



Quality Control: The Challenges of Globalization to Nigerian Manufacturing Firms

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ARTICLE INFO

Received: 04-01-2017
Accepted: 18-01-2018
Available online: 28-02-2017

Keywords:

Control; Inspection; Quality;
Work-In-Process,

JEL Classification: J15 ; H20.

ABSTRACT

This work looked at the quality control mechanism in organisation with the mission of getting high quality products/services during production across to the end user. The work looked into quality control concept with much emphasis on tolerance level and went further to show those identified challenges of quality control to Nigerian manufacturing firms. The problems of quality control as well as the internal and external elements affecting quality control. Finally, it was concluded that Nigerian manufacturing firms will find it difficult to cope with the current trend and the challenges of globalization due to the economic problem in the nation; worst still the present economic recession.

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DOI: <http://dx.doi.org/10.18533/job.v2i2.63>

ISSN 2380-4041(Print), ISSN 2380-405X(Online)

1. Introduction

A definition of quality was always conspicuously missing in almost all textbooks, probably; it was assumed that everyone knows what quality should be or what? Again, where it was given, the definition given were usually based on the perception of the individual providing the judgment or using the product or service. As a general rule, quality should be defined for each separate product or service in accordance with the end use of that product or service.

When a craftsperson creates a product, he or she obtains raw material and the required tools, checks them to be sure that they were satisfactory, and begins work. Much of the checking of the materials was done as the materials were used. At each step of the production process, the craftsperson makes sure that the work was good before proceeding to the next step. When the product was complete, it was carefully checked again to be sure that it was perfect and, if the product was to serve some function that it works properly.

The industrial revolution introduced machinery that accomplished production at much greater speed and at, much less cost than before, and it eventually led to a high degree of automation in production. Although, the automation helped to make goods more plentiful and to raise the standard of living in our society, there were problems associated with this mode of production. A major problem was how to control the quality of the goods produced in this manner. The mechanized production replaced the work of the craftsperson in many ways, but it failed to constantly inspect the product. The quality control function was aimed at correcting this problem.

Quality control in manufacturing firms will seek to ensure efficiency in terms of purchasing quality raw materials, the machine or conversion equipment and quality of labour or human effort because the quality of these factors mentioned above determine the quality of the end product (Orga, 2011). A craftsperson merges the inspection function with that of production. To place the inspection function in an automated production environment, it was necessary to look at the timing of and the motivation for the inspection done by the craftsperson. The craftsperson inspects raw materials, equipment, in-process goods, and finished products.

Raw materials inspection was done as the materials were received. The method of inspection and the criteria for acceptance (labeling the material as "good") must be specified by contract if the materials were produced by an outside supplier. The reason that materials inspection was specified by the contract with an outside supplier was clear. A company will pay for the material only if it meets the company's acceptance criteria.

However, the goal of quality control was not only to make judgments concerning the quality of the products/services but also to enable the producer to take the necessary steps to improve quality throughout the operation. Quality management accomplishes these goals by providing information concerning the causes of low quality in addition to identifying its presence.

The terms quality management, quality control, and quality assurance often are used interchangeably. Regardless of the term used within the business, this function is directly responsible for the continual evaluation of the effectiveness of the total quality system.

Quality control includes all steps that management can take to increase the quality of the areas directly under its control, including the quality of the product design, in-process inspections, training programs, quality circles, employee award programme and even, employee drug testing programmes. Quality assurance encourages higher quality production in areas outside of management control. The most obvious quality assurance function is the inspection of incoming goods and finished goods. Neither of these inspections, however, controls the quality of the operation directly. They just "assure" that accepted or shipped items are satisfactory, independent of the process. Other less obvious quality assurance functions include programs publicizing the names of the top quality suppliers, contractual penalties for delivering poor quality material, and inspection of the outgoing product. This inspection of the outgoing product can be considered to be within the direct control of management, but the usual view is that, once the product is complete, it is too late for management to control it. Thus, the assurance function is applied prior to delivery.

