

Impact Of Quality Management On Organizational Performance:

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Abstract: This study purposely focuses on the application of the Quality Management generally in all scales like small, medium and large scale organizations in the sector of automotive vendor industries of Pakistan, to determine and extract whether the automotive industries as a whole following quality management, the intensity of basic requirement of quality management at the level of all scales of vendors measured with the perception that if quality management is implemented in its real approach it positively impact on reduction in cost, inter-firm relationship, self-control-quality as well as it enable and leads manufacturer to export across the world. This study measured the perception into 63 vendors out of 121. Do the organization quality management system contribute in inter-firm relationship, improved supply chain, effective and efficient process control with leading to the culture of self-contained-quality, reduced the cost by application of statistical process control at various level? Is the Quality Management is the core excellence in the vendors continuous quality improvement program? and if the quality of auto parts are recognized by the world leading automobile Original Equipment Manufacturer than whether the vendors getting entry in their transplant across the world?

Key Words: ABC-MIL-STD-105E , Automotive Vendors, Average Outgoing Quality Level (AOQL), Inspection, Pakistan

1 INTRODUCTION

The Automobile Industries in Pakistan established since 1963, when Awami Motors the manufacturers of Mack Trucks started there assembly plant in Karachi, at that time there were no concept of organized vendor industries and parts required for Mack Truck were imported from Japan. Later on in 1980 the Pakistan in collaboration with Japanese well known auto maker called the Suzuki Motor Company Japan established their assembly point in Karachi named Pak Suzuki Motor Company (PSMC), that was the 1st organized assembly plant in Pakistan under directed and operated under the management of Japanese Motor Company experts, the manufacturing plants that are engaged in manufacturing, the Automobile Vehicles as well as the engineering products are worldwide known as the Original Equipment Manufacturer (OEM), and the suppliers engaged in development, production and supplies of auto parts, sub-assemblies and assemblies in accordance with the engineering specification, inspection and test standards OEM are known as the vendor. Hence the period from 1981 to 1995 was the era when many others four and two wheelers automobiles OEMs came into existence such as Hino Pakistan (the Assemblers of Hino Buses and Trucks), Millat Tractors and Al-Ghazi Tractors (the Assembler of Messy Furgoson and FIAT tractors), Indus Motor Company of Pakistan (the Assemblers of TYOTA cars), Gandhara Nisan (the Assemblers of Nissan branded automobiles) and similarly the Atlas Honda (the Assembler of Honda cars) as well as the two wheelers such like Dawood Yamaha (the Assembler and manufacturers of Yamaha Motorcycles) and the Atlas Honda Motorcycles (the Assemblers and manufactures of Honda Motorcycle), in the same era Raja Corporation in Azad Kashmir established for manufacturing Vaspa Scooters and three wheelers called Rickshaw. In parallel to this emerging sector of automobile assemblers the indigenous development of automobile parts for these assemblers in Pakistan also came into existence, for this purpose the than autonomous body known as the Pakistan Automobile Corporation (PACO) and the State Engineering Corporation of Pakistan (SECP) which were already formed by the government of Pakistan objectively to establish the network of industries with local and international collaboration played a vital role in establishing the large industries which served for the acceleration of automobile industrious development, vending industries, transfer of technology, skill development and creating job

opportunities. Hence a large scale vendor industries such as Bolan Casting (the Manufacturers of engine block, brake drums and other parts which required casting and machining of the automobile parts), the Balouchistan Wheels (the Manufacturers of all sized of Wheel Rims), in parallel to larger business group such as Habib Group, Dawood Group also emerged in as vendors such as the Agriauto Industries (the manufacturers of automobile gaskets, cam shafts in collaboration with Camtext UK, cylinder liners, engine valves, and the Shock Absorber in collaboration with Gabriel USA), the Avitronics (the manufacturer of the Automotive Steering System), the Thal Engineering (the manufacturer of automotive wiring harnesses, and air conditioner), Baluchisstan Engineering Works (the Manufacturer of the Sheet Metal parts) and similarly so many industries which came into existence and playing a vital role in adaptation of world class new technological changes and also engaged not only in indigenous development, production and supply of parts for automobile parts to the automobile vehicles assemblers but also engaged in export across the world. Since 1995 many other international OEMs emerged in the automobile market of Pakistan such as the Dewan Farooque Motors Limited the assembler of Hyundai and Kia brands vehicles under technical licensing with Hyundai Motor Company Korea and KIA Motor Company Korea, Nisan Motor Company engaged in assembling of Land Rover beside a plant for assembling of Volvo Trucks are under commissioning in Karachi. Also significant quantity of Chinese OEM's network is also enlisted in the automobile vehicles assemblers in Pakistan. The organization engaged in the assembling of automobile vehicles, are also termed as the 'Mother-of-Industries'. In Pakistan the total investment as on 2013 is Rs.150 Billions, created employment opportunities for 1,92,000, and there current export in US \$ is 128 Million. This study aimed to determine the level of quality management practices in regards to the engineering and technical specification, and inspection and test standards duly provided to vendors from their respective OEMs. As this automotive vendor industries comprises all scale of industries for example, the large scale vendor industries, medium, small even cottage industries as tire three supplier the main objective of this study is to focus whether the key pillars of quality management practices such as the cost of quality, supplier-manufacturer's relationship that lead an improved

supplied, and the improvement of quality during manufacturing process as well as whether the quality of parts and sub-assemblies meeting the requirement of international auto-buyers or only meeting the requirement of local assemblers at all scale of vendors or is being addressed only by tire one vendors. Tire one supplier are capable to control and cost of failure; inter-firm relationship in turn improve supply chain; effective and efficient control over product & process that leads to self contained quality and lead to export across the world. The Quality Management practices are one of the essential requirements in achieving the corporate goals by satisfying their consumers in local as well as in international market, due to this essential part of manufacturing system organization seeks more business share if their customers are highly satisfied in term of cost, quality and supplies of parts and in so doing organization not only expand vertically as well as horizontally but attract national and international entrepreneur to invent in local industry. The large and reputed vendor are mostly certified by international standards of quality, environment, safety and health, even few of them are certified by QS-9000 (a United State standard for quality system) and TS-16494 (Quality Standards for the Automotive Industries), where as the Indus Motor Company (the assemblers of Toyota branded vehicles) and Honda Car (the assemblers of Honda branded vehicles) are the leading organization following the "Total Quality Management" in their company-wide manufacturing and marketing system.

