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Strategies for Enhancing Productivity and Quality in Industries

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Abstract: ***Productivity refers to the physical relationship between the quantity produced (output) and the quantity of resources used in the course of production (input).Productivity is the ratio of output/input. Here output means No. of items produced or services rendered. Input consists of various resources viz men, machine, material and money. Productivity measures the efficiency of the production system. The efficiency with which resources are utilized is called productive efficiency. Higher productivity means producing more from a given amount of inputs or producing a given amount with lesser inputs Enhancing productivity in manufacturing industries is very essential in the present scenario. The present business scenario has undergone a lot of change. It is not the same as that existed before. Product life cycle has changed from years to months and variety has become the need of the hour. In fact the pace of change has accelerated. The competition has got intensified. Speed has become the essence of business. Today it is survival of the fittest. In addition to this customer satisfaction has gained prominence and undoubtedly it can be said that the customer has become the king of the market. Hence in today's competitive manufacturing environment it is essential to get the most out of our existing assets. As it has been said that a nation, a state or an industry advances by using less to make more. In other words it is not important for industries to just increase production but it is even more important to maintain and enhance productivity.. The objective of this paper is to suggest suitable strategies for enhancing productivity in manufacturing industries. In order to enhance productivity in industries the first step is to measure overall productivity. Then the total productivity should be analyzed in terms of each input factor .To achieve this the cause and effect diagram of productivity shown in this paper can be used to pin point certain areas or factors which can be improved upon to enhance productivity. In other words by first analyzing the partial productivity indicators viz productivity of men, productivity of materials, productivity of machines and methods and then by combining all of them the overall productivity of a manufacturing industry can be increased. The other important areas which can be concentrated for improving productivity are rejection level, implementation of quality management systems, total cycle time, creativity and innovation, motivation of employees etc. Quality of a process has a direct impact on the productivity. Quality results in fewer rejections hence, lesser no of reworks and better productivity. Better quality standards save time and money which are very crucial to the efficiency of any process, be it manufacturing or service. Product life cycle doesn't end after its purchase. When a product or a service is not as expected or as promised to the customer, it leads to customer churn. Today we live in a world where customer acquisition costs are high thanks to intense competition in every industry. In such a world retaining existing customers has become one of the main focus points of any business. This has led to companies pouring in huge chunk of money into customer service operations, which demand high level of productivity and quality, as it is a way in which the company interacts directly with the customer. Quality of such operations is crucial in meeting customer expectations. In this paper we also discussed a quality tool that can be implemented in any industry, be it manufacturing, IT, consulting etc. Critical TO Quality (CTQ) Drill Down Tree helps individuals or companies identify measurable parameters that can improve the quality of operations required to enhance a product or a service.***

Keywords: Productivity, quality, output, input, CTQ.

1. Introduction

Productivity refers to the physical relationship between the quantity produced (output) and the quantity of resources used in the course of production (input).Productivity is the ratio of output/input. Here output means No. of items produced or services rendered. Input consists of various resources viz men, machine, material and money. Productivity measures the efficiency of the production system. The efficiency with which resources are utilized is called productive efficiency. Higher productivity means producing more from a given amount of inputs or producing a given amount with lesser inputs Enhancing productivity in manufacturing industries is very essential in the present scenario.

The present business scenario has undergone a lot of change. It is not the same as that existed before. Product life cycle has changed from years to months and variety has become the need of the hour. In fact the pace of change has accelerated. The competition has got intensified. Speed has become the essence of business. Today it is survival of the fittest. In addition to this customer satisfaction has gained prominence undoubtedly it can be said that the customer has become the king of the market. Hence in today's competitive manufacturing environment it is essential to get the most of your existing assets. As it has been said that a nation, a state or an industry advances by using less to make more. In other words it is not important for industries to just increase production but it is even more important to maintain and enhance productivity. The objective of this paper is to suggest suitable strategies for enhancing productivity in manufacturing industries. In order to enhance productivity in industries the first step is to measure overall productivity. Then the total productivity should be analyzed in terms of each input factor .To achieve this the cause and effect diagram of productivity shown in this paper can be used to pin point certain areas or factors which can be improved upon to enhance productivity. In other words by first analyzing the partial productivity indicators viz productivity of men, productivity of materials, productivity of machines

and methods and then by combining all of them the overall productivity of a manufacturing industry can be increased. The other important areas which can be concentrated for improving productivity are rejection level, implementation of quality management systems, total cycle time, creativity and innovation, motivation of employees etc. control