Quality, therefore, was described as follows:

- Quality is fitness for use.
- Quality is doing it right the first time and every time.
- Quality is the customer's perception.
- Quality provides a product or service at a price the customer can afford.
- You pay for what you get (quality is the most expensive product or service).
- Quality is excellence.
- Quality is value and reliability.
- Quality is conformance to specifications.
- Quality is meeting and/or exceeding customers' expectation.

Although, each of these views has merit, they have shortcomings as well. In any case, little is accomplished by arguing over precise quality definitions or slogans. The first key to managing for quality is being aware of the need to improve; the second is selecting improvement techniques with the best chance for success.

2. Quality control concept

Marire, et al (2014) emphasized that quality cannot be inspected into a product; it must be built into it. Just as reliability cannot also be built into a product; it must be designed into it. Therefore, it must be noted that reliability is a consequence and 'end product' of quality which is concerned with satisfaction during use and also, the extent to which the product satisfies the purpose. Quality control concept, therefore, relate with the management of the quality standard set by the government, customers and the competitors globally. It must be noted, however, that what is quality today might not necessarily be a good quality tomorrow. For instance, talking about automobile a lot of innovation is coming up day-in, day-out but the most important and key issue is that the firm should be able to attain the standard set for itself in terms of quality.

Again, most present-day goods are manufactured by mass production methods on machines which repetitively produce almost identical units. However, owing to uncontrollable variations in the quality of the processed

material and in the settings of the processing machines, no two units are exactly identical. A customer accepts this as the price to be paid for the economies of mass production, but usually specifies limits within which the dimensions of a unit must lie, for instance, engineers' 'tolerance'. The manufacturer, if he wishes to stay in business, must ensure that most of the units lie within these limits.

However, although, any units which do not fulfill the specifications will usually be scrapped and will, therefore, incur a loss to the producer, in general it is usually cheaper to design a production system which tolerates a proportion of 'defective' items to be produced, rather than to design one which produces one hundred percent 'good' units. Since the properties of successively produced units are subject to variability which can be expressed using the concepts of statistics, procedures for monitoring and controlling the variability of these properties have been developed under the term Statistical Quality Control.

These procedures can be roughly grouped under two headings.

- a. Process Control – which evaluates properties of the units in an 'on-going' process to ensure that they are keeping within the specified limits. This object is usually achieved by means of control charts, in which measures of the required property or properties of successive units are plotted in a form which reveals quickly the random fluctuations and trends present in the measure. If the measures display excessive fluctuations about, or trends away from, the required limits, corrective action can be taken before a larger number of 'rejects' have been produced. Clearly Process Control must be performed by the manufacturers, whereas:
- b. Acceptance Sampling is usually performed by customer. In this case, the customer evaluates a number of units by choosing an appropriately designed sample of the units in the lot (sampling) and determining the number of 'defects'. If this number exceeds a given value, the lot is rejected, otherwise it is accepted. The quality of product or service can only be defined by the customer (Deming, 2000)

Nevertheless, in controlling quality, there must be adequate inspection of raw materials, work-in-process, and finished products which provides the basic data for documentation and evaluation in the control process. Inspection is the observation and measurement of the conversion process outputs and inputs. Inspection can be done either visually or mechanically; its purpose is to see whether the physical characteristics of the product or service conform to specifications. Inspection is commonly divided into three areas: receiving inspection, work-in-process inspection, and finished goods inspections.

Receiving Inspection: Generally, output quality can be no better than the input quality. Inputs are often built up, over a succession of stages, into the final product. At the end of this progression, we sometimes find that defective inputs used in initial stages result in an unacceptable final product. This means costly repair, which could have been avoided. To do so, management often provides for inspection of inputs prior to their use. At receiving inspection, incoming shipments of raw materials, subcomponents from vendors, or other inputs are observed and evaluated against predetermined quality standards. These materials are often physically separated for work-in-process materials and are only released to operations after passing the initial inspection. It is best to eliminate receiving inspection, moving inspection to the vendor's facility, but only if a working relationship of trust can be established with the vendor.

