Quality Management, Total Quality Management And Six Sigma

Mudit M. Saxena,, Dr. KVN Srinivas Rao

Abstract:: Quality is the characteristic which distinguishes a product and service from its rivals. Quality is not the responsibility of a single member to ensuring superior quality of a service or product. TQM is a combined endeavor of management, Employees, workers and suppliers in order to get and go beyond client happiness point. PDCA cycle is major part of TQM. TQM is a joint effort of both top management and employees of a company to devise efficient policies and strategies to give good quality goods which meet and exceed customer satisfaction. Each TQM model incorporates customer feedbacks with applicable data and strategy as per the design effective plans to attain high quality goods. Few quality management tools are check list, Pareto chart, Fishbone diagram, Histogram, Scatter diagram, and graphs. Six Sigma make sure better quality of goods by eliminating the imperfections in the systems and processes. DMAIC and DMADV are two methods of Six Sigma. Kaizen is explained as a constant attempt by all employees to make sure enhancement of all system and processes of a particular company. “Five S” of Kaizen is a methodical approach which directs to infallible systems, standard strategies, set of laws and regulations to give rise to a strong work culture at the company. There is a vital role of managers and customers in implementing Six Sigma. Six-Sigma and TQM both are efficient tools for quality management but there exist a thin line of difference between them. Six-Sigma gives improved and efficient outcomes as compared to TQM. There are some differences in methodologies of manufacturing and service sectors.

Index Terms : Quality, Quality Management, Total Quality Management, Six Sigma, PDCA, KAIZEN, Quality management Tools

1. INTRODUCTION

Quality represents a parameter which makes a decision of the inferiority or superiority of a goods or service. Quality may be explained as a characteristic which distinguishes a product or service from its rivals. An essential role in every business is played by quality. Industry marketers require giving emphasis on quality of their products over quantity to carry on the cut throat rivalry. A customer comes to you if your product is superior to the competitor.

2. TQM

TQM is explained as a constant effort by the management as well as workforce of a particular company to ensure extended customer loyalty and customer satisfaction. Happy and satisfied buyer brings many new clients along with him while one disappointed person will spread bad word of mouth and ruin several of existing and prospective customers. One needs to provide something extra to his customers to anticipate loyalty in turn. Quality may be measured in terms of reliability, durability, usage and so on. TQM is a planned effort by people to endlessly develop the quality of the products and services via proper responses and study. It is not the responsibility of a single member to ensuring superior quality of a service or product. All employees from the company have to contribute in the same way to design infallible processes and systems which would ultimately make sure better quality of products and services.

- *Mudit M. Saxena,*
- *mms.saxena@gmail.com*
- *Ph. 9904260740*
- *Assistant Professor*
- *IITE, Indus University*
- *Dr. KVN Srinivas Rao*
- *kvnsrao@gmail.com*
- *Professor*
- *Dept. of Mechanical Engineering*
- *B V RAJU Institute of Technology*

TQM is undeniably a combined endeavor of management, Employees, workers and suppliers in order to get and go beyond client happiness point. We can’t just hold responsible someone for not sticking to quality procedures. The liability lies on everybody who is anyway related with the company. Deming, Juran, and Armand V. Feigenbaum together generated the idea of TQM. It initiated in the industrial segment, yet may be functional to all the companies. TQM makes certain that all employees are functioning on the way to the enhancement of job culture, procedures, systems and services to make sure continual improvement.

TQM comprises of PDCA cycle.

- Plan
- Do
- Check
- Act

Plan

It is the major part of TQM. In Planning phase people have to participate with the troubles and queries which require to be tackled. People have to come up with the diverse challenges they come across in the everyday functions and also examine the trouble’s source. People are needed to do required investigation and gather related data that would help them to find way out to all the difficulties.

Do

In this stage, workforce develops a way out for the problems as in planning phase. Policies are planed and realized to prevail over the challenges faced by workforce. The efficiency of results and policies is also calculated in this phase.

Check

It is the phase where an evaluation analysis of prior to and later data is done to confirm the efficiency of the processes and measure the results.

Act

In Act stage people file their results and organize themselves to deal with additional problems.

