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GAP ANALYSIS FOR IMPLEMENTING TQM IN SEAFOOD EXPORTING FIRMS

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ABSTRACT

Gap analysis is a very useful tool for firms contemplating adoption of a new system. This paper envisages the use of the gap analysis tool as a precursor for Indian seafood exporting firms to adopt total quality management. Total quality management (TQM) is a management philosophy which strives to put quality at the forefront of all its decision-making, thereby satisfying customers. We therefore recommend that firms adopt the TQM system for better alignment of management goals. The gap analysis tool serves as a roadmap for TQM implementation, by showing the management where they actually are and where they want to be. The main gaps were found to be in the areas of usage of SPC tools (66.7%), benchmarking (65.6%), top management commitment (56.25%) and customer focus (48.1%).

Keywords: Gap Analysis, total quality management, seafood firms

INTRODUCTION

The food business is perhaps the most risky of all businesses. Besides product quality, food safety aspects have also to be borne in mind by new business entrants and by old timers alike. The seafood industry in India had already adopted the Hazard Analysis of Critical Control Points system of quality management more than 2 decades ago, in tune to its adoption by seafood processing firms all over the world. Inspite of the numerous benefits of adopting HACCP, there are some very critical issues, which have remained beyond the scope of the system, namely the aspects of customer focus, organizational strategy, profitability and cost reduction, which are also central to the existence of any organization. Such being the situation, the need of the hour undoubtedly would be the implementation of a quality management system, which is able to take into aspect the multi dimensional complexities that form the core of this industry.

It is therefore time for the industry to turn to total quality management system as a measure to weed out its besetting problems of profitability and cost reduction, while retaining the chief tenet of quality in its entire processes and products. Total Quality Management is an integrative philosophy of management for continuously improving product and process quality to achieve customer

satisfaction (Ahire, 1997). A HACCP programme simply identifies the critical areas of an operation and provides methods of monitoring, recording and handling those areas, while a TQM programme provides a comprehensive examination of all the systems, processes, people, organizational strategy, focus and organizational health. When a manager is preparing to implement total quality management as a business strategy, gap analysis becomes an invaluable tool. Gap analysis is simply the process of comparing one's standards to actual performance and identifying what the gap is between the two. A gap analysis compares and examines the current system functionality against the proposed system and requirements. If the proposed system meets the current system functionality or new requirements, there is a fit. If it does not, then there is a gap. When an unacceptable gap occurs, it is usually a sign that training is necessary. This paper therefore attempts to conduct a gap analysis prior to the prospect of adoption of TQM by the seafood industry in India

MATERIALS AND METHODS

The survey findings are based on the responses from 32 organizations, forming 80% of the firms exporting seafood to the European Union, from Cochin. Survey instruments like questionnaire was also used to chalk out the gaps present between the present system of HACCP and TQM. The ten key constructs developed by Ahire *et al*. (1996) were used to delineate the major factors to be considered for implementation of TQM. These include: top management commitment, customer focus, supplier quality management, design quality management, benchmarking, Statistical Process Control usage, internal quality information usage, employee involvement, employee training and employee empowerment. The questionnaire developed included questions covering the various aspects of the ten constructs and the responses generated were analyzed. The gap analysis was done by comparing the operation of each of the individual factors that made up each of the ten constructs, to that required by TQM principles. Each of the ten constructs consists of individual factors, the responses to which were rated, to find the degree of nonconformity, with respect to the firms under survey. The responses were given weights, and the observed score was calculated for each of the factors. Along with this, the expected score of each factor was calculated depending on the maximum scores allotted for each factor. The gap percentage was then calculated based on the ratio between the expected and observed scores. The test statistics is based on the chi-square test for goodness of fit. The analysis was done using SPSS.

RESULTS AND DISCUSSION

The survey revealed that the implementation of HACCP by all the firms surveyed helped in providing a strong background for the future implementation of TQM. Respondents were asked to evaluate their firm with respect to the implementation of the ten constructs in order to do the gap analyses.