Pakistan Automobile Manufacturers Association (PAMA)

PAMA is an association of Automobile Assemblers in Pakistan, is the second name of collective effort in strengthen the vendor industries by providing technical and commercial assistance, encouraging technical workforce for continuous quality improvement through application of Japanese Management System such as KAIZEN, and other tools which adding value that impact on the ultimate cost, quality and a culture of creativity in the organization. Through annual KAIZEN or the VENDOR CONVENTIONS employee get awards on their creations and outcomes of their performance in reducing cost, improvement on quality and so on and so forth.

Engineering Development Board (EDP)

In early 1980s government of Pakistan constituted an Engineering Development Board in the Ministry of Production, with the main objective to improve the local manufacturing rather than to incur high cost in importing the parts and sub-assemblies. In accordance to the policy frame work for deletion program (the program that delete certain amount of percentage of imported part by manufacturing the same in local industries) the assemblers of automobiles vehicles in Pakistan are restricted to shift on indigenous development and production gradually by deleting described percentage of imported parts and sub-assemblies every year. In so doing the growth rate in the indigenous development and production of parts increased from 5 per cent in 1981 to 70 percent in cars, 90 per cent to 96 percent in trucks and buses and almost 98 percent in motor cycle. (Ref: Trade Directory of Pakistan Automobile Parts and Accessories Manufacturers 2012).

2 RESEARCH METHODOLOGY

Since the study was quantitative in nature and majority of the questionnaire were bases on the perception so an One-Sample T-Test conducted to determine the degree of

respondent's agreement on my perception to confirm that Quality Management impact on the cost, relationship with suppliers, self-contained quality and export quality as well, the combination of these four basic factors leads to satisfactory performance level for business with local and international buyers. Questionnaires were distributed to 70 respondents in 30 organizations out of which 63 responses were received. Questionnaire was consisted of 16 questionnaires.

2.1 SAMPLE AND SAMPLING TECHNIQUE

The Directory of "Pakistan Association of Parts and Accessories Manufacturers" were referred as the 'Sample Frame' for this study. Where 124 vendors out of 290 were belongs to Karachi. Initially the Proportionate Stratified Random Sampling method planned to chose the subject from each stratum randomly for 124 vendors of Karachi, questionnaire were distributed through emails, postal mail and major portion were distributed through a leading OEM and 32 questionnaire were distributed myself in accordance to the 'Systematic Random Sampling' vide emails and Pakistan Post Mail services in my initial efforts. The respondents of these questionnaires are classified as under.

1. C.E.Os / Owners of the vending industries.
2. Technical Managers.
3. Engineer
4. Technical Staff working in cross disciplinary areas in inter-firm relationship.
5. Few questionnaires were filled by the executives who either retired from OEMs or served in vendor industries for a long period of time but currently working in OEMs.

2.2 Selection of Sample Size

2.2.1 Stratification

Stratification Sampling Plan selected and the Sample Frame stratified in three stratum as described below.

Strata 1, comprise vendors having effective management hierarchies, well equipped, with highly trained Engineer and technical workforce as well as having strong reputation in the OEM community.

Strata 2, comprise medium and small scale units, although financially sound like the large scale industries, but having no adaptation of advance technology but having a significant penetration in OEM industries since long and there qualitative status is well known in auto sector.

Strata 3, although they are the registered vendor but their average out going average quality level are not well known. The Population size of sample frame $N=121$,

$$\sum N = N_1 + N_2 + N_3$$

$$\sum 121 = 19 + 29 + 73$$

2.2.2 Proportionate Stratified Random sampling method adapted to chose subject from each stratum randomly

The sample size of sample frame taken $n = 72$ (60 % of the Population Size) The **Sampling Friction (f)** using the statistical formula i.e., $f = n/N = 72/121 = 0.5950$ or 59.50 %

Hence Sampling friction, $f = 59.50 \%$

The sample size for each strata has taken as follow

$$n_1 = N_1 \times f = 19 \times 59.50 / 100 = 11.3 \text{ rounded to } n_1 = 11$$

$$n_2 = N_2 \times f = 29 \times 59.50 / 100 = 17.25 \text{ rounded to } 17$$

$$n_3 = N_3 \times f = 73 \times 59.50 / 100 = 43.43 \text{ rounded to } 44$$

$$\sum n = N_1 + N_2 + N_3$$

$$\sum N = 11 + 17 + 44 = 30$$

2.2.3 Systematic Random Sampling

For Stratum-1

$N = 19$, & $n_1 = 11$, $N/n = 19/11 = 1.72$ rounded to 2.0, by selecting random number from 1-2, chosen 1, started with # 1 and taken every 2nd unit.

For Stratum-2

$N=28$, & $n_2= 17$, $N/n = 28/17 = 1.64$ rounded to 2.0, by selecting random number from 1-2, chosen 2, started with # 2 and taken every 2nd unit.

For Stratum-3

$N=73$, & $n_3= 44$, $N/n = 73/44 = 1.65$ rounded to 2, by selecting random number from 1-2, chosen 1, started with # 1 and taken every 2nd unit.