3. Significance of Quality Management

Superior quality products and services are ensured by "Quality management". In terms of performance, reliability and durability quality of a product can be measured. A crucial parameter is quality which discriminates a company from its rivals. Quality management tools ensure changes in the systems and processes which sooner or later result in better quality goods and services. Techniques of quality management such as TQM or Six Sigma have a common objective - to produce a high quality product. Quality management is necessary to generate better quality goods which meet and exceed client satisfaction. Customers have to to be pleased with the brand. Business people are doing well simply when they stress on quality moderately than quantity. Quality goods make sure that you carry on the aggressive competition with a satisfaction. Quality management is necessary for client pleasure which ultimately directs to loyalty of the customer. It is significant for each business to have a number of loyal clientele. It is needed to have several clients who would return to your business in any case. Clients would come back to the business only if they are happy with your goods and services. Confirm the purchaser is contented with the product. A customer would be pleased and contented only when the product fulfils his expectations and needs. Comprehend what is expected from you by the customer? Realize his actual need. Gather related information which would provide you additional insight into client's requirements. Consumer reactions ought to be gathered on a normal basis and cautiously watched. High quality goods and services are ensured by eliminating shortcomings and including constant transforms and developments in the system. High quality goods sequentially direct to faithful and pleased customers who bring few new clients along with them. You might save some funds by overlooking quality management processes but in the end lose out on your main clients, thus inviting enormous losses. It is ensured by Quality management that you deliver goods according to promises made to the clients via different forms of promotions. Quality management tools facilitate a company to design and make a product which is actually wants and desires the customer. Increased revenues and higher productivity for the organization is ensured by Quality Management. Employees are earning if a business is earning. Employees are frustrated when their earnings or other payments are not given on time. The main inspiring factor is money. When there is free cash flow salaries are released on time. Quality management implementation make certain elevated client loyalty, thus improved trade, improved money flow, pleased workers, healthy workplace. Eliminate redundant processes which just waste worker's time and never add much to the company's productivity. Employees to deliver more work in less time are enabled by Quality management. Quality management helps organizations to reduce waste and inventory. It enables employees to work closely with suppliers and incorporate "Just in Time" Philosophy. Close coordination between workers of a company is ensured by Quality management. It instills a strong sense of team work in the human resources.

4. TOTAL QUALITY MANAGEMENT SCULPTS

TQM is a joint effort of both top management and employees of a company to devise efficient policies and strategies to give good quality goods which meet and exceed customer satisfaction. TQM facilitates workers to focus on quality than number and try hard to excel in anything they do. As per TQM, consumer responses and expectations are mainly necessary when it comes to devising and realizing new policies to bring better goods than rivals and ultimately yield better revenues and income for the organization. A lot of models of TQM are there and it is in fact not necessary that all companies ought to select and apply the same sculpt.

5. DIFFERENT MODELS OF TQM

Deming Application Prize

- Malcolm Baldrige Criteria for Performance Excellence
- European Foundation for Quality Management, and
- ISO quality management standards

The foundation of every TQM model is clients and their feedbacks. In fact, TQM starts with understanding clients, their requirements and what clients expect from the comapny. Design perfect systems and processes to gather client data, information to more study, examine and act therefore. These activities help you recognize your objective clients and foresee client behavior. One requires being aware of age range of his target clients, their choices and requirements. Members required obtaining how their goods or services can complete customer wants and demands. TQM model needs careful preparation and research. Each TQM model incorporates customer feedbacks with applicable data and strategy as per the design effective plans to attain high quality goods. Plans designed to give improved quality goods require to be assessed and appraised from time to time. Keep in mind clients are contented only when goods meet their hope, accomplish their desires and are worth for money. Their total experience with the company requires to be enjoyable for them to be pleased and come back to the company still the coming time. Unremitting developments, alterations and amendments in the current processes as per the client's prospects are essential to get elevated earnings. Procedures can't be similar for all time. If a client objections to a given product, discover the origin of problem. Recognize and put into practice necessary TQM models to put right the problem, get rid of the imperfection for a elevated quality product. The successful accomplishment of TQM model desires widespread preparation and participation of all members who is benefitted out of the company. TQM model would be a complete failure without the involvement of every person. TQM model starts with research and gathering data about consumers pursued by full contribution and planning of people for unbeaten accomplishment. Higher management desires to make other squad affiliates aware of the advantages of TQM process, significance of quality to stay alive in the long run and how they can put into practice a variety of TQM models by prioritizing their clients and their responses.