Quality of a process has a direct impact on the productivity. Quality results in fewer rejections hence, lesser no of reworks and better productivity. Better quality standards save time and money which are very crucial to the efficiency of any process, be it manufacturing or service. Product life cycle doesn't end after its purchase. When a product or a service is not as expected or as promised to the customer, it leads to customer churn. Today we live in a world where customer acquisition costs are high thanks to intense competition in every industry. In such a what is a way in which the company interacts directly with the customer. Quality of such operations is crucial in meeting customer expectations. In this paper we also discussed a quality tool that can be implemented in any industry, be it manufacturing, IT, consulting etc. Critical TO Quality (CTQ) Drill Down Tree helps individuals or companies identify measurable parameters that can improve the quality of operations required to enhance a product or a service. This paper also discusses a quality tool that can be implemented in any industry, be it manufacturing, IT, consulting etc. Critical TO Quality (CTQ) Drill Down Tree helps individuals or companies identify measurable parameters that can improve the quality of operations required to enhance a product or a service.

1.2 Definition and Importance of Productivity

Productivity is a term analogous to than of efficiency of a machine. As one would like to have a machine which is very efficient so also an organization or an industry. Productivity is interpreted differently by different people. Some say that productivity means increasing efficiency in production. While others say productivity means bringing about continuous improvement in whatever is being done. Productivity also means an attitude of mind to some i.e., an attitude of welcoming change for better. Some others argue that it simply means eliminating wastages in all forms. Productivity can also be viewed as a function of providing more and more of everything for more and more of people with less and less consumption of real resources. Another way of looking at productivity is to view it as a combination of efficiency and effectiveness. If efficiency is treated as doing things right and effectiveness as doing the right thing. Then productivity can be treated as doing the right thing right. Whatever may be the type of industry, productivity can be defined as the ratio between output and input i.e.

$$\textbf{Productivity} = \frac{\textbf{OUTPUT}}{\textbf{INPUT}}$$

Here output means No. of items produced or services rendered. Input consists of various resources vizmen, machine, material and money. This ratio can also be used for measuring productivity.Figure1 shows Input - Output Model of Industry.

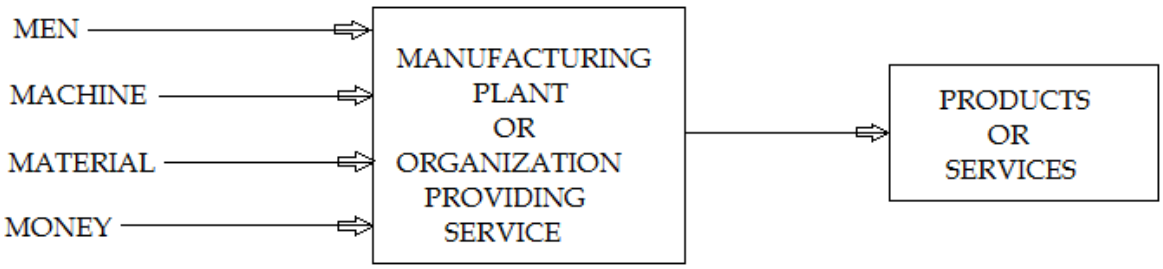

Figure 1: Input - Output Model of Industry

1.3 Misconceptions of Productivity

There are some myths about productivity. If production is increased productivity increases. This is not true. In fact productivity can decreases in some cases. Consider a manufacturing company whose output in terms of production value is Rs.10,00,000 in the first year and it is increased to 15,00,000 in the 2nd year. If the manpower used in the 1st year was 10 and it was increased to 20 in the 2nd year. Then if productivity is calculated for the 1st year it comes to 1,00,000/10 is Rs.10,000 and for the 2nd year it comes 1,50,000/20 = Rs.7500. So it can be seen that the productivity has in fact reduced in the 2nd year. Another common myth about productivity is that productivity and quality are trade-offs. This is not true because quality is an integral part of productivity.

1.4 Factors affecting productivity in Manufacturing Industry:

a) Design defects:
   - Lack of standardization
   - Wrong specification
   - Over design

b) Process defects:
   - Wrong process and equipment,
   - Wrong methods,
   - Low Process capability,
   - Improper Layout

c) Management defects :
   - Planning
   - Organising
   - Directing
   - Controlling

d) Employee Defects:
   - Discipline

- Attitude
- Application
- Participation

1.5 Advantages of increasing productivity

1) Management
   - Increase in profits
   - Clearing loans
   - Standing better debts in the market
2) For Employees:
   - Better working conditions,
   - Higher wages,
   - Higher standard of living
   - Job security and satisfaction
3) For Customer:
   - Reduced price of the product.

2. Methodology for Measuring and Enhancing Productivity

In order to enhance productivity in industries the first step is to measure overall productivity. Then the total productivity should be analysed in terms of each input factor viz Men, Machine, Material and Method. The cause and affect diagram of productivity shown in Fig.2 can be used to pin point certain areas or factors which can be improved upon to enhance productivity.