1. Top management commitment

This is one of the most important factors for the implementation of TQM. The top management is responsible for the way things are done in the firm and without their whole-hearted commitment, which also includes commitment of resources; implementation of any quality management system is impossible. The survey data reveals that the top management in all the firms surveyed was fully committed to the cause of supporting and taking the initiative in developing and maintaining the existing quality management programme, namely HACCP. However, it was observed that the 56% of the top management were unaware of the TQM tools. 56% of the firms had their top managements adopting special motivational techniques, for encouraging improvement of product quality, although 81% did not have any quality oriented incentives. The survey also quizzed

the top management for their interest in adoption of TQM tools. 75% wanted to implement TQM. A quality policy is the overall intentions and direction of an organization with regard to quality, as formally expressed by top management. It can be used as a touchstone for all employees to gauge whether actions are in conformance with the standards and values of the firm's quality policy. It was noted that only 50% of the firms had clear quality goals.

The top management commitment construct consists of 6 individual factors. It was seen that the top management is fully supportive of the present HACCP system implemented in the firms. If the workers are to be fully committed to the cause of quality, then the management needs to gear up their definition of quality goals, make it clear to everyone, and provide some quality-oriented incentive to the workers. The gap (84%) in the case of the quality incentives is one of the highest in the study.

Table 1 –Gap Analysis For Top Management Commitment

Construct:Top management commitment	Responses No/Yes	% Yes	Score Observed /Expected	Gap (in %)	Comments
1.Top mgmt supports quality improvement programme	32 (Y)	100%	32 / 32	Nil	Significant gap exists between present level of top management commitment and the desired level, for all factors except the first one, where there is no gap, as shown in the test statistics below. Chi-Square test: significance less than 0.005 for all 5 factors.
2.Top mgmt initiates motivational techniques to improve quality	18 (Y), 13 (N)	56%	18 / 32	43.75%	
3.Top mgmt initiates quality incentive system	5 (Y), 26 (N)	16%	5/32	84.40%	
4.Top mgmt is aware about TQM tools	13(Y), 18(N)	44%	13 / 32	59.40%	
5.Top mgmt is interested in implementing TQM	24(Y), 6(N)	75%	24 /32	25.10%	
6.Clear quality goals are identified	16(Y), 14(N)	50%	16 / 32	50.10%	
OVERALL			108 / 192	56.25%	

Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

2. Supplier quality management

Most firms have realized to their advantage that cultivating long-term buyer-supplier relationship, leads to reduced costs and improving profits in the long run. This means lesser rework, lesser inspection and guaranteed quality. Hence, supplier quality management is a critical aspect to be focused on while implementing TQM. The basic purchasing policy should place priority on mutual trust and understanding, and aim at long-term stable business relationships on the basis of mutual survival and prosperity. Firms need to treat their suppliers as partners, as an extension of their own firms (Deming, 1986). Firms must obtain from their suppliers information sufficient to judge whether they have the capability to provide products and services that meet all fitness-for-use requirements. In the end, only those suppliers who can compete on quality, price, and close working relationships with a firm can be kept in its supplier list (Deming, 1986; Feigenbaum, 1991; Ishikawa, 1985).

Supplier rating is an index of the actual performance of a supplier in terms of its product quality, service quality and delivery performance, among other criteria (Feigenbaum, 1991). Firms need to keep their suppliers informed of any change that they make in terms of design and production. Failure to provide adequate design change information to suppliers has been a distinct obstacle to supplier quality management. The survey revealed that 90.6% of the firms were happy with the raw material quality received. 84.4% of the firms were dependent on suppliers for their raw material, and out of these, 78% were fully satisfied with the incoming quality of the raw material, while 6% were dissatisfied with the raw material quality. 47% of the firms replied in the affirmative on being asked whether they were satisfied with the quantity of raw material being received. 81% of the firms were regular in informing the suppliers about changes in buyer specifications of products, while 87.5% of them regularly kept the suppliers up-to-date on the changes in the firm's quality policy. 87.5% of the firms said that they evaluated suppliers based on the raw material quality and a similar proportion maintained that vendors were selected on the basis of the most suitable supplier, who was evaluated by the above process. 81% of the firms were satisfied with their supplier's quality commitment.