3 LITERATURE REVIEW

Société Générale de Surveillance (SGS) 1994 states that before 3000 BC the Quality Control was the responsibility of the craftsman, while the craftsmen were enjoying on the completion of their finished project the *Tower of Babul* another person who was not the part of this project pointed out craftsmen that the tower is slightly tilted, from that moment the responsibility of quality control shifted from the shoulder of craftsman to the person who examine the finished product. Shaikh, M Jiyad (2012) referred the statement of Feigenbaum (1951) that is the performance outcomes of human's result oriented intelligent efforts in the appropriate directions and is not an accident. Oxford Dictionary 2009 revealed the precise definitions of the Quality Control and the Quality Assurance, the Quality Control are the measurement and verification of the product characteristics in context to desire standards standard of goods and services, whereas the Quality Assurance is the managing the methodologies to produce goods and services according to the customer's needs and wants. After second World War, industries focused on the new shift of reduction of cost objectively to meet the than challenges in the market in order to compete and penetrate in the market, because without reducing cost and adaptation of advance technologies through modern equipment, improved methodology, and process techniques in their quality management system the objectives of gaining market share were deemed to be impossible. That shift led entrepreneurs to shift on certain quality control measures at various level of inspection in their organizational structure such as inspection of incoming material, inspection of goods during their process that called the Process Control and, or the Process Quality, the final inspection that carried out at the time of finished

products leaving the manufacturing practices. The aims and objectives of the new shifts were to adapt the corrective and prevention measures to address the root cause of the defects and the abnormalities in the process causing the defects in the products instead of to detect the defect after hundred percent and to rectify the each and individual product. Purposely the organization were required a development of system, procedure, process, method and technique in their manufacturing setup to grip on the abnormalities before the occurrence of defect or immediately when defects reported, ensuring process is under control at all levels and at all stages in order to deliver defect free product and to attain the end user confidence. Ali Tasneem (2003) stated that Dr. William Edwards Deming (1967) in conjunction with the experts of U.S. War Department led a project of Quality Assurance after that another shift of cultural changes in the organization developed which led the workforce to identify problem before they developed and to take the preventive measure for timely elimination of defects. Her study also reveals the cost of quality, which mainly classified as 1) principle cost which further expanded as cost of control and cost of lake of control causing the failure, mainly incurred due to inspection, test, quality audit, vendor assessment cost and vendor's periodic performance cost 2) producer operating quality cost. The quality cost is the cost incurred in term of the preventing the abnormalities prior their occurrence in the process and system causing the non-conformities in product, and or the quality cost incurred when process is unstable or producing unsatisfied outcomes. The cost incurred in preventing the abnormalities before occurrence in the process is termed as the Preventive cost mainly incurred due to failure or abnormalities in the machine, untrained operator or inspectors, inappropriate methodologies in production & process, and due to capital issues, metrological errors and deviated material specification. She further stated that delivery of finished goods without conduction quantifiable as well as non-quantifiable defects cause has a chance of rejecting entire lot at customer's end which incurred heavy monetary lost to the producer and besides losing customer confidence over produce and loss of market share as well. In case of rejection principle cost also increased as in some cases there are no options except to scrap the whole lot if not rectifiable. Such lost of both parties can be balanced through Economic Design module, the cost-perspective model in mathematics. Dr. William Edwards Deming (1967), the philosophy of Deming 1st applied in Japan in 1920 and statistical techniques evident a significance achievement in the production and quality improvement. Deming emphasized that if process control tools and techniques are being applied correctly it yield the accurate and credible process capability. His contributions were highly recognized in Japan which later on flourished in United State. NBC-Television, a telecast of documentary in United State in 1950's made a u-turn, and US entrepreneurs, quality management experts and journalists frequent visits to Japan unfold the "secrets" of the "rapid" improvement and business successes in Japan, they also studied the Quality Circle practical approaches which inspire them as one of the core excellence in problem resolutions by applying statistical tools and techniques and concluded adaptation of the Quality Circle as one of the important factor in the continuous quality and productivity improvements. US visiting team concluded that "if Japanese can ---- Why Can't American. This conclusion brought an industrial revolution in United State and since then

quality control techniques were widely implemented in US. Before the widely acceptance in America there were the reasons due to which the philosophy of application of statistical quality control techniques were not so successful, the example of these reasons are, the lack in management involvement in continuous quality improvement but after passage of some time they realized the benefits in the form of reduction in cost and elimination of waste in the organization; people analyzed effort in the production and deliveries are lacking the application of these tools and techniques of statistical control charts; there were no focus on the collection of data and their objectives were only the exhibition of charts instead of to diagnose the problems and to kill accordingly; they were rely on their warranty system in 1960 and their revision in the versions of warranty on which they were proud of having a comprehensive mechanism of addressing customer complaints and analysis and diagnosis of process abnormalities were abortive and exercises; similarly they were focusing on hundred percent inspection for detection of defects in their finished product rather than to eliminate through implementation of effective and efficient system like the statistical process control. Ishikawa Kaoru (1981, 1983, 1987, 1989), in 1955 introduced and developed the quality control charting techniques, these control charts are since then has a wide acceptance in the manufacturing and service organization of Japan which later on transformed throughout the industrial world. Taguchi (1981, 1987) worked on the analysis of the Data through his conceptual framework of the signal-to-noise ration. James C. Siegel., 1982, stated that if statistical control technique by using the statistical control charts are being adapted in the manufacturing processes it orient effective and efficient process outcomes, he emphasize on the identification of the occurrence of problem with reduction of process quality cost and cost of failure logically and in so doing a culture of quality improvement is being induced in the organization resulting the improvement in the finished products. The statistical quality control charts also meant as a medium of communication that report to management regarding the process stability and credibility. Throughout the world organization evident that these tools and techniques are the means of improvement in production and quality control as well. Juran (1978) and Gryna (1974) focused on the role of leadership and availability of the effective training systems for the employees in the organization. Crosby (1979), emphasized on the reduction of quality cost, and the continuous quality improvement. His two books the 'Quality Is Free' (1979) and 'Quality without Fears' (1984) gained world wide acceptance. Quality is not only considered in under developing countries such as Pakistan and India seriously, this is the point of consideration in developed countries such as United State, Europeans country and the Japan as well. Takeishi, Akira and Fujimoto, Takahiro (March 2001) introduced their concept of modularization 1) "modularization in product design and engineering; 2) "modularization in production." And 3) "modularization in vending industries, that meant to outsources their associated parts and sub-assemblies as their sub-system. Their research reveals a concept on development and production of parts and sub-assemblies of automobiles in these three hierarchies of production, inter-firm system, and engineering designs, they compare with Japan, United State and European automobile industries and enlighten the rationales behind and effects on the changes in product designs. Modularization in inter-firm