6. TOOLS FOR MANAGING QUALITY

Tolls for Quality Management assist companies gather and examine data for workers to simply comprehend and understand information. Widespread planning and gathering related information about consumers is needed by Quality Management models. To deliver superior quality products customer feedbacks and expectations required to be cautiously observed and assessed. Tools of Quality Management assist staff to recognize the frequent troubles which are happening again and again and their sources. Tools of Quality Management play a vital role in enhancing the

superiority of goods and services. With the help of tools of Quality Management employees can readily collect the data as well as put in order the gathered data which would more aid in examine the same and ultimately come to tangible results for improved quality goods. Tools for Quality Management create the information effortless to comprehend and allow people to recognize procedures to set right imperfections and find answers to definite problems.

7. QUALITY MANAGEMENT TOOLS:

Check List – To collect data and information check lists are helpful .It also facilitates people to make out troubles that prevent a company to give quality goods which would meet and go beyond client expectations. Check lists are long list of recognized problems which require to be tackled. As you locate an answer to a specific problem, mark it right away. Workers refer to check list to comprehend if the modifications incorporated in the system have brought enduring enhancement in the company or not?

Pareto Chart – It helps workforce to make out the troubles, prioritize them and also decide their occurrence in the system. It reports the causes which derives maximum client grievances and ultimately allows workforce to devise related plans to resolve the majority general defects.

The Cause and Effect Diagram – It is also known as "Fishbone Chart" and Ishikawa diagrams. It records reasons of a particular problem .It plays a vital role in recognizing the origin of a specific problem and also probable aspects of a frequent problem at the place of work.

Histogram – It is a graphical depiction showing concentration of a specific problem. It helps recognizing the cause of problems in the system by the outline as well as thickness of the distribution.

Scatter Diagram – It helps to examine connection amid two variables. In a scatter chart, data is characterized as points, where each point indicates a value on the level axis and perpendicular axis. Scatter Diagram demonstrates many points which show a connection amid two variables.

Graphs - These are the simplest and most regularly used quality management tools. It help to identify if processes and systems are as per the predictable level or not and if not also record the level of divergence from the normal conditions.

8. QUALITY MANAGEMENT AND SIX SIGMA

It is a business management plan which intends at enhancing the quality of processes by reducing and ultimately removing the variations and errors. Motorola introduced the concept of Six Sigma in 1986, but was Jack Welch popularized it, which included the policy in his business processes at General Electric. Quality plays a significant role in the success of a company. Six Sigma make sure better quality of goods by eliminating the imperfections in the systems and processes. It is a process which supports in enhancing on the whole system and processes by recognizing and ultimately eliminating the obstacles which might prevent the company to arrive at the perfection levels. Companies applying Six Sigma generate particular levels for workers inside the organization. These levels are termed as: "Green belts", "Black belts" and so on. Persons qualified with any of these belts are specialists in six sigma process. As per Six Sigma any process that does not direct to client satisfaction is termed as a defect and has to be abolished from the system to make sure better quality of goods and services. Each company struggles hard to sustain outstanding quality of its product and the process of Six Sigma make sure the same by eliminating different errors and defects which arrive in the path of client pleasure. Six Sigma was originated in manufacturing processes but at the present it discovers its use in other areas as well. Appropriate resources and budgets required to be allocated for the accomplishment of Six Sigma in companies.

Two Six Sigma methods are:

- DMAIC
- DMADV

Existing business practices are taken care by DMAIC. Creating new strategies and policies are taken care by DMADV.

9. FIVE PHASES OF DMADV

D - Defining the Problem. Various problems which need to be taken care of are evidently defined in the primary phase. Responses are obtained from clients as to what they experience about a specific good or service. To comprehend problem part and their root causes responses are cautiously observed.

M – Gauge or measure and find out the main points of the existing process. Employees collect relevant data once the problem is identified, which would provide an insight into present processes.

A - Analyze the data. The information gathered in the next stage is meticulously confirmed. The root cause of the imperfections are cautiously considered and examined as to discover out how they are influencing the whole process.

I - Improve the existing processes depending on the study and examination done in the prior stage. Attempts are done to generate novel projects which would make sure better quality.

C - Control the processes so that there are no further defects.

10. DMADV Method

- D - Design policies and procedures which make certain full client agreement.
- M- Measure and recognize factors that are imperative for quality.
- A - Analyze and build up high level options to make sure better quality.
- D - Design particulars and procedures.
- V - Verify different procedures and lastly apply the same.