Table 2. Gap Analysis for Supplier Quality Commitment

Construct: Supplier Quality Management	Responses No/Yes	% Yes	Score Observed/ Expected	Gap (In %)	Comments
1.Satisfaction with R.M. quality	29 (Y), 2 (N)	90.6%	29 / 32	9.40%	Significant gap exists between present level of supplier quality and the desired level.
2.Obtain adequate quantity of raw material from supplier	15 (Y), 13 (N), 4 (NA)	46.9%	15 / 32	46.90%	
3.Communication of buyer specification information to supplier	26 (Y), 2 (N), 4 (NA)	81.3%	26 / 32	18.75%	
4.Communication of change in quality policy information to supplier	28 (Y), 4 (NA)	87.5%	28 / 32	12.50%	Chi-Square test: significance less than 0.000 for all 7 factors.
5.Evaluation of supplier according to quality	28 (Y), 4 (NA)	87.5%	28 / 32	12.50%	
6.Selection of most suitable supplier	28 (Y), 4 (NA)	87.5%	28 / 32	12.50%	
7.Satisfaction with supplier quality commitment	26 (Y), 2 (No)	81.3%	26 / 32	18.75%	
OVERALL			180 / 224	19.60%	

This construct consists of 7 individual factors, namely satisfaction with raw material quality, obtaining adequate quantity of raw material from suppliers, communication of buyer specifications information and change in quality policy of the firm to the suppliers, evaluation of the supplier based on quality, selection of most suitable supplier based on quality performance and supplier commitment to quality. It was seen that the top management was satisfied in general with the supplier's quality commitment and the quality of the raw material, but were dissatisfied with the lack of receipt of abundant quantity of the raw material. This was attributed to the scarcity of resources generally prevailing in the present scenario. The gap was highest for the same (47%), in this construct. Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

3. Customer Focus

The TQM process begins with the customer and ends with the customer. The TQM process takes specific inputs (the customer's wants, needs and expectations), transforms (processes) these inputs within the organization to produce goods or services that, in turn, satisfy the customer (output).Customer complaint information is valuable for the firm in pursuing quality improvement and customer satisfaction. The firm needs to collect various pieces of complaint information from customers extensively. 75% of the firms reported that they received customer complaints rarely, which could mean that their products were quite good, while 25% acknowledged that they received complaints sometimes. Effective dealing with the complaints would help retain the customers. 94% of the firms asserted that their customers were happy with their product quality. The gap analysis was done on the basis of 4 factors, namely, awareness of customer requirements, conduct of customer satisfaction surveys, frequency of receipt of customer complaints and satisfaction quotient of customers. The gap was highest in the case of customer surveys, as very few firms performed this task, and those who did conduct surveys, did not do it regularly. Lack of proper awareness of customer requirements was also seen to show a high gap percentage of nearly 45%.

Table 3 - Gap Analysis for Customer Focus

Construct: Customer Focus	Responses N/Y,F/A/S,Ra/S/ R*	Score Observed/Expected	Gap (In %)	Comments
1. Awareness of customer requirements	3 (F), 15 (A), 14 (S)	53 / 96	44.8%	Significant gap exists between present level of customer focus and the desired level, as shown in the test statistics below. Chi-Square test: significance less than 0.016 for all 4 factors.
2. Conduct customer satisfaction surveys	23 (Ra), 7 (S), 2 (Re)	43 / 96	55.2%	
3. Frequency of receipt of customer complaints	24 (Ra), 8 (S)	24 / 32	25%	
4. Are customers happy with product quality	30 (Y), 1 (N)	30 / 32	6.25%	
OVERALL		166 / 320	48.1%	

*Score: Unaware – 0, To some extent –1, Aware – 2, Fully aware – 3, Rarely – 1, Sometimes – 2, Regularly – 3 Yes – 1, No – 0.

Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

4. Usage of Statistical Process Control Tools

SPC is an important means of measuring quality which allows one to track variations and to determine if they are normal or random, or if they indicate an out-of-control operation, and thereby bring the process back in control by controlling the assignable causes for variation. The various tools include check-sheets, histograms, Pareto charts, cause and effect diagrams, scatter diagrams, control charts and graphs. It was seen that the firms hardly made use of statistical process control tools, and the gap was to the tune of 67%. Use of SPC tools is integral to TQM implementation, as they help in minimising variations. Though use of checklists and flow charts are part of HACCP system and were widely used, it was noted that analysis of this data was not done regularly. The firms did not use control charts, fishbone diagrams, Pareto charts, scatter diagrams and histograms, although the

HACCP system involved the use of decision trees. It was noted that regular analysis of the data and periodic checking for defects was not done.