draw in-depth focus in the European automobile main assembly plants. That modernization also focus on close, effective and collaborative integrated coordination among the Engineer in their cross disciplinarians and functional areas such as parts design and development engineer, production and process Engineer and production planning and material control Engineer because such coordination are the need to overcome the conflicts and to resolve them in order to make effective and efficient decision making in timely manner to reduce the cost and improve the quality and supplies as well. This study reveals that there is also a western need of requiring strong inclination towards the "modularization in outsourcing of production of parts and sub-assemblies in order to meet the challenges of inconsistency and disputed coordination in their sub-system of outsourcing. Whereas Japanese are focusing on in-house production of parts and sub-assemblies. Automobile manufacturers in Japan are seeking for "modularization in their product engineering" to meet the need of functional and quality conformation of models assembled in house in parallel to their main assembly lines. Since both the European and Japanese automobiles makers are adapting two different paths in implementation of modularization of product outsourcing, become emerged as diversification in production process, design and thus the cases of operation boundaries between outsourcing and in-house production could be diverse. Deimler-Chrysler established their new assembly plants in 1996 for production of larger automotive components as a separate intermediate layer as a concept of producing parts and sub-assemblies for example wiring harnesses, instrument panels, under their close control and in order to assemble a finished sub-assemblies and larger parts into a body of car at final assembly line. The objective behind this was to narrow the scope of in-house operation. Secondly they have let outsourcing subsystem to narrow the scope of in-house operation. This assembly plant of two-seater vehicle was the joint venture of Mercedes-Benz and SMH (a Swiss watch manufacturer), they named their car a "Smart". Where as they outsourced their larger components and main sub-assemblies such as doors, roof, main outer body parts, front and rear axle, doors to their approved vendors. They created a culture of system partner. The reason behind the establishment of inter-firm relationship with their system partners were getting the advantage of lower labor cost, continuous reduction in cost of manufacturing process and product, overcoming the overhead of direct and indirect manufacturing cost, they also focused on the transportation cost and emphasized to incorporate those qualified vendors situated adjacent or near by the "final assembly plant. European and United State auto makers aimed at inter-firm relationship building objectively to manage their low cost production for larger parts and sub-assemblies as module even incumbent vendor are still manufacturing and design. This is a common problem throughout the world that automobile manufacturers still have a degree of distrust over the sub-system suppliers, because their management capacity in handling development & design, prices of parts, cost of quality, are still a matter of control, that is why automobile manufacturers still focusing on the control over the selection of supplier for indigenous development with emphasis over suppliers to make more investment and to take a challenges of accepting risk factors. Sub-system suppliers offer a low labor cost which does not inspire to manufacturers because of these common problems. This research reveals that unlike European

and USA, the Japanese automobile manufacturers do not use the term “modularization” the reason behind is that, there is no such definition of it and the factor analysis like 1) standardization of parts and accessories, 2) transition towards integral change, 3) independencies on functionality of components and 4) horizontal expansion of the scope of sub-assemblies, hence in the light of these factors it is deemed to be difficult to generalize the means and purpose of modularization because of its multiple dimension. The functions of the parts and sub-assemblies analyzed as more complex and the intensity and integration in functional coordination increased the changes in opposite to the direction of modularization. This survey conducted in 1999, through a questionnaire and interview selecting the sample size of 153 first-tire supplier, that reveals the study of eight Japanese automobile manufacturer’s internal practices about the extent to which parts and sub-assemblies of the instrument panels were assembled prior installation on main assembly line and significant progress experienced in having subassemblies in larger and integrated assemblies inside the vehicle’s main assembly. The significant benefits of incorporation of sub-assembly lines in parallel to the main assembly line were observed 1) The worker performance under the umbrella of agronomical comfort, and safe work while engaged in assembling of components onto the engine assembly as the sub-assembly and also the worker who stand in torturous position while assembling the engine assembly into the main assembly of car. Workers understand well the significance of work they performed, gained higher degree of satisfaction as well as their degree of motivation also enhanced. 2) Another benefit is the inducement of self-contained quality control culture in which employees examine the quantifiable as well as non-quantifiable defects during the production of parts and sub-assemblies at each of its respective stages of production. This culture lead an effective and efficient relationship between the internal supplier and internal customer, the internal supplier are the worker who work on parts and prior delivery to adjacent or next stage of production examine carefully while the internal customer are the worker of adjacent or next stage of production who examine the semi finished part carefully prior starting his part of work on it. This trend also leads to early grasp of the defects during the process rather than to grasp these defects at the stage of final inspection before delivery of finished goods consignments to end user. The culture of self-contained quality provides higher degree employees involvement in work, satisfaction and sense of responsibility to the employee and the automobile main assembly plant workers and management get the strong confidence building over the qualitative and quantitative performance of sub-supplier system. This is the main cause of a shift from existing conventional practices of maintaining quality at all levels within the organization to adaptation of new self-contained quality practices which ultimately increased adaptation of more outsourcing. This research also reported a significant variation between the Japanese and European automobile industries, where Japanese automobile manufacturer prefer a separate sub-assembly line for a larger parts and sub-assemblies rather than to outsource these parts and sub-assemblies to outside vending industries. Whereas in Europe automobile manufacturers are focusing on outsourcing their components under their existing management plan to have them back to in-house by establishing a separate sub-assembly line in parallel to main assembly line of automobiles.