11. KAIZEN; THE CHANGE FOR BETTER

Kaizen is explained as a constant attempt by all employees to make sure enhancement of all system and processes of a particular company. Japanese people give much importance to the process of Kaizen. It helps Japanese companies to outperform all other rivals by following definite set strategies and conventions to get rid of imperfections and make sure long term higher quality and ultimately client satisfaction. "Change is for good" is the basic principle of Kaizen. Kaizen denotes "continuous improvement of processes and functions of an organization through change". Kaizen brings nonstop little enhancements in the whole processes and ultimately aspires to company's success. Japanese believe that several

small incessant changes in the policies and systems bring efficient results than a small number of major changes. Kaizen process targets at nonstop enhancement of procedures in manufacturing sector as well as in all other departments as well. Realizing Kaizen tools is the liability of every member who is directly connected with the company. Every person, irrespective of level in the hierarchy requires contributing by adding in little upgrading and modifications in the system.
Six Sigma has the following main components:

- Teamwork
- Personal Discipline
- Improved Morale
- Quality Circles
- Suggestions for Improvement

12. FIVE S TERMINOLOGY OF KAIZEN

"Five S" of Kaizen is a methodical approach which directs to infallible systems, standard strategies, set of laws and regulations to give rise to a strong work culture at the company. Japanese wokers never speak badly about their company. The process of Kaizen has an significant role in employee as well as customer satisfaction via small constant changes and removing imperfections. Tools of Kaizen creates a well organized place of work which falls out in improved efficiency and yield improved resultsFive 'S'SEIRI – It means Sort Out. According to it, workers should organize and sort out things well. Tag the items as "Necessary", "Critical", "Most Important", "Not needed now", "Useless and so on. Discard the useless items. Keep aside which is not required at the instant. Critical Items which are most significant ought to be put at a safe position.

SEITION – It means to Organize. Workers waste much of their valuable time finding items and significant documents. Every item should have definite space and must be put at its position only.

1. SEISO - It means shine the workplace. The workplace and surroundings should be kept unsoiled. De-litter your workplace. Essential documents ought to be put in proper files and folders. Use drawers and cabinets to store your items.

2. SEIKETSU-It refers to Standardization. Every company needs to have definite set rules and set policies to make sure better-quality.

3. SHITSUKE or Self Discipline - Employees are required to respect company's strategy and stick to rules and system. Self discipline is necessary. Follow job procedures and remember to carry your identity cards. It gives a sense of pride and esteem for the company.

Kaizen focuses on constant little enhancements and thus provides instant outcomes.

13. MANAGERS' ROLE IN TOTAL QUALITY MANAGEMENT

Each company has to take care of its clients. It is essential to take their feedbacks. TQM generates systems and processes based on client feedbacks and various studies which ultimately assist in the growth of company. A great amount of planning and research is required in starting and applying TQM programs. Before applying the same managers need to get trained in various TQM practices. Some costs are involved in the whole process of TQM. It is the official's responsibility to assign financial plans for TQM at the starting of each financial year. One need to be convinced first why quality is a vital parameter in each industry. If you yourself are not convinced, it would be very hard for you to encourage other divisions for put into practice Total Quality Management. Know your customers. Recognizing your objective market cautiously. Move out, visit customers and discover out as to what all they anticipate from your product. In devising strategies for TQM customer responses play a significant role. As a manager; one need to work closely with the higher management, HR professionals to build up infallible execution strategies. Keep in mind, a manager has to take action as a link between the higher management and the whole workers. Manager's role is to take action as a catalyst at the place of work. The duty of manager is to assist workers in applying Total Quality Management. The Responsibility of manager is to select and employ right persons who can work as line managers and get charge of the whole project. The selected employees should be dependable and hard-working and ought to be competent enough to take care of a critical project like TQM. The manager's liability is to allocate resources for TQM, allot time for a variety of training plans and welcome workers who turn up with a variety of development thoughts and plans which would help the company give better quality goods. Subordinates should be trained to make sure smooth execution of Total Quality Management devoid of any obstructions. The benefits of TQM must be conversed by the manager to all other affiliates of the Company. Call Employees must be called on a common platform and benefits and importance of TQM must be addressed. They must understand how successful accomplishment of TQM programs would give high quality goods which would benefit the organization and the workers linked with the same. We should train our own human resources. A trainer is required to be ready for all queries. A manager is forever a strong resource of motivation for other members. One requires practicing TQM himself before expecting people to believe in TQM. Client feedbacks ought to be cautiously observed and taken into account while making company's main strategies.