Table 4 - Gap Analysis for Usage of Spc Tools

Construct: SPC Tools	Responses Ra/S/Re/N*	Score Observed/Expected	Gap (In %)	Comments
1. SPC is used extensively in our plant	30 (Ra), 1 (N), 1(S)	32 / 96	66.7%	Significant gap exists between present level of top management commitment and the desired level. Chi-Square test: significance less than 0.000 for the factor.
OVERALL		32 / 96	66.7%	

*__Score:__ Never – 0, Rarely – 1, Sometimes – 2, Regularly – 3

5. Benchmarking

Benchmarking is the process of understanding one's practice and performance, comparing them against that of competitors or best-in-class firms, learning how they practice and perform, and using that information to improve one's own practice and performance. It is an effective catalyst for change and an effective tool for continuous improvement. Benchmarking can stimulate creativity and provide a stimulus that enables operations to better understand how they should be serving their customers. To conduct benchmarking, firms should know their own situation and identify what and who to benchmark. In order to use benchmarking effectively, the firm should have sufficient information from its competitors or best-in-class organizations. The survey revealed that only 3% of the firms go in for benchmarking, and that they followed benchmarking only sometimes.

Table 5 -Gap Analysis for Benchmarking

Construct: Benchmarking	Responses Ra/S/Re/N*	Score Observed/Expected	Gap (In %)	Comments
1. We are engaged in extensive benchmarking	31(Ra), 1(S)	33 / 96	65.6%	Significant gap exists between present level of benchmarking and the desired level. Chi-Square test: significance less than 0.000 for the factor.
OVERALL		33 / 96	65.6%	

*Score: Never – 0, Rarely – 1, Sometimes – 2, Regularly – 3

The analysis revealed that the gap between the expected result and the observed one was around 66%. Benchmarking is part of the total quality process and is a popular tool used among companies trying to become more competitive, striving for world-class performance. The seafood industry could do well to go in for effective tools such as this in order to compete on a global scale. Being competitive is fast becoming a prerequisite for survival. Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

6. Internal Quality Information Usage

A firm needs to collect the data of quality-related costs, which it can use to seek improvement opportunities. There are four categories of quality-related costs: Internal failure, external failure, appraisal, and prevention. Internal failure costs are associated with defects found prior to transfer of

the products to the customer. Without carefully investigating the data of quality costs, actions cannot be effective and chronic quality problems cannot be eliminated. Through analyzing quality costs, more improvement opportunities can be identified (Dale and Plunkett, 1991). Communication about the defects identified to the respective workstations is necessary for correction and to avoid occurrence of similar mistakes. It was seen that the firms did not usually carry out quality costing and about 9 % of the firms alone went in for this kind of analysis. All the firms communicated the information regarding occurrence of defects.

The gap analysis was done on the basis of 2 factors, namely, readiness of cost of quality data and passing of information regarding defects to the respective workstations. The gap was highest in the case of availability of cost of quality data. It was the largest gap found in the study. Lack of transmittal of information about defects to the workstations promptly was also seen and the gap was to the tune of nearly 44%. Use of such data will help the firms enormously in identifying profit opportunities, improving purchasing and supplier-related costs, identifying quality problems, as a strategic tool for allocation of resources for strategy formulation and implementation, in identifying redundant systems, and wastes in overheads caused by activities not required by customers.

Table 6 - Gap Analysis for Usage of Internal Quality Information

Construct: Usage of internal quality information	Responses N/Y Ra/S/Re/*	Score Observed/Expected	Gap (In %)	Comments
1. Cost of Quality data is readily available	3 (Y), 28 (N)	3 / 32	90.6%	Significant gap exists between present level of usage of internal quality information and the desired level. Chi-Square test: significance less than 0.034 for the 2 factors.
2. Information about defects is conveyed to workstations.	22 (U), 10(S)	54 / 96	43.75%	
OVERALL		57 /128	44.5%	

*Score: Yes – 1, No – 0. Never – 0, Sometimes – 1, Usually – 2, Always – 3

Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

7. Employee involvement

Employee involvement is a way of engaging employees at all levels in the thinking process of an organization. It is the recognition that many decisions made in an organization can be made better by soliciting the input of those who may be affected by the decision. Employees have normally been working at a position for a long time and are very familiar with their work. It is easier for them to identify their working problems, find the causes of the problems, and develop solutions. Therefore, employees should be encouraged to submit their suggestions, which should be listened to and valued by the management. All the firms in the study were responded positively on the question whether workers were involved in quality improvement programmes. Around 38% of the firms reported that their workers usually came up with suggestions on improvement of processes and quality, while 12.5% said that their workers never came up with such suggestions. 34% of the management rarely implemented workers' suggestions. Around 69% of the top managements usually discussed the drawbacks of any suggestions put forward by the employees. The gap analysis was based on 4 factors and the gap was highest in the case of the top management considering the suggestions of the employees and implementing it if found good. A gap of 56percent denoted that the top management was generally not open to suggestions from the employees. The high gap in the case of workers offering suggestions may either be due to lack of sufficient know-how or due to lack of motivation or

lack of encouragement from the top management. The overall gap of the construct of employee involvement is also seen to be high.

Table 7 - Gap Analysis for Usage of Employee Involvement

Construct: Employee Involvement	Responses N/Y,U/Ra/S/Re/N*	Score Observed/ Expected	Gap (In %)	Comments
Worker involvement in quality improvement programme	32 (Y)	32 / 32	Nil	Significant gap exists between present level of employee involvement and the desired level. Chi-Square test: significance less than 0.034 for 2, 3 & 4 factors. No gap for 1st factor.
Workers offer suggestions for quality improvement	12 (U), 7 (S), 9 (Ra), 4 (N)	59 / 128	53.9%	
Top mgmt considers their suggestions & implements it if good	1 (Re), 9 (U), 7(S), 11 (R)	56 / 128	56.25%	
Discussion of drawbacks of suggestions	22 (U), 4 (S), 1 (Ra), 1 (N)	75/128	41.4%	
OVERALL		222 /416	53.4%	

*Score: Never – 0, Rarely – 1, Sometimes – 2, Usually – 3, Regularly – 4
Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

8. Employee Training

Job training is specific training for different employees to meet the requirements of their jobs. Every employee in the firm needs to accept necessary job training so that they can perform their jobs better. The survey revealed that the workers received periodic training from the firms and therefore the gap was comparatively much low in the case of this construct, though remaining significant. The implementation of TQM would necessitate further training in its principles.

Table 8- GAP Analysis for Employee Training

Construct:Employee Training	Responses Al/U/S/Ra/N*	Score Observed/ Expected	Gap (In %)	Comments
Are the workers receiving any training from the company	1 (Al), 24 (U), 7(S)	90 / 128	29.7%	Significant gap exists between present level of employee training and the desired level. Chi-Square: significance less than 0.000 for the factor.
OVERALL		90 / 128	29.7%	

*Score: Never – 0, Rarely – 1, Sometimes – 2, Usually – 3, Always – 4

9. Design Quality Management

Design quality management entails specific tools and strategies used to design quality into products instead of ensuring quality after manufacturing by removing defective products. For a firm which has already implemented TQM, design quality management means ensuring product quality by using techniques like Taguchi's design of experiments, quality function deployment etc. Process capability measures the extent to which a firm's production systems can meet design specifications. As a machine wears out, its process capability may degrade to the point that it cannot hold the

tolerances specified by engineering design. Therefore, the firm should study its process capability and calculate a process capability index in order to determine whether a process is stable, investigate any sources of instability, seek their causes, and take actions to eliminate them. Process capability information can provide designers with important information in setting realistic specification limits (Dale *&* Plunkett 1990; Feigenbaum, 1991). 84% of the firms were satisfied with the efficiency of their machinery. The evaluation of process control was termed good by nearly 63% of the firms, while the design and layout of 69% of the firms was good. The gap analysis was based on 3 factors and the gap was found to be significant in the case of the factors, namely evaluation of process control and plant design and layout. It was seen that the firms did not use techniques like design of experiments and quality function deployment. However, the gap for satisfaction with machinery efficiency was small (15.6%).