Work-In-Process Inspection: The employee who produces an item should be responsible for inspecting it to ensure its quality. When someone other than this employee needs to inspect work, management can provide for work-in-progress inspection. The outputs of one or more stages of production are screened before they are used in subsequent operations. The intensity of inspection depends on the volume of output, the cost of inspecting, and the cost consequences (in subsequent stages) of not inspecting.

An important decision for the Operations Manager is how many inspection stations to have and where to locate them. A very simple heuristic can be used to help make this decision. Two key factors must be considered: the percent defective, that is, the percent of output expected to be defective at each stage of the conversion process and the cost of inspection. Ideally, you would want to inspect at locations where inspection costs are low and percent defective is high. This would give a small critical ratio – the ratio of cost to percent defective. We can use a simple three step procedure for selecting the locations of inspection stations

- i. Identify all stages of the conversion process that are potential locations for inspection stations. For each potential location estimate the inspection costs and gather historical percent defective data.
- ii. Compute the critical ratio for each potential inspection station.
- iii. Rank the inspection stations by critical ratio. The smallest critical ratio is the most desirable location; the highest critical ratio is the least desirable, and so forth. With limited resources, place inspection stations until funds are depleted.

Finished Goods Inspection: Various testing procedures can be used to determine whether the final product conforms to functional and appearance standards. If it does not, sources of discrepancy must be identified, and corrective measures must be initiated. Finished goods inspection should be a verification stage as the management focus should be prevention early in the operations process, not detection at this stage.

3. Challenges of quality control to Nigeria manufacturing firms

Quality control as an exercise being carried out by organisations poses a lot of challenges to manufacturers worldwide particularly the Nigerian manufacturing firms as a result of globalization. Some of the challenges will be discussed below with much relevance to Nigerian manufacturing firms and their relevant environment in trying to adapt to the globalization.

To start with, firms are made to invest more in research and development exercise all over the world and more importantly in Nigeria. With research, more better way of satisfying customers are explored, more better way of producing quality products are known and quality standard are set by organisations to be in line with the happenings or rather the current trend. The research exercise brings about a lot of development to the organisations in different ways and as well, the workers are developed too. This is because you cannot do anything tangible in an organisation without allowing the workers to be in line with the current trend in the organisation and worldwide.

Globally, organisations make a change in their organisations to reflect adequate quality control. While some make Quality Control Department a unit, some makes it a subunit under production and as well we now see Research and Development as a whole unit or rather, a full fledge Strategic Business Unit (SBU) like in Nigerian National Petroleum Corporation (NNPC). All these are the effects of challenges posed by the global quality control. Nigerian manufacturing firms are forced to move along the same line to be relevant in the industry.

Again, customer awareness has been harnessed due to the free flow of information on the globe. A lot of information is allowed into the air which almost everybody can access as and when necessary. This makes customers realize the current trends and happenings globally in seconds and keeping and coping with the awareness from the customers, manufacturing firms in Nigeria are kept on their 'toes' all day to ensure adequate quality control measures.

In the same vein, workers awareness are forcefully increasing in trying to cope with that of the customers awareness and more relevant in their field of specialisation which invariably brings about adequate personnel development on the job and technical know-how. This takes us to the issue of job satisfaction which will lead to better performance and vice versa. Where workers are satisfied with their job, there is a better performance which assists in reducing poor quality. But this makes manufacturing firms in Nigeria to realise the need for personnel development which they do not always want to show much interest in.