14. ROLE OF CUSTOMERS IN TOTAL QUALITY MANAGEMENT

TQM provides a constant attempt of management along with the workers of a specific organization to enhance the quality of goods and services. Industry needs to stress on superiority of their goods rather than numbers to continue exist the vicious competition. A customer would not return to your company if you do not give what you had assured him at first. You can dupe someone once but not again. Quality is foremost parameter for each business and should not be overlooked at any cost. The liability of giving quality goods and services to clients lies on the shoulders of each single person who is even a little connected with the Company. Management and workers ought to come up with development thoughts to make infallible processes and systems to deliver quality goods which meet and go beyond the hope of consumers. role is played by customers in total quality management. A trade is doing well only when its goods and services have ample number of buyers. There are also several other factors but clients play a vital role in deciding the accomplishment and

failure of a company. Business dealers need to concentrate on their consumers and what precisely they look forward to from their company. Feedbacks of the customer ought to be recurrently and cautiously checked before making any key business policy. One cannot ignore the customers who pay for goods which ultimately bring profits to the company and give greater earnings?

Recognize the demands and needs of the clients

TQM ensures that workers comprehend their objective clients well previous to building any variations in the processes and systems to provide better quality goods for better client satisfaction. Companies bring in TQM or any other quality management tool to boost their client base and levels of client satisfaction. TQM enhances a company's database of devoted clients who would not go anywhere. Goods quality is defined in terms of its durability, packaging, reliability, timely delivery and also by customer's on the whole experience with the company. Client disappointment causes loss of trade. In service industry, Employees in service industry require to interact with the clients wisely and with greatest concern and professionalism to expect pleased and dedicated clients.A variety of feedback forms for the clients are to be made to share what they experience about the goods and services. Negative remarks or responses of the clients must not be ignored. In TQM, workers should sit on a general platform, come up with thoughts and come to tangible results which would get better the systems and processes to sooner or later delivery what the client look forward to. No amount of TQM would help if you disregard your clients.

15. TQM and SIX SIGMA

Six-Sigma and TQM both are efficient tools for quality management but there exist a thin line of difference between them. Even though the line of attack and measures involved in both the two come into view quite alike but certain key distinctions are there. Six-Sigma is a comparatively newer idea than TQM but not accurately its substitute. The fundamental distinction between TQM and Six Sigma is that TQM brings better quality manufactured goods whereas Six Sigma provides better results. TQM refers to incessant attempt by workers to make sure high quality goods. The Six Sigma process incorporates a lot of minute modifications in the systems to make certain efficient results and improved client satisfaction. TQM engross designing and building up new systems and processes and makes sure efficient synchronization among different sections. Based on various customer feedbacks and researches new Processes are developed. The centre point of TQM is to preserve existing quality standards whereas Six Sigma first and foremost focuses on making little essential alterations in the processes and systems to make certain improved quality. The TQM process does arrive at a saturation level subsequent to a definite period of time. After attainment the saturation phase, no additional enhancements in quality can be done. Six Sigma hardly ever obtains the saturation phase by starting a subsequent level quality process. The TQM process involves enhancement in present policies and processes to make certain high quality. Six-Sigma spotlights on enhancing quality by reducing and ultimately eliminating faults from the system. TQM process makes sure that each single person connected with the company is operational towards the enhancement of present processes, systems, services and work culture for long time quality products/services. Six Sigma concentrate on first recognizing and ultimately eliminating a variety of imperfections and hurdles which might appear in the way of company's success. TQM in a layman's language highlights on enhancing the prevailing policies and making needed alterations in the systems to make sure better quality goods and services. Companies involved in Six Sigma are paying attention on eliminating errors and defects to make sure better quality goods. TQM is a not as much of complex process a Six Sigma. Six-Sigma engages particularly skilled persons whereas TQM does not have need of broad training. Six Sigma process generates particular levels for workers who are only qualified to put into practice the same. People trained for Six Sigma are time and again certified as "Green Belts" or "Black Belts" as per their level of expertise. Six-Sigma needs contribution of only certified experts whereas TQM can be taken as a part time action which need not necessitate any particular training. Six-Sigma can be executed by devoted and well qualified professionals. Six-Sigma gives improved and efficient outcomes as compared to TQM. Six Sigma process is based on client responses and is more precise and outcome oriented. Client feedbacks play an imperative role in Six Sigma. Professionals foresee that six sigma will outperform TQM in due course of time.

