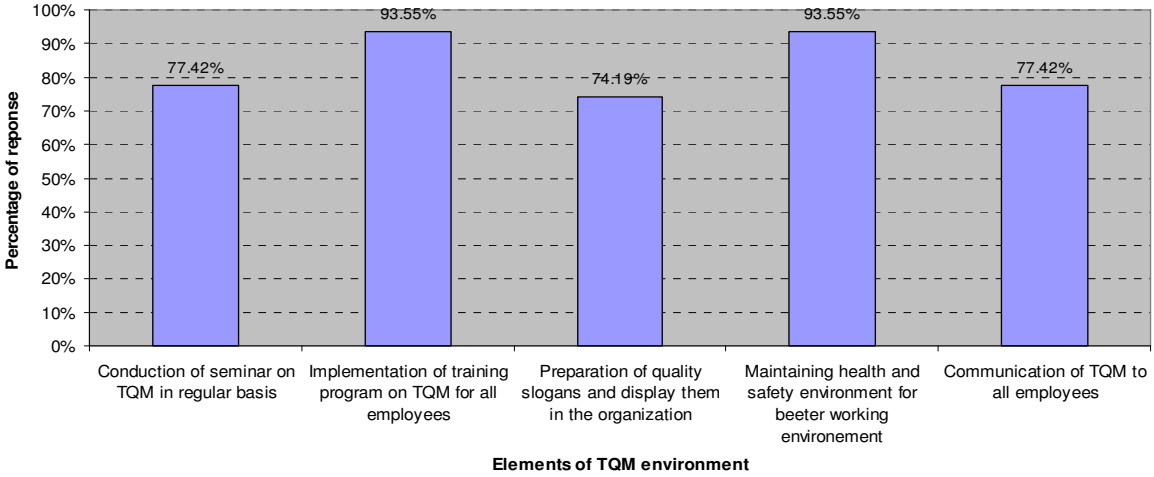

Figure 2: Status of the factors associated to pillar one

to different locations visible to the employees. This plays an important role to motivate the employees to create a good quality culture. Although health and safety issues are not directly relevant to the implementation of TQM, these play very vital role as these are directly related to employees' satisfaction and motivation. It is found that 93.55% organizations are conscious about health and safety even though the practice according to rules and regulations demands more improvement. One of the most difficult tasks in the beginning phase of implementing TQM is to determine where to start and when to start. According to Pareto's Law it is assumed that 80 percent of the company's problems stem from 20 percent of the company's processes. In this connection, the organizations which are serious and systematic about finding the causes and consequences of any problem can be assumed that they are in a good starting point for implementing TQM. We have found that the majority of the studied organizations (95.83%) are conscious about why to implement TQM. However, 41.67% are found confused about how to implement. In 77.42 % organizations, the information regarding TQM implementation is well communicated of all employees through team formation, team meeting, tasks sharing and responsibility sharing. We have found that 77.42% organizations introduce employees with quality tools and techniques. Considering all these, it is clear to us that the majority of the organizations are conscious about the creation of quality management environment and they emphasize the elements which we propose in our TQM implementation framework. .

The organizations in which managers are on the hunt for someone to blame for problems that are found are not in a good condition for implementing TQM. This type of attitudes of managers may create unhealthy and stressful working environment to the employees. This in fact discourages creative and innovative thoughts and practices implementation. So, management should take initiative to create such environment where the teamwork is highly encouraged. We find that about 64.52% organizations have formed Quality Control Circles (QCC) at the factory floors. Majority of them has built cross functional teams with multi skilled people. However, about 58.06% maintain effective information sharing. To involve all employees in the decision-making process, it is imperative that information should be shared with everyone. In the operational decision-making process, frontline employees' opinions should directly or indirectly be reflected. In our study, we find that there is a serious lack in the involvement of frontline employees in decision making. Only 6.45% involve their front line employees for operational decision taking. The overall picture about the elements of pillar two is depicted in Figure 3. According to the findings, it can be concluded that the studied organizations focus on the needs of team building and are, however, weak in fostering teamwork in true sense at their workplace. Because, they are not involving significant number of frontline employees in decision making.

The overall status of the factors relevant to the pillar three is depicted in Figure 4. To ensure quality of the product, the associated processes must be controlled. In the control processes, there should be scientific application of statistical control tools and techniques. Although 83.87% of the studied organizations claimed that they use control charts in their process control, only 51.61% are actually found conscious about the fundamental quality control tools and techniques. Majority of them practice such tools in different names. However, majority of the organizations are not familiar with FMEA, even though some of them follow the similar approach informally to identify the causes and consequences of some production problems. Only 16.13% implement FMEA. There is similar scenario about the adoption of TPM. It is therefore can be conclude that that much encouraging.

The status of the studied organization of the pillar 3 is not

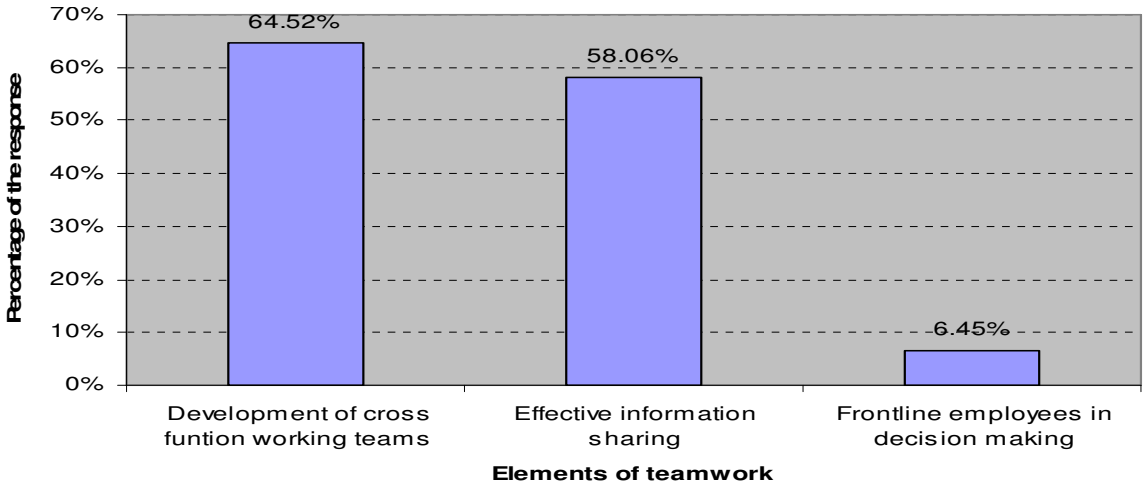

Figure 3: Status of the factors associated to Pillar 2

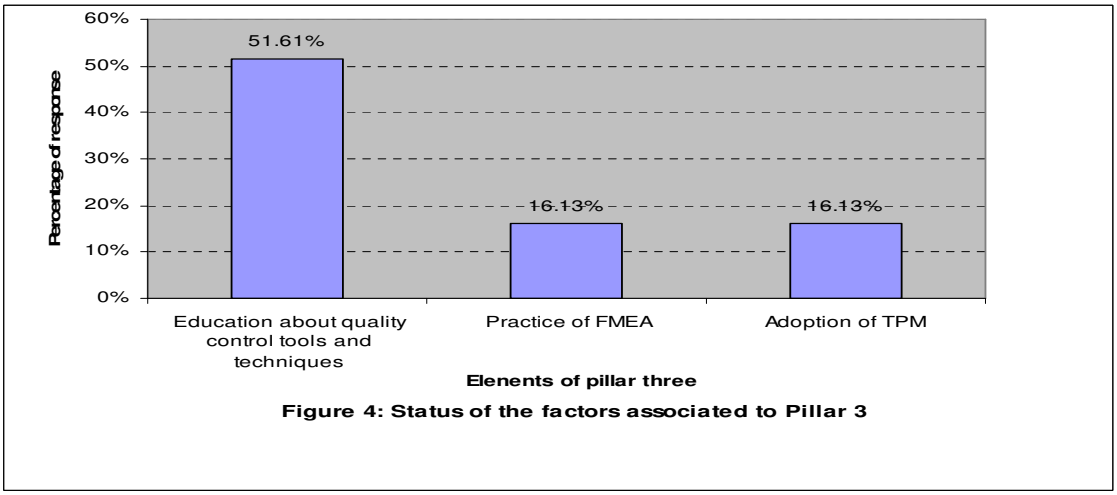

Figure 4: Status of the factors associated to Pillar 3

From beginning to the end, customer satisfaction should be the focal point of TQM system. Regarding the factors associated with pillar 4, it is found that 87.50% organizations are pretty conscious about customer requirements and their satisfaction. They produce their products according to specific customer requirements. Majority of the organizations (about 87%) have structured customer feedback system in order to identify the customer needs. Although 64.52% claim that overall production cost increases due to fulfilling customer needs in addition their set specifications, they are stick in their focus on customer satisfaction. Contrary to fact, weakness is found in employee motivation on customer satisfaction. This is obviously alarming against the success through TQM. However, the status about pillar four is found quite well and the factors are found relevant.

Concerning the factors of pillar 5, it is found that the studied organizations work hard to fulfill buyers' requirements in due date. Indeed, they need to collect good raw materials at right time to produce quality products and deliver these to the customer on time. For this, they build up long term trust based relationship with their suppliers. Except one organization, all have made such relationship. Their suppliers ensure the quality of raw materials and they work on the basis of win-win situation. About 87% of the organizations make long term written contract with the suppliers. However, some weaknesses have been observed in the supplier selection process and in implementation of advanced procurement system, even though the limited numbers of organizations (16.13%) are doing well in those areas.

Regarding pillar 6, the study explored a gloomy picture about benchmarking. The practice of benchmarking is rare in the studied organizations. Most of organizations are found satisfied enough with their own performance. Only 16.13% have benchmarked the TQM implementation strategy from the successful organizations. However, about 45% claim that they are trying to benchmark and about 6% says that they are learning about it. The rest does not consider that the benchmarking is necessary for successful implementation of TQM.

As mentioned earlier, continuous improvement is

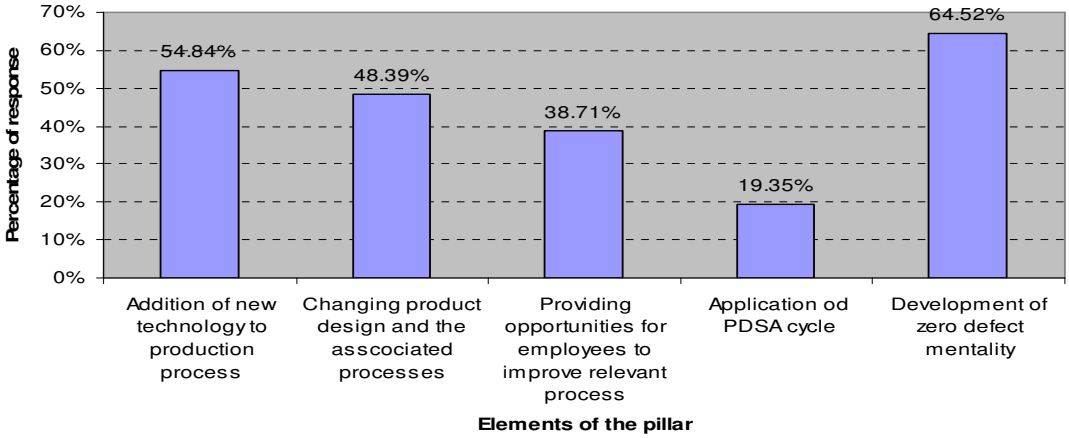

Figure 5: Status of factors related to Pillar 7

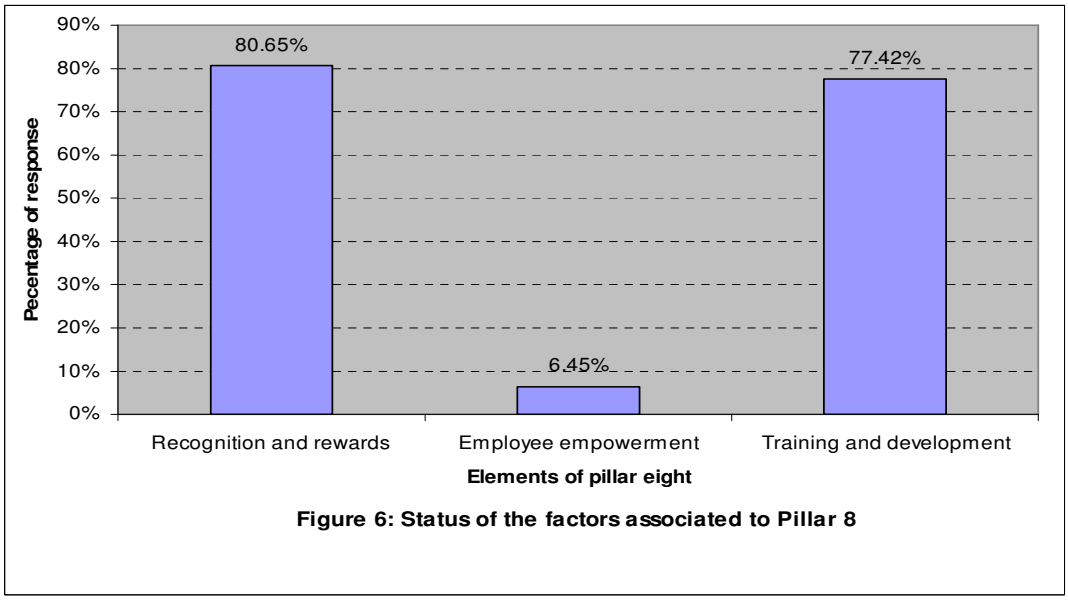

Figure 6: Status of the factors associated to Pillar 8

necessary for any organization to be competitive in the current business arena. For this, organizations need to be up to dated with technological advancement. They should possess the capability to make the variation in product design and to adopt the designs to its production process. The overall status regarding the associated factors of pillar 7 is depicted in Figure 5.

In that context, the employees need to be creative and innovative. In this study, we find that 54.84% organizations add new technology to their production system whenever necessary, 48.39% change product design time to time and 38.71% organizations provide the employees to be creative and innovative. However, the application of PDSA cycle is found minimal in the organizations.

For successful implementation of TQM, group incentive is highly encouraged in addition to individual incentive for better performance. Team based rewards can play a vital role to motivate the employees in achieving the targets. The overall scenario about pillar eight is delineated in Figure 6.

We find that majority of the studied organization (80.65%) employ individual wage incentive plan and performance based promotion system. Only 41.94% give incentive on team performance. However, we consider 80.65 % of the organizations while we talk about recognition and rearwards for employees in terms of customer focus.

Concerning pillar eight, we find that the organizations are in dismal condition about employee empowerment, even though they agree that the empowerment of employees play vital role in TQM implementation. Only 6.45% organizations in practice empower their employees for decision making and redesign or make any change in their workplace. However, more than 77% organizations

are actively engaged in conducting training program for employees to enhance their general skills as well as to educate them about TQM.

CONCLUSIONS

In this paper, an attempt has been made to discuss the pillars of TQM implementation in the manufacturing organizations. A comprehensive framework with eight pillars and 25 associated factors were developed and verified in practical settings. The framework has been examined using multiple case studies in 31 manufacturing organizations of the RMG sector in Bangladesh. The framework is claimed to be comprehensive as it includes almost all factors of TQM implementation addressed in the literature. Moreover, it has been supported by the empirical study. Six out of eight pillars are strongly supported by the managers of the studied organizations. The most vital pillars are: closer supplier relationship, creation of quality management environment, closer customer relationship, development of teamwork, practice of quality control tools and techniques, and employee involvement. Although two pillars namely benchmarking and process improvement are given less priority by the managers, these are found directly or indirectly correlated to other pillars. Again these are considered important attributes of TQM by the previous studies. So, the authors incline to keep these two as the pillars of TQM implementation in the framework. Almost all factors are apparent in the studied organizations. The factors are associated to the designated pillars. According to the investigation, the important factors are: training of employees on TQM, long term contract with suppliers, formal customer feedback, recognition and rewards for employees, training and development of employees, information sharing, introduction of quality tools and techniques, arrangement of seminar and symposium on quality management, quality slogans and displays at different locations, and development of cross functional teams. Other factors are also evident in the studied organizations, while their aspect and significance differ. It can be concluded that the proposed framework is valid in terms of successful implementation of TQM in manufacturing organizations. Hopefully, the comprehensive framework can readily be applicable to the practitioners of TQM implementation. For the researchers of TQM, this study provides a novel approach for implementation aspects. However, there were a few limitations in this study. For example, in this study it was assumed that all the associated factors have the same importance; it can be nullified in practice. Again, the examination of the framework has been done in the RMG sector only; this can be done in the other sectors of the manufacturing industry to generalize the framework. That means there are rooms for further study considering relative importance of the associated factors of the pillars.

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