Improved productivity is another challenge of quality control. Quality control is a measure to maintain production standard and perhaps to improve on it. When control measures are put in place and they are adhere to strictly, it becomes a routine and a new way of thinking. Production and productivity are enhanced upon by the workers. Better products are seen all over the place; while the sub-standard is neglected. Quality control also allows firms to produce at the level they can produce best in terms of quality and not just the production capacity. A plant that can produce 500units of a particular product in an hour meeting the required standard may be able to produce as much as 2000 units of the same product per hour but the products not falling within the tolerance limit not to talk of the control limits. "Tolerance limits are set for every important quality. These tolerance limits are limits of variation beyond which the variations will not be accepted" Marire, et al (2014).

Another good challenge of quality control is the improved 'rivalry' and competitiveness among the manufacturing industries. Due to globalization, manufacturing firms cannot sit down in one place and fold their arms or go to sleep. They need to monitor the quality control measures put in place to be sure the process of manufacturing is in control. That is, it is still within the upper control limit and the lower control limit. Also, such control limits need constant review and analysis to be able to rub shoulder with other firms in the same industry both within and outside the country.

Quality control also poses the challenge of information management. To be abreast of happenings around the world; how things are done; what things are done and the standard; there is need in managing the information system of the firm. Phillip Kotler once said that to managing information is managing a business and vice versa. If we say quality is excellence, conformance to specification as well as meeting and/or exceeding customers' expectation; it, then, imply that firms must know the exact thing customer want in a product as such there is need

for information gathering which cannot be done only when such information is needed. Therefore, firms are forced to manage their business through constant managing of information that can assist in having a good quality in their product to meet the world expected standard.

4. Problems of quality control

In quality control in manufacturing firms, there used to be a lot of obstacles being faced in carrying out adequate and proper quality control.

One of the problems is the ability to set a reachable standard in terms of quality. Before control can be effected standard must be set as control is said to be the act of measuring performance against standard set. This means that standard must first be set before control measure can be put in place. But most firms have problem in setting the quality standard due to many reasons on the part of the management. Then if firms find it difficult to set quality standard, it is as good as not having quality control measure in place for the firm.

Also, the dynamism of the manufacturing system these days make it difficult for firms to cope with the current trend. While many manufacturing firms are still struggling to catch up with what is in vogue, a new technology would have been introduced as such they find it difficult catching up with the current trend. This explains why many firms choose to remain very conservative in nature. Changes also take time and money to effect in organisations, especially, manufacturing firms.

Tools to be used for adequate quality control always pose a lot of problems to our manufacturing firm. The tools consist of statistical and non-statistical techniques of controlling quality in a firm. Statistical tools like the control charts – mean and range control charts; and non-statistical tool like inspection. Some of the advantages of control charts include the provision of visual aids, easy preparation, early warning or signal of trouble and variations conformity. But statistical quality control possess certain disadvantages like inaccessibility of poor quality products, rejection of an occasional good lot and acceptance of very many bad lots as a result of items included in the sample. While many firms can afford to use both statistical and non-statistical tools together; some can only use inspection. Even where they are used the proper application always poses a lot of problem to our manufacturing firms in Nigeria.

The cost of quality control might be too much for some firms from their own point of view. They may be looking at the little resources available to the organisation and refuse to dispense or even allocate some for controlling the firm's product quality. But like it is said that if you think education is expensive try ignorance likewise if you think quality control is expensive try ignorance and see the outcome of that on your product and consequently, on the customers' acceptance.

Some other firms may be willing to carry out proper and adequate quality control but may lack the resources mainly human resources. This may be due to inability of such organisation to have capable personnel to take full charge of controlling the firm product quality effectively while certain firm policy does not encourage the empowerment of employees to make decisions. For instance, one of the authors once visit a soft drink manufacturing firm in Aba, Abia State, Nigeria where the firm production plant cannot start-off for production unless and if the branch general manager is present and even, the product quality is only and single-handedly certified good or bad by him despite the fact that there is a department in charge of quality control manned by qualified personnel.

Other likely problems of quality control include individual biasness as to what quality is to an individual, time constraint as to implementation of change with the modern trend and finally, the application and sustenance of the quality maintenance technology called Total Quality Management (TQM).

5. External and internal elements affecting quality

Systems viewpoint helps us understand the key elements, both external and internal, affecting quality. The organisation as system interacts externally with customers and vendors – two key elements that specify and affect quality at the boundaries of the firm. Customers' desires should be the basis for quality objectives. Often in service-oriented companies, customers also participate in generating the service – setting quality standards and making sure they are met. Examples include joint participation at self-service gasoline stations, cafeterias, and departmental/supermarket stores. Customers, to a great extent, serve themselves – and quality can vary widely from individual to individual. It becomes a challenge to design service systems to meet a particular quality level in such a shared labour situation. "Quality of any company's product or service determines its position in the

market. This is because customers desire to get the best value for their money. The quality of product or service can only be defined by the customer" (Deming, 2000).

As the second key element, vendors are especially important to organisations that purchase a high percentage of their products. Progressive firms are moving toward vendor certification and away from incoming inspection. In essence, certification makes the vendor a part of the company team.

Internally, an organisation's managers, employees, materials facilities, processes and equipment all affect quality. Dr. Joseph Juran and Dr. W. Edwards Deming (1975; 1981) who are specialists on Japanese quality, suggest that as much as 85 percent of the quality problems are management problems. Their view is that managers, rather than employees, have the authority and tools to correct most quality problems. Employees do have certain opportunities to affect quality, however, because some variations in quality are individually determined.

In a production environment, materials vary; high quality materials are easier to work with than low quality materials, and they often result in a labour savings. The key factor in production is often the degree of variation – there should be piece-to-piece consistency within a material lot and in subsequent lots. This is true for material used (inputs) as well as for products and services produced (output).

6. Conclusion

After critical study of the challenges posed to manufacturing firms in Nigeria as a result of globalization in terms of quality control, it is advisable for firms to inculcate quality control into the corporate culture of their firms by involving all employees of the organisation and setting the tolerance limit together with the employees. A clue must be made from a Japanese car manufacturing company which made their workers to sing and imbibe a creed which states thus:

"It is through the combined efforts and co-operation of each member of our organisation, that progress and development can be realized. Each of us, therefore, must keep this idea constantly in mind, as we honestly and selflessly devote ourselves to the continuous improvement of our company".

This is what is referred to as motivational workers' creed which was one of the ways of applying the law of 'Predominant Mental Impression'. This could be a way of life for the organisation and its workers. The question, then, arise: how do you introduce a new way of life to an organisation and its workers? It is through the introduction, application and sustenance of a new paradigm called Total Quality Management (TQM). In Total Quality Management, quality enhancement is emphasized, boundaries between the organisation and its environment and change, continuous improvement, and learning are encouraged (Ahiauzu, 1999).

With proper installation and sustenance of the Total Quality Management (TQM) quality will be a way of the workers life as such controlling firm product quality will not be proper. Also, there should be adequate and proper management of information by the firm to be in line with the current trend.

Again, apart from the quality control unit or department, quality circle must be put in place as at when necessary. Quality Circle is an ad-hoc committee set up to tackle an identified quality problem and comprises of people from different educational background and department.

Assistance, or rather, involvement of most notable customers in quality control and importantly, setting of tolerance limit through feedback and/or interactive session with the customers should be inculcated into the system based on the proposition of Deming (2000) that "the quality of product or service can only be defined by the customers. The issue of Research and Development must be a continuous exercise with recruitment of experts in the field as well as adequate budgeting for the department for continuous innovation.

Finally, we wish to submit that it will be very difficult for Nigerian manufacturing firms to cope with the current trend and the challenges of globalization due to our economic problems. Though, Nigeria as a nation is endowed but something, somewhere makes us no to reap or enjoy the endowments.

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