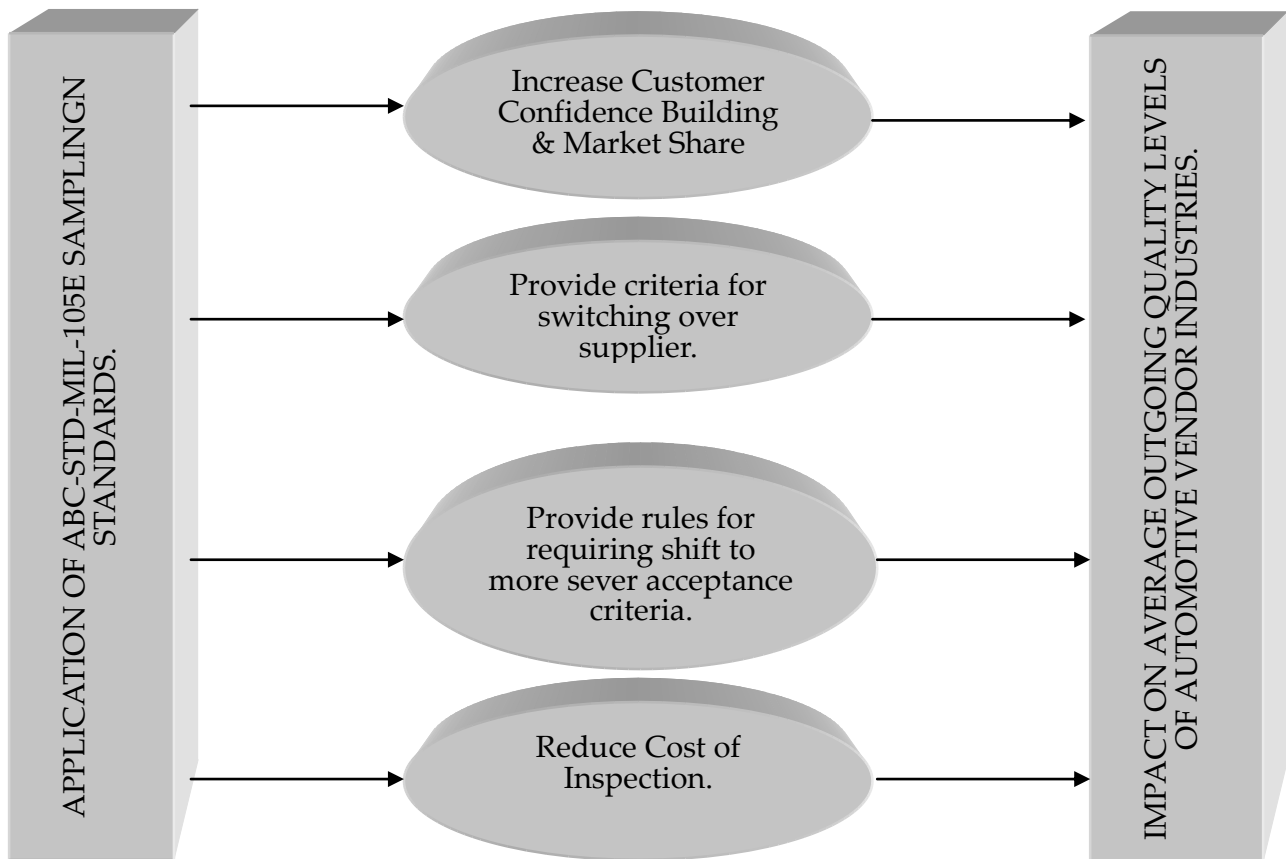
Fujimoto and Ge (2001), highlights the capability of sub-supplier system, and further stated that if supplier has a capability to develop and produce parts and even integrated sub-assemblies in accordance with their drawing, provided material and process specification, inspection and test standards and the roll and responsibilities in maintain quality are clearly defined and communicated than such parts and sub-assemblies can be produced as outsourced because if functions assigned to vendors clearly can be managed by vendors as a self-contained units. Fujimoto and Ge (2001) also emphasized that promotion of indigenous development of parts and their production can be possible to outsourced more easily in larger units if modules of product design allows to redefine the quality control scopes with defined responsibilities. The supplier have capability, expertise, sound and vast experience with high skilled and knowledgeable workforce available for indigenous development, production and supplies of parts and if a separate sub-assembly lines established in-house parallel to the main assembly line of vehicle adding valued that impact on the concept of “Kyogyo” in which multiple sub-supplier system work in multiple lines to produce associated auto components under the close guidance and control of the management of main automobile manufacturers. Langlois and Robertson (1992), stated that, the problem of improved product integrity is still unsolved in automobile industry in the under developing as well as more or less in developed countries. The Society of Automotive Engineer since 1919 striving for standardization of automotive components across the automobile industries for creating and ensuring compatibility between different automobile manufacturers, which due to monopolistic resistance from some key automobile leaders in the developed country like the Ford Motors, the Chryslers and the General Motors as they continuously intending for not to lost their matured corporate position in the automobile market by introducing a strong brand image and stuck to their own standards. Nakamura Masao, Sakakibara Sadao, and Schroeder Roger (1998), stated that effective and efficient application of the Quality Management (QM) practices provide support through uninterrupted operation in entire cross functional operation within the manufacturing framework of an organization. The stated that the ‘Just in Time (JIT) manufacturing leads to timely and accurate feedback about the manufacturing process, as this system helps management and workers for effective and efficient diagnosis of problem for their immediate resolution rather than retardation and remedies of defect at the stage of final inspection. Their empirical study also reveals that there is still a debate on organizational management, whether the quality management is the core excellence in attainment of economic resource in order to compete globally? As such there is no single piece of research finding in this area and the question is still in place. 1) Product design and reliability in product design are also still not ignored, the incorporation of inputs and customer’s need and want at the time of product design as the customer is the ultimate judge who finally examines and evaluates the plant’s performance on product quality and deliveries. 2) Approximately 80 per cent of the product failures are estimated due to the causes of abnormalities in the product design. Hence quality stands everywhere as a core excellence of the manufacturing system of vending industries as well as of automobile manufacturing plants. 3) The statistical quality control and statistical process control are also incorporated in product design as one of the

core excellence of quality management, as these tools provide early and frequent information on the potential non-conformities. Concluded that if quality management with their main factors such as cost, process control, inter-firm relationship building as well as also there is a sign of delivering to automobile manufacturing plants in the country as well as to their transplant across the world are being applied in its real practical approaches are the set of practices improve the organizational manufacturing performance. Shaikh M Jiyad (2012) stated vide his research on quality management that, the eminent quality gurus like Juran, Crosby, Deming rendered their service as consulted in leading automobile and engineering manufacturing firms like Caterpillar, Ford, Motorola, in gaining their lost market share by improving their manufacturing and management performance through application of Japanese quality management practices, induced as their foundation in result these organization not only regained their marketing share but sooner become marketing leaders in the United State. Quality Management is a very strong rational and evident the success of in top 1000 firms (fortune magazine). Asanuma, Banri (1985) focused his emphasis on the importance regarding the location of automobile vending industries near to the manufacturing plant of the automobiles manufacturers. His research revealed that the location of vending plant as one of the strategic success factors of the General Motors's plant in Buick City, Flint, Michigan is the auto zone General Motors established and stressed their vendors to establish their manufacturing units in that auto zone for improve supply chain via the "Just-in-time" method and closure coordination between vendors and General Motors and effective control over vendors, as well as to diminish transportation cost as well. This research also stated that due to effective and efficient coordination between the management of original equipment manufacturers and their supplier, and in result best practices in procurement of parts and sub-assembly under improved "Just-in-time" method of supply chain in Japanese automobile manufacturer transplant from Japan to the United State. Sanjay L. Ahire (1996) conducted research for 449 sub-system suppliers in perspective to their quality management system, empowerment and customer focus, based on these three predictors he explained 26 per cent of variation in part quality, concluded that without the role and commitment of higher management production and delivery are not possible at par, hence top management leading role is the key predictors of product quality whereas the quality management, customer focus, and empowerment are the primary predictors of product quality. Elisabeth J. Umble, stated that quality originated from the Deming's teaching even Deming's believe about the quality transformed into the "Total Quality Management" (TQM), if that highly effective manufacturing system totally depended on the structure of the organization, if not inducing a reliability and adding such values in the process meant the structure of the organization is not on the quality-based foundation. She also concluded that Deming philosophy is totally based on continuous quality improvement in organizational business process and the theories of "reengineering" trend discovered from this philosophy. Her research also reveals that if obstacles causing hampering the workforce in coordination with management and vice-a-versa are removed it would lead workforce to become more superior performer, deliver maximum involvement with a team participative approach which results more and better

improvement in process. Khan A. Tariq (2005) stated that, the Shewhart Cycle (1950) renamed as Deming Cycle is widely applicable in automobile manufacturers and their vending industries, as it has considered an easy way of detecting and resolving problems because it simply composed of a cycle which composed of 'Plan, Do, Check and Act' stages which lead a success in improvement if followed in the same sequential order of the cycle stated, this cycle is the main predictor of KAIZEN also. Doner, Richard F., Noble, Gregory W., and Ravenhill, John, (2006) stated that if one of the factors like system, standards, procedures are ignored or missing than the desired quality levels in the supplier's sub-system would be seems difficult. They research on the liberalization in business and capitalization in automobile industries in Korea, China and Indonesia, and the cause-and-effect on how an indigenous development and production penetrated in their industrious culture of auto parts manufacturing. Automobile manufacturers provided technical, commercial management to their vendor in indigenous development and production of auto parts and sub-assemblies, their research reveals that without the support of government indigenous development also deemed to be difficult, they stated the system, standards, policies and rules always comes from top and missing of any one or all quality and indigenous manufacturing is difficult. Government policies impact on the adaptation of technological changes, creation in job opportunities, and diffusion of quality control standards in small and medium scale vending organization and the main vehicles assembly plant as well. Foreign investor capitalized their investment in Korean automobile manufacturers as joint venture as well as in its vending industries under encouragement of Korean government in 1990 to small scale auto industries objectively to strengthen their indigenous manufacturing and promotion of economy of scale. Nick Oliver, Rick Delbridge, Jim Lowe (1996), focused on the performance and pattern by which organizations are working and stated the there is no clear link between these factors and the measurement of organizational process capabilities in low performing auto part manufacturing units is still not at par as compared with process capabilities of their high performing auto parts manufacturing units. Their research is based on the detail survey on the performance and practices in vendors of automotive parts and sub-assemblies in eight countries with sample size of 71 automotive vendors, in result lean manufacturing principle determined difference of level in vendor's manufacturing performance across the globe. Liang ,Joy Chia Huh (2009), stated that if product development process (PDP) begins from customer inputs this meant that good quality practices are not ignored in the organization, apart from this beginning stage of customer input there are four other key stages after passing through these four stages like the Conceptual Designing; the Detail engineering design; Manufacturing Processes; and the Production and the last one is the Sales and distribution organization must meet its unique requirement with continuous quality improvement across its core functional areas of technical and commercial disciplines that ultimately yield common and higher customer benefits. The features of computer aided design (CAD), computer aided manufacturing (CAM), failure mode and effect analysis, and automations are also essential components of these five stages of integrated market driven product development processes. Sutton John at al (2004), visited nine Chinese and Indian auto parts vendors with their focus on gauging the degree of supply chain to measure the extent to which

automobile manufacturer preferred outsourcing of required auto parts rather than in-house development and production by establishing a separate sub-assembly line in parallel to their main assembly line of vehicles. The concluded a systematic differences in hierarchy of vendors from first tire vendors to second tire vendor in meeting the quality level when moved down the supply chain requirement. Joel E. Ross (0000) Quality cost categorized as; 1) Prevention cost, that include the activities such as quality planning, production reviews, training and engineering analysis which remove and prevent defects from occurring in the production process and the activities like Design Review, Zero Defects Zero Hour Program, Engineering Changes, Product Liability, Increased Overhead, Quality Audits, Supplier Periodic Evaluation, Supplier Training, Specification Review, are involved to maintain Prevention cost; 2) Appraisal costs are incurred to ensure that poor quality is not produced. Appraisal cost incurred to detect poor quality products after they occur but before shipment to customers. Inspection activity, Vendor Surveillance, Receiving Inspection, Product Acceptance, Process Control, Inspection labor, Quality Control Lab Testing, Equipment cost are the examples; 3) Internal Failure Cost incurred during the production process, the causes of internal failure cost are the machine downtime, poor quality of incoming materials, resorting, 100% inspection, in-process rejection rate increased, Over Inventory, Disposal cost, Re-inspection or second sampling; 4) External Failure cost incurred after the product is shipped, this cost includes warranty cost, hidden cost of customer dissatisfaction diminishing in market share. Cost of non doing things right the first time was 25 to 30 percent of revenues as estimated by Hewlett-Packard. Motorola has reduced the cost of poor quality by about 5% of total sales, or about \$480 million per year. Businesses meant higher quality as the higher cost. Juran examined the economics of quality and concluded that benefits outweighed costs. Feigenbaum introduced "Total quality control" and developed the principle that quality is everyone's job. Crosby (1979) introduced the now popular concept that "Quality is free"

3.1 CONCEPTUAL FRAMEWORK



3.2 HYPOTHESIS

Quality management has been addressed by global automakers and their associated suppliers in the developed countries as a key component, evident that, if quality management implemented in its real practical approach, it enable the organization in vertical and horizontal advancement. Further in the increasing demand in the better and improved inter-firm relationship building and inducing the culture of self-contained-quality the automaker's main focal points are the cost, quality, vendor development and the continuous quality improvement that leads these factor, that's why Original Equipment Manufacturers are mainly focus on the their quality management for getting competitive edge by snatching the local and international market share that would not possible with week quality management practices.

- H1** Quality Management Practices contribute to the increase export shares of the organization.
- H2** Quality Management Practices contributes to control over product and process specification through the Self Contained Quality.
- H3** Quality Management Practices contributes to improved supply chain through strong inter-firm relationship.
- H4** Quality Management Practices contributes to reduction in cost of control and cost of failure.

4.0 DATA ANALYSIS AND PRESENTATIONS

This small scale quantitative research based independent study is a determination of conceptual impact of quality management on the four factors affecting ultimately on the ultimate vendor's performance. The sample of 63 vendors out of 121 were selected for analysis through getting responses against the perception vide structured questionnaire. The descriptive summary of quantitative analysis is illustrated in the chart given below. The copy of SPSS data sheet also attached as Annex-C.

<i>Descriptive Summary of the Data</i>						
Q	Particulars	St. Disagree	Disagree	Neutral	Agree	St. Agree
1	Statistical Process Control	1.59 %	4.76 %	15.87 %	38.09 %	39.68 %
2	Statistical techniques control cost	1.59 %	3.17 %	17.46 %	38.09 %	39.68 %
4	Geographical distance incurred high cost	1.59 %	1.59 %	15.87 %	47.61 %	33.33 %
5	OEM's assistance & CI	1.59 %	3.17 %	23.80 %	50.79 %	20.63 %
6	OEM controls, process, price, R&D, quality	-	1.59 %	15.87 %	41.26 %	41.26 %
7	Annual KAIZEN Convention	1.59 %	3.17 %	19.04 %	53.96 %	22.22 %
8	Jigs & Fixtures Design & Development	1.59 %	1.59 %	15.87 %	53.96 %	26.98 %
9	Jigs & Fixtures - Application	6.34 %	15.87 %	20.63 %	38.09 %	19.04 %
10	Destructive and Non-Destructive Test	1.59 %	3.17 %	15.87 %	53.96 %	25.39 %
11	Engineer & workers in Pakistan	1.59 %	1.59 %	19.04 %	41.26 %	36.50 %
12	Higher OEM's Satisfaction on vendor's quality	1.59 %	3.17 %	17.46 %	57.14 %	20.63 %
13	Vendors meeting world class standards	-	1.59 %	12.69 %	41.26 %	44.44 %
14	OEM restriction on export	-	1.59 %	12.69 %	57.14 %	28.57 %
15	Indigenous quality is world class	-	3.17 %	15.87 %	52.38 %	28.57 %
16	Chinese low cost parts with poor quality	-	-	20.63 %	46.03 %	33.33 %
3	Application of Control Charts					

Stratification of vendors at Karachi



Stratification

Stratums	Frequency	Percent	Valid Percent	Cumulative Percent
Strata - 1	19	15.70	15.70	15.70
Strata - 2	29	23.96	23.96	39.66
Strata - 3	73	60.33	60.33	100.0
TOTAL	121	100.0	100.0	

Statistics of Respondents.

Designation	Frequency	Percent	Valid Percent	Cumulative Percent
Managers	28	44.44	44.44	44.44
Engineer	22	34.92	34.92	79.36
Executives	13	20.63	20.63	100.0
TOTAL	63	100.0	100.0	

A brief introduction of Respondents.

50	44.00 %	Managers
40	34.92 %	Engineers
30		Executives
20	20.63%	
10		
0		

5.0. FINDINGS AND INTERPRETATION

5.1 TESTING OF HYPOTHESIS

Hypothesis tested using SPSS, to determine what mathematical model supported to the perceptions asked to respondent.