Table 9 - Gap Analysis for Design Quality Management

Construct:Design Quality Management	Responses N/Y,VG/G/S/NI*	Score Observed/ Expected	Gap (In %)	Comments
1. Satisfaction with machinery efficiency	27 (Y), 5 (N)	27 / 32	15.6%	Significant gap exists between present level of design quality management and the desired level. Chi-Square: significance less than 0.000 for the 3 factors
2. Evaluation of process control	20 (G), 10 (S), 2 (NI)	82 / 128	35.9%	
3. Plant design & layout	22 (G), 7(S), 3 (NI)	83 / 128	35.2%	
OVERALL		192 / 288	33.3%	

*Score: No –0, Yes – 1. Very Good – 4, Good – 3, Satisfactory – 2, Needs Improvement – 1, Bad – 0

10. Employee Empowerment

Empowerment is an active approach in which employee input is sought and given serious consideration. Empowered employees provide input concerning decisions that affect them and can apply their own ingenuity in seeking improvements themselves within specified limits. The workers were divided on their opinion on getting more responsibility in improving quality and productivity. 84% of the firms found their workers' quality awareness satisfactory, while 16% found it to be high. The gap analysis was conducted for 2 factors namely workers getting more responsibility in improving productivity and their level of quality awareness. It was seen that 50% of the firms' workers were not interested in being assigned greater responsibility. This would mean management has to employ motivational incentives in order to encourage them to be more responsible. The gap in the case of level of quality awareness was also significant in 46% of the firms. The reason was attributed by the managements, to the number of temporary staff employed who would change on a regular basis, thereby making it difficult to train them. The management therefore should focus more on quality training, and should employ more permanent staff, in order for any quality management system to work effectively.

Table 10 - Gap Analysis for Employee Empowerment

Construct: Employee Empowerment	Responses N/Y VH/H/S/NI*	Score Observed/ Expected	Gap (In %)	Comments
Opinion about getting more responsibility in improving quality & productivity	16 (Y), 15 (N)	16 / 32	50%	Significant gap exists between present level of employee empowerment and the desired level. Chi-Square test: significance less than 0.000 for the 2 factors.
Level of quality awareness among workers	5 (H), 27 (S)	69/ 128	46.1%	
OVERALL		192 / 288	33.3%	

*Score: No –0, Yes – 1. Very High – 4, High– 3, Satisfactory – 2, Needs Improvement – 1

Small significance values (<.05) indicate that the observed distribution does not conform to the hypothesized distribution. Hence, significant gap exists.

CONCLUSION

The survey revealed that the top 4 areas of consolidated non-conformities to TQM principles, or "gaps" include the constructs of usage of SPC tools (66.7% gap), benchmarking (65.6%), top management commitment (56.25%) and customer focus (48.1%). It was noted that in these areas gaps were either very large or significant. The constructs, which had the least % of non-conformities, include supplier quality commitment (19.6%) and employee training (29.7%), although the supplier quality management construct has a high gap with respect to an individual factor namely obtaining adequate quantity of raw material from supplier where the gap was found to be 47%. The gap analysis revealed that in the case of certain factors namely, top management support and enthusiasm for quality improvement programmes, communication of buyer specification information and change in quality policy to supplier, evaluation of supplier according to quality, selection of most suitable supplier, satisfaction with supplier quality commitment, customer satisfaction with product quality, management satisfaction with machinery efficiency, evaluation of process control, plant design & layout and employee training, HACCP implementation has helped a great deal. In the case of these factors, the amount of gap is fairly low compared to the others. The management should therefore pay greater attention to constructs like employee empowerment, use of SPC tools, benchmarking and initiation of motivation factors especially quality incentives, in order to start implementing TQM.
In effect, a two-pronged strategy using both TQM and HACCP would be very effective in developing the quality of products and would help the firms to become world-class competitors. It was also seen that the managements of nearly 75% of the firms, irrespective of the size of the firm were interested in implementing TQM.

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