16.ACCOMPLISHMENT OF QUALITY STRUCTURES IN MANUFACTURING AND SERVICE SECTOR

Imperfection in production in a company like GE (General Electric) could cause in that particular produce or the part being detached from the assembly line and not passed out as finished good.

On the other hand, in the service sector, a process fault might prove to be expensive.

A literature review of the dissimilarity amid adopting Six Sigma for manufacturing and services gives the result that there are four points to take care of before service companies take on Six Sigma as a way of life in their companies.

17. MAJOR RESEMBLANCE AND DISSIMILARITIES BETWEEN MANUFACTURING SECTORS AND SERVICE SECTORS

First, in the service sector managers must understand that nothing like in the manufacturing division, there are few processes in the financial services companies and banking that are of changing intricacy and diverse levels of customization. For example, an assembly line in a manufacturing company is an illustration of a exceedingly standard process that can take on a quality structure. Though, in the banking division, there are a number of processes that are extremely complex and do not lend themselves to standardization in the similar way that a process in the manufacturing division does. Hence, the for the service sector challenge is to consider which process can be as a whole customized which mean that the process is the identical for all clients and in all circumstances and then put the quality structures to attain process distinction. In the banking industry or any service sector company an example of a mass customized process would be the credit card accounting processes or payroll and that lend themselves to standardization. Likewise, in a fast food industry, the

processes lend themselves to a greater degree of standardization and hence these can choose for application of the quality structures. Another point to be taken care of is one of the fundamental principles of quality control: To describe a defect and how it is measured. In manufacturing industries it is easy to find defects as visual examination or even higher quality control processes can frequently find defects as they narrate to the quality of the good manufactured. Though, in service industries, finding a defect is a challenge as the disagreement between quality as insisted by the client and the quality of the service as given by the service giver are two unlike things. Due to the perceptual nature of reaching at an understanding of defect, it is time and again useful to describe the defects in expressions of clientele lost, client agreement ratings and service spin times. What these three factors denote is that the idea of quality in the service division is often dictated by the client. For this reason, efforts should be made to recognize the client point of view by using trained researchers and service persons to put into practice a “feedback loop” that put into the system widespread in the service sector and self corrects. The third point narrates to the technique in which quality slippages are examined in the service sector industry. Ongoing to the same point made in the previous paragraph, it is significant to get the “root cause” at the back of the imperfection or the shortage in service and then act therefore. It could be the case that difficult processes with many rules leading each step of the process might need to be examined minutely for probable root causes for the imperfection.

18. REFERENCES:

[1] Adam E. E., L. M. Corbett, B. E. Flores et al.(1997).
[2] “An international study of quality improvement Approach and firm performance,” International Journal of Operations and Production Management, , vol. 17, no. 9
[3] Ahire, S.L., Golhar, D.Y., & Waller, M.A.(1996). Development and validation of TQM implementation constructs. Decision Sciences, , 27(1)
[4] Black, S.A., & Porter, L.J. (1996) . “Identification of the critical factors of TQM”. Decision Sciences, 27(1),
[5] Block, F.E. (1995), Study of price to book relationship.
[6] Financial Analysis Journal, 51
[7] Cao, S.H., & Hwang, M.Y. (1995). Application of qualitative and quantitative multi-criteria method on the study of the market potential of the overseas visitors in China. Outdoor Recreational Research, 8(4),
[8] Crosby, P.B. (1979). Quality is free: The Art of Making Quality Certain. New American Library, New York. Deming, W. Edwards, (1982). “
[9] Quality, Productivity, and Competitive Position,” M.I.T. Press. Deming, W.E. (1986). “Out of the Crisis” MIT Center for Advanced Engineering, Cambridge University Press.
[10] Juran, J.M., “Juran’s Quality Control Handbook, ” McGraw-Hill, 1988 Kaynak H. , “The relationship between total quality management practices and their effects on firm performance,”
[11] Journal of Operations Management, vol. 21, n o. 4, 2003
[12] Kim D. Y. V. Kumar, and U. Kumar (2012), “Relationship between quality management practices and innovation",
[13] Journal of Operations Management, vol. 30, no. 4
[14] Sharma B., (2006). “Quality management dimensions, contextual factors and performance: an empirical
[15] Investigation,” Total Quality Management and Business Excellence, vol. 17, no. 9

: