

Goal of Modern Industries: “Zero Defects, Zero Effect”

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Abstract- The requirement of global market is to produce highest grade quality products corresponding to world class standards. This can be achieved by providing services which are ecologically superior and economically viable. The efforts must be made to enhance the efficiency, minimizing waste and optimum use of resources. This paper presents an approach for the industries to produce zero defect products i.e. products with “**zero non-conformance/zero non-compliance and zero waste**”. It is also essential that during production industries should ensure that they cause zero effect to the environment i.e. “**zero air pollution/liquid discharge/solid waste and zero wastage of natural resources.**”

Keywords- Zero defect, Zero effect, Six sigma, DMADV, DMAIC, Total quality management, Benchmarking, sustainable environment.

I. INTRODUCTION

The objective of modern industry “Zero Defect, Zero Effect” indicates towards the competitiveness, from the perspective of an individual or an industry. The roles of business strategies, industrial development policies and individual initiatives in maximizing productivity, calls for quality improvement & environmental protection. Productivity is defined as an indicator of a nation potential for growing economically in short and medium run. Productivity is a culture of bringing and accepting about continuous improvements including the environmental concern.

Presently major countries of the world are facing a big challenge towards environmental protection. Due to neck to neck industrial competition in this century, no doubt unimaginable technological advancements have taken place which side by side has put an adverse impact towards the degradation of the environment. It is true that any kind of development can be successful only and only if it produces a zero effect on the environment and the surroundings.

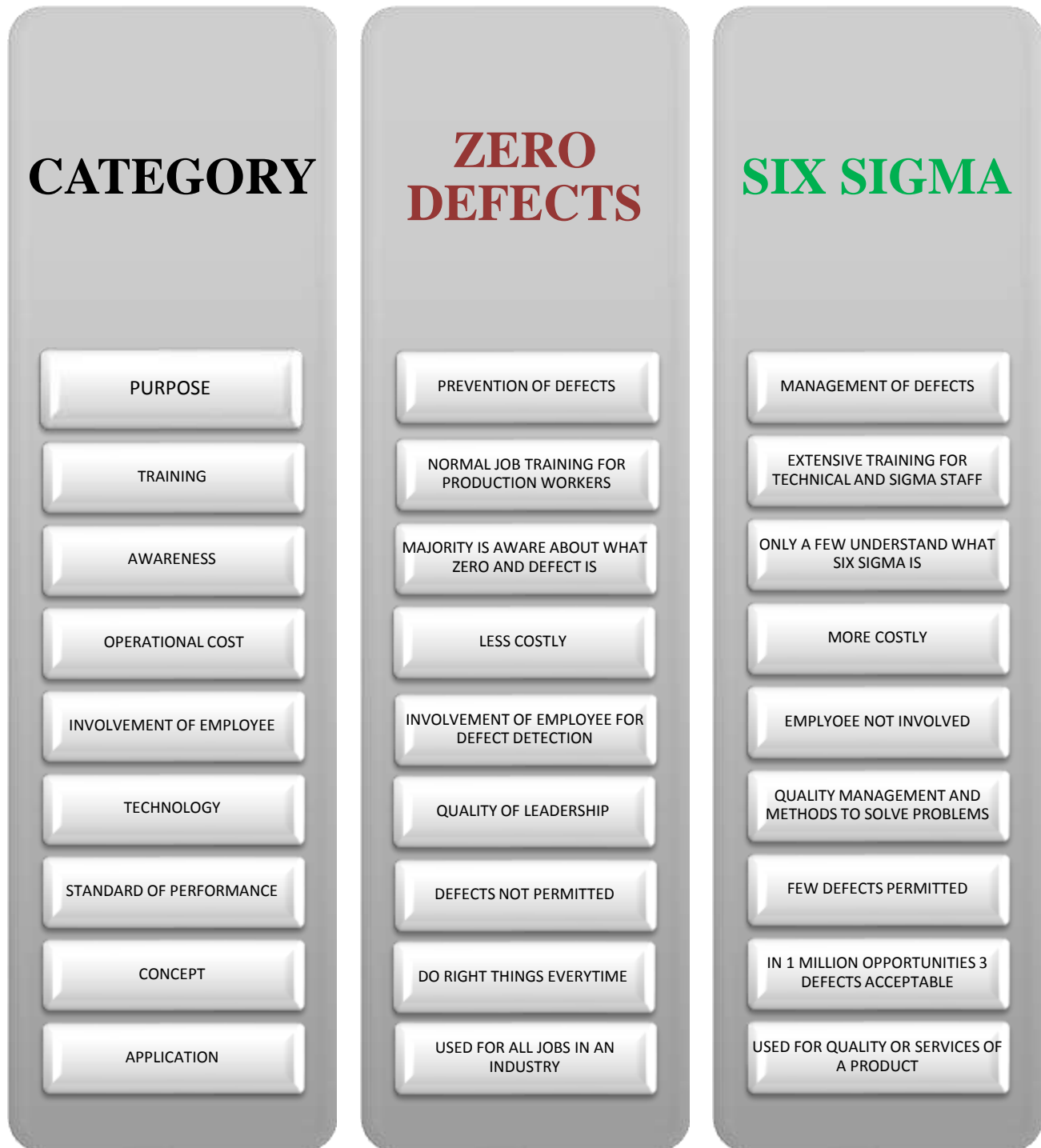
II. MODERN INDUSTRY APPROACH FOR ZERO DEFECT

Due to economical changes the world has brought about complications and increasing day to day level of competition in each and every sector of industry. As a whole productivity is one of the most important criteria in competitive market of each sector, nation or an industry. Quality output is a state of being able to perform in this competitive world. It is related with the ability to produce defect free and reliable products. It is the degree to which a modern industry can produce goods and services with zero defects, which meet the test of International Markets i.e. it does not come back (get rejected) from the world market

In the early 1960s, the idea of zero defects was discovered by Phil Crosby and was implemented at the Martin Company in Orlando, Florida. The various quality programs such as Total Quality Management (TQM), statistical process control (SPC) and ISO 9001 has taken up all the oxygen, and presently the zero-defect approach is followed by some industries.

In the late 1980s, Six Sigma approach entered the industry. It was a part of the capability study used in SPC. It has proved as a boon for the industries and is very popular today. It was developed by Motorola.

The minute differences between zero defects and six sigma are illustrated below:



III. QUALITY TOOLS FOR ZERO DEFECT

- Total quality management(TQM)
- Quality specifications and costs
- TQM Tools: external benchmarking
- ISO 9000
- Service quality measurement(SQM)
- Six sigma quality

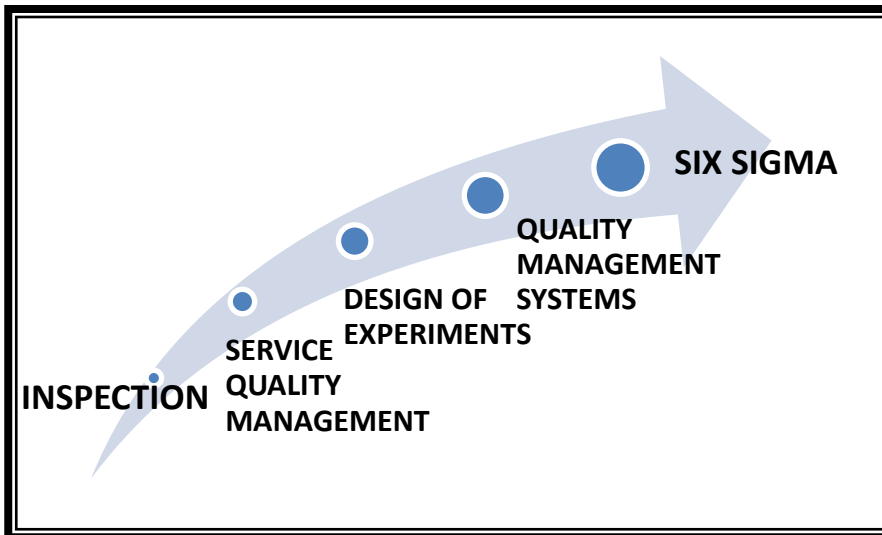


Fig. (1) Evolution of six sigma

3.1. TOTAL QUALITY MANAGEMENT

Organizations approach on management is mainly centered on the Quality, which is based on the active participation and membership of all of its member's. This aims at success in long term, through the satisfaction of customer, and profits and benefits to every member of the organization and to the society.

TQM mainly involves a cultural change which is based on continuous improvement.

3.1.1. ELEMENTS OF TQM

- Commitment of top management
- Involvement of the customer
- Process of design production for quality
- Process of control production for quality
- Developing partnerships with the supplier.
- Customer service, distribution
- Teams building of employees that are empowered.
- Continuous improvement
- Benchmarking.

3.2. EXTERNAL BENCHMARKING

- We can compare ourselves with a reference point called benchmarking.
- Constantly inculcating the best and thus bringing about a change.
- This benchmarking is used to produce a performer of world class.
- Identifying the core competency and improve on it - IT, miniaturization

3.2.1. STEPS

- Determine this benchmarking object
- Then select the partner
- Then compare to dig up gaps
- Then determine the action plans and the objectives of the process.

- Implement and review

3.3. SIX SIGMA QUALITY

Six sigma is basically a business process improvement approach which focuses on attaining the final quality level or defect level that is in parts per million, which is a pretty good level of quality. Six Sigma tries to eliminate the causes of defects and any errors that might be there in manufacturing service processes. It focuses on the output and those particular outputs that are critical customers, and tries to look for a clear financial return for the organization. Therefore the main objective of six sigma is to reach a defect level that is only in parts per million.

The origination of the term Six Sigma came from the terminology that is related with the [manufacturing](#), particularly terms related with the statistical modeling of industrial manufacturing [processes](#). The maturity in an industrial manufacturing process is described by the rating of sigma which indicates the percentage of zero defect products that it creates and its yield.

Also the term "six sigma processes" comes from the notion, that if any of the one has a deviation of six standards within the mean process and the nearby limit of specification, no items will fail to meet specifications. This process is mainly based on the method of calculation which is employed in capability study process.

Features that make Six Sigma differ from other quality improvement techniques include:

- A strong focus on achieving the measurable and determinable economic returns from any kind of the Six Sigma project.
- An additional prominence on strong and determined management support and leadership.
- A clear assurance to making recommendation on the basis of provable statistical methods and data, rather than guesswork and the assumptions.

Six Sigma approach follows the two project methodologies

- DMAIC aims to improve the prevailing business processes. This is articulated as "duh-may-icky".
- DMADV aims at developing new process designs and new product. This is articulated as "duh-mad-vie".

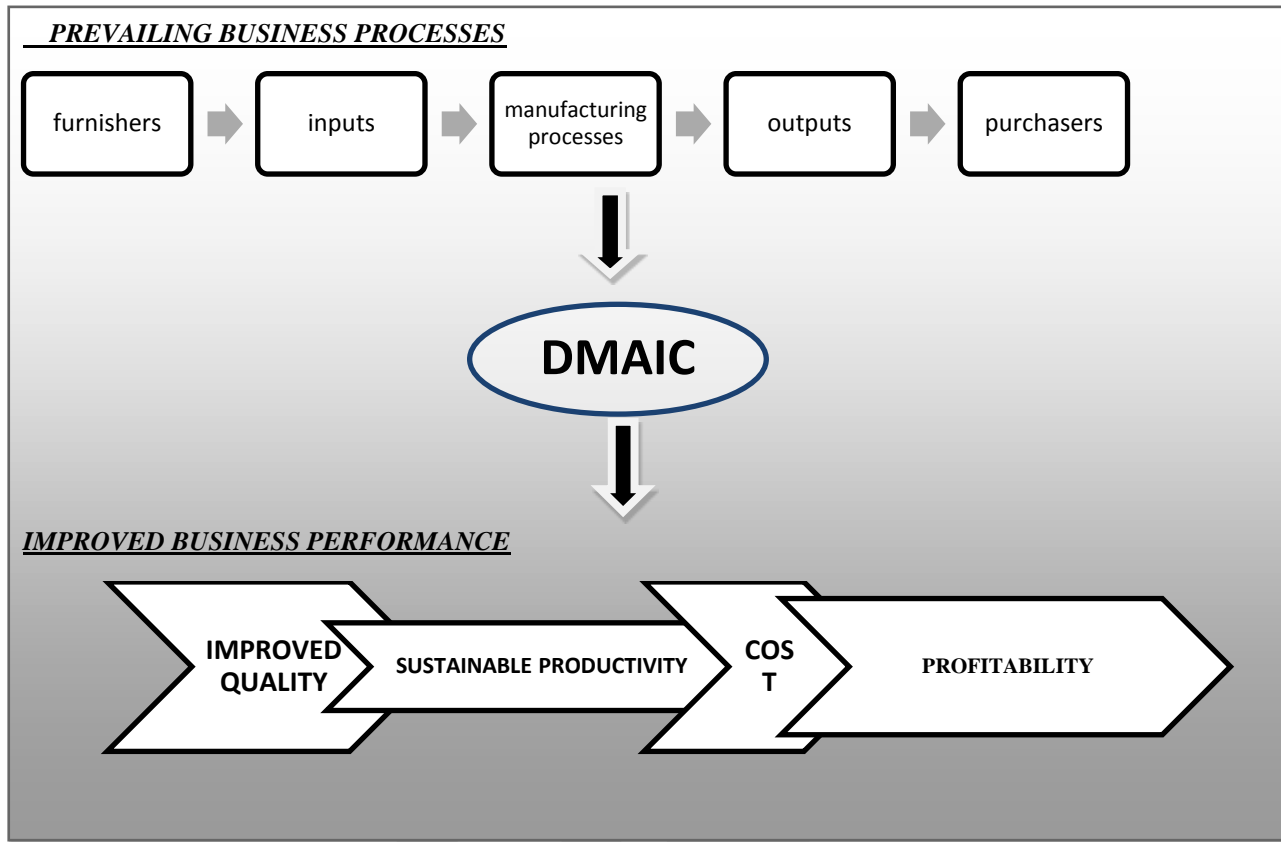


Fig. (2) DMAIC approach



fig. (3) DMADV approach

IV. SIX SIGMA IMPROVEMENT MODEL



V. MODERN INDUSTRY APPROACH FOR ZERO EFFECT

Developing countries have less efficient manufacturing practices than that of developed countries. It means the developing countries waste their income and resources by consuming more water, energy, materials than required as well as providing damage to the environment. But due to advancement in the manufacturing processes, there are ample of opportunities to save money, resources and in turn less harm to the environment.

As we know that, in the 21st century the technology has grown so much rapidly, a lot of industries have been developed and science has advanced a lot, due to which the manufacturing has come into existence. Because of the industrial revolution, the Homo sapiens have advanced a lot. Previously, the number of industries was very less, due to which the amount of environmental pollution and degradation caused by their manufactured components was also very less. But now, as the number of industries are growing and becoming full scale industries, the level of harmful and detrimental impact that their manufactured components are causing to the environment is increasing at a alarming rate.

Most of the pollution on the planet earth is mainly due to this increasing number of manufacturing industries. Most of the countries facing rapid and sudden growth of such number of industries are finding it to be a very critical problem that has to be brought under control immediately. The main issues concerning with the environmental impact of components is the use of volatile organic compounds, heavy metals and non-renewable oils that put an adverse impact on the surroundings. This problem can only be controlled only and only if the manufacturing industries produce such products which have a zero effect on the surroundings that is by bringing zero effect approach into practice.

An industry is a gathering of companies which manufacture a related set of goods and services that are finally in the hand of consumers. A number of industries, which manufacture a certain essential commodity or product, work together in collaboration with one another. These industries are further divided into three groups:

- **Primary industries** - These industries gather, collect, and harvest resources.

- **Secondary industries-** these industries collect raw materials, convert them into useful products.
- **Tertiary industries-** these industries are those which produce services for advertising or for individuals.

All the three groups differ in the level of pollution produced by their manufactured products.

Some of the industries have developed some new technologies which do not produce any harmful impact on the environment, whereas some of the factories still manufacture such products or components which have a detrimental impact on the surroundings and the nearby environment.

The secondary industry is the one which produces the highest amount of pollution, which degrades the environment the, most.

The objectives of industries must be

- To evaluate the efficiency and efficacy of resource utilization (i.e., people, machines and materials).
- To identify the areas of risk, environmental liabilities, weakness in management systems and problems in complying with regulatory requirements.
- To ensure the control on waste/pollutant generation from the products produced by them.

There must be a verification process, whereby the facilities must establish the extent to which it is complying with environmental regulations, rules, limits etc. Operational risk concentrates on the potential frequency and consequences of environmentally damaging activities in the raw material and product storage/handling and manufacturing process.

Waste audits must be intended to identify the possibilities for improvement. The recommendations contained in waste audits must not be based on objective comparisons between expectation and results, but instead should be based on technical and economic evaluation of various waste minimization alternatives.

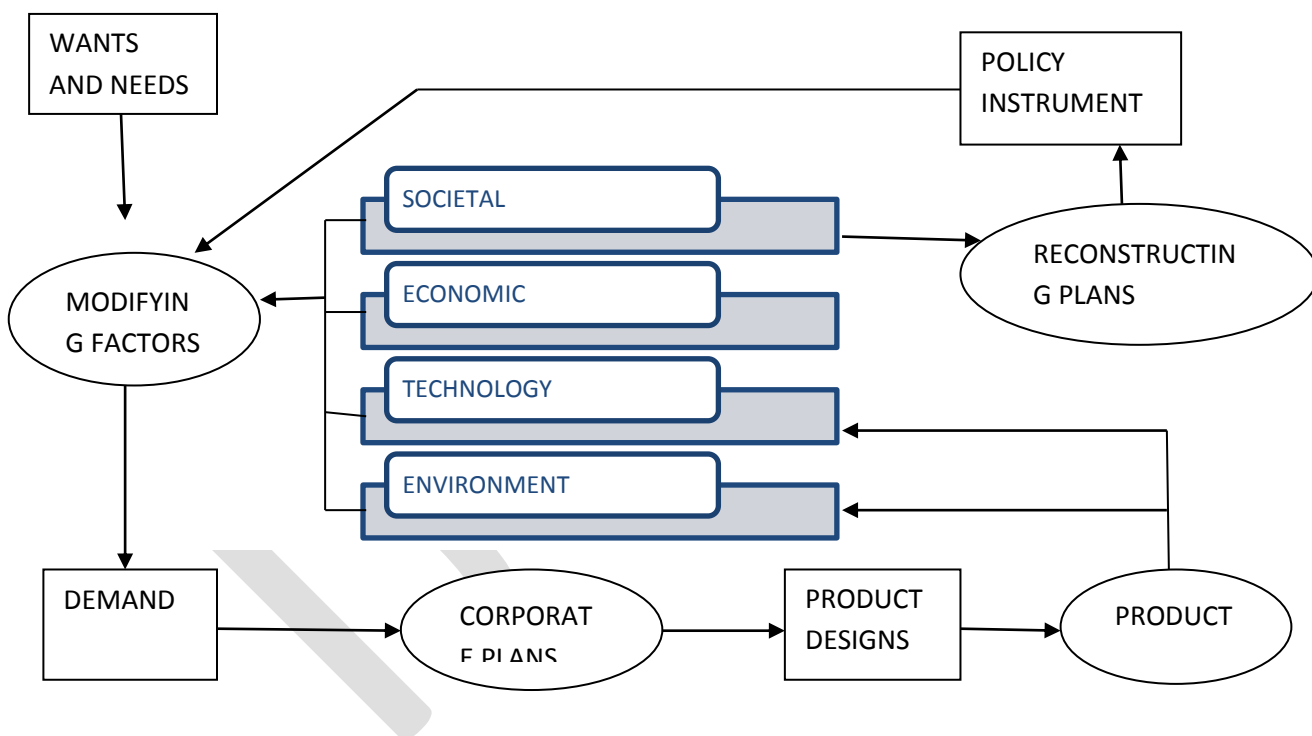


Fig. (4) Interactions that take place between Industry, Society, and the Environment

VI. CONCLUSION

It must be clear that the entrepreneurs should never compromise mainly on two points i.e. **first is the Zero defect and, second, Zero effect.** It is suggested that the products should be manufactured in such a way that they bear zero defects and if exported, the goods

should not get rejected in the international markets. These goods produced by manufacturing industries should also have zero effect that they should not produce any sort of detrimental or negative impact on the environment. Considerations towards environment should be taken at every stage of the manufacturing life cycle so as to manage and assess the possible potential risks. The inputs to and outputs from each stage of the manufacturing life cycle should be analyzed to assess their impact on the environment and surroundings.

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