H1: Quality Management Practices contribute to the increase export shares of the organization

In this hypothesis vendors capability determined in terms of OEMs satisfaction on vendors performance, and determined that if parts or sub-assemblies developed and produced in accordance with the acceptable standard requirement of the world leading automobile OEMs in Pakistan will also be accepted by their transplant across the globe (e.g., Transplant of Toyota Motor in Europe or USA)

One-Sample Test (H1)

	N	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Lead to Export	63	4.1048	.38497	.10476	2.160	.035

This table indicates the value for the one sample t-test, the degree of freedom and also shows the significance value. By using this significance value, statistical conclusion could be finished as to whether or not the population mean and the sample mean are equal. If the significance value is less than the encoded significance level, which is 95% confidence interval or .05 value of significance. If the designed mean value is greater than the investigation value, and the sig. value is greater than .05 its mean that there is no difference between sample mean value and the investigation value than accept the null hypothesis and conclude that the mean of the test value and sample are statistically equal. If the sig. value is less than .05 its mean that difference is exist between the sample mean value and the test value or investigation value, after getting sig. value the mean difference value has been checked whether it is positive difference or negative difference. If the dissimilarity is positive its mean sample value is greater than test value again hypotheses would be accepted.

According to the above table, the sig. value of Lead to export is significant but mean difference is positive which is 0.10476, this hypothesis can be accepted on the basis of mean difference.

H2: Quality Management Practices contributes to control over product and process specification through the Self Contained Quality.

In this hypothesis perception addressed that quality management impact on the efficient and effective process controls and induce a culture of self-contained-quality by applying statistical tools and techniques, poka yoke inspection system also play a vital role in maintaining quality in accordance to the international standards as the application of jigs, fixtures, go and no-go gages are widely being used in all scale of industry these tools including tools and technique of statistical applications are widely being implemented in all scale of industries within automotive sectors of Pakistan.

One-Sample Test (H2)

	N	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Effective and Efficient Control	63	3.9008	.50109	-.09921	-1.571	.121

According to the above table, the sig. value of Effective and Efficient control is insignificant, this hypothesis can be accepted on the basis of significant value.

H3: Quality Management Practices contributes to improved supply chain through strong inter-firm relationship.

This hypothesis include the perception that OEM are playing a vital role in transformation of technology, skill development, quality management standards takes place from OEMs to vendors that implementing an organization wide continuous quality improvement culture in vendor industries. This inter-firm relationship is a strong ignition point in sustainable improvement in quality of products.

One-Sample Test (H3)

	N	Mean	Std. Deviation	Mean Difference	T	Sig. (2-tailed)
Inter-Firm Relationship	63	4.0159	.50243	.01587	.251	.803

According to the above table, the sig. value of Inter-Firm Relationship is significant but mean difference is positive which is 0.1587, this hypothesis can be accepted on the basis of mean difference.

H4: Quality Management Practices contributes to reduction in cost of control and cost of failure.

This hypothesis perceived that quality management practices

are the strong enabler in reduction to cost of failure and cost of control through application of statistical technique, close interaction with OEMs, and through effective and efficient control over their production process.

One-Sample Test
(H4)

	N	Mean	Std. Deviation	Mean Difference	t	Sig. (2-tailed)
Cost Control	63	4.1230	.52146	.12302	1.872	.066

According to the above table, the sig. value of Cost Control is significant but mean difference is positive which is 0.12302, this hypothesis can be accepted on the basis of mean difference.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Prior this study a stratification sampling was planned to determine the level of quality management implementation in different scales, the small, medium and large scales organization, unfortunately study result concluded that quality management is being applied across the vendors industries in automotive sectors of Pakistan with same approach. This has further concluded that as the respondent supported and observations determined the perceptions evident into reality. The factors of cost control, inter-firm relationship, effective and efficient process control are the common key success factors which ultimately leads to organization for export as the quality, cost and other factors are recognized by the leading OEM transplanted in Pakistan. This has also concluded that vendors are still engaged in export to European and other developed market with current export of US\$ 128 Million (PAAPAM Directory 2012). Technological transformation from OEM to vendor resulted 70% deletion in Cars and 80 % to 96 % deletion in three two wheelers, three wheelers and tractor industries. Self-Contained-Quality, Inter-firm, and efficient process control are the core excellence of quality management throughout the world. Among from these factor Inter-firm is still the focal point of European auto maker to reduce the transportation cost by establishing vendor's setups in parallel to main assembly line at OEMs or even in their auto zone. The conclusion drew from literature review that self-contained-quality is highly dependent on strong inter-firm relations between the OEM and Vendors. Internationally technological changes, tight market competition OEMs are settings new standards through these core factors. Hence evident that quality management has a very strong and positive impact on the performance of automotive vendor industries. Control charts like X-Bar & R-Chart, np Chart, u-Chart, histogram, process capability and STD-ABC-MIL-105E, poka yoke are widely implemented in auto vendor industries of Pakistan which result an efficient process control that leads to export.

6.2 RECOMMENDATIONS.

1. Vendor Development Department in OEM should also focus on elimination of copy paste practices in inter-firm relationship in order to more improve quality management with transformation of technology and skill development.
2. Vendor should emphasize to focus on development of their 1st tire supplier and develop them at similar level as they have developed by OEMs.
3. OEMs and Vendors need to adapt new technological changes, and this should be their integral part of quality management, so that vendor can meet global challenges for more penetration in export shares.
4. Efficient and effective process control, with continuous quality improvement program, reduction in cost of failure and cost of control should be the focal point of top management, in order to more improvement accordance with the requirements of the auto buyers across the world.

7.0 AREA OF FURTHER STUDY

Research required in key areas such as supply chain, total quality management, six-sigma practices and applications of advance statistical techniques. In HEC repository no single research thesis on Pakistan's OEMs and in vending industries available. Literature review reveals that there is a need to research on "whether the quality management is the core excellence in attainment of economic resource in order to compete globally? Study also required to determine the opportunities of new OEMs, vendors, and the vertical & horizontal expansions in existing organization in automotive sector, what are the restriction and barriers in export, why rebuilt vehicles are being imported every year rather than to strengthen existing and new OEMs. What is the level of engineering and technological in context to international engineering and technological practices objectively to determine when Pakistan will be the 1st choice of the auto world?

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