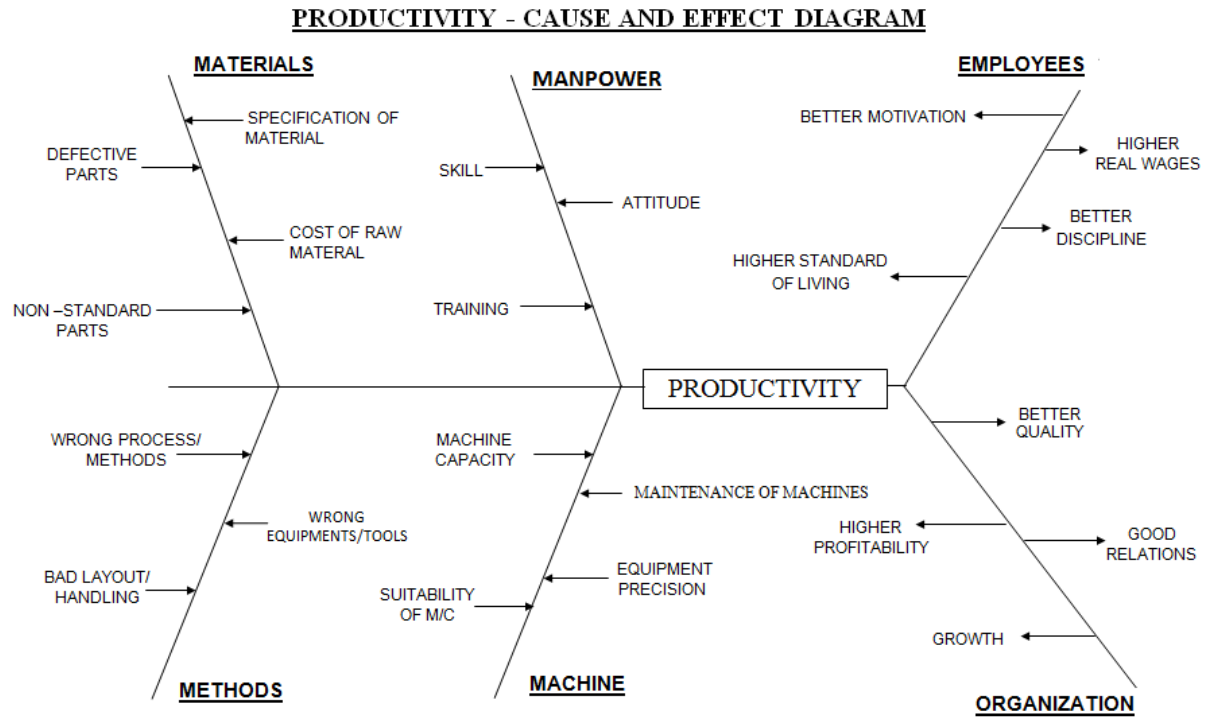

Figure 2: Cause and Effect Diagram of Productivity

In other words evaluation and analysis of partial productivity indicators must be done. These partial productivity indicators are Productivity of Men, Productivity of material, Productivity of Machine etc. These can be combined to evaluate the total productivity of an industry. Productivity improvement should become a continuous practice in industry. It follows a cycle .The various stages involved in improvement of productivity are shown in Fig.3.

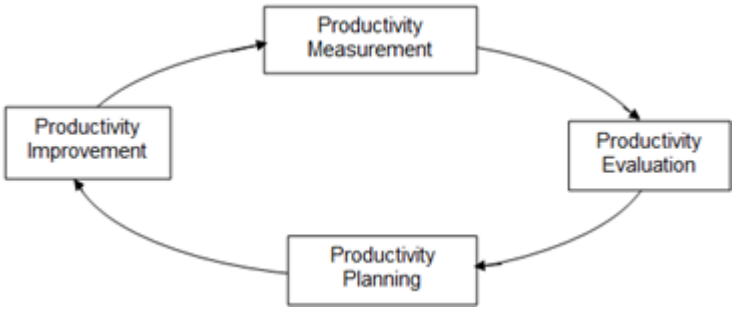

Figure 3: The productivity cycle productivity measurement, evaluation, planning and improvement when form a continuous process, abbreviated MEPI (Sumanth, 1979)

2.1 Partial Productivity Indicators:

The total productivity when analyzed in terms of each input factor leads to partial productivity indicators. These partial productivity indicators are given below:

1) Productivity of Men: If a worker has been producing 60 metallic containers as hour and improved method of work enables him to produce 80 metallic containers an hour, the productivity of the worker has increased by 33.3 %. Productivity of men can also the increased by motivating the workers, redesigning the jobs to make them more interesting and challenging. Labour productivity =output/no of workers or production in standard hours/actual man hours
2) Productivity of material:- If a skilled worker is able to cut 22 blanks from a strip of sheet from which an unskilled worker can only cut 20. Then it can be said that in the hands of the skilled worker the strip of sheet was used with 10% greater productivity.

Material productivity= material= material cost/no of units produced

Productivity of Machine: If a machine tool has been producing 1000 pieces per day and through the use of improved cutting tools its output in the same time is increased to 1200 pieces, the productivity of that machine has been increased by 20%.

Similarly by changing the method of work or process leading to reduced cycle time the productivity can be increased.

These simple examples help us to show that the factors affecting productivity in industry are many and often interrelated.

Many people have been misled into thinking of productivity exclusively as the productivity of labour, mainly because labour productivity usually forms the basis of statistics on the subject. It also becomes evident how, in a community state or a country enhancing productivity or the best possible yield from available resources does not mean exploitation of a worker but effective utilization of resources stimulate higher standard of living and an improved quality of life.

3. Strategies for Enhancing Productivity

Analyzing 4M's

The best way to enhance productivity of an enterprise is to analyze in terms of 4M's i.e. Men, Machine, Material and Methods (the input factors).In other words by first analyzing the partial productivity indicators viz productivity of men, productivity of materials, productivity of machines and methods and then combining all of them the overall productivity of a manufacturing industry can be increased.

The other area to be focused is the area of quality. The rejection level in even well run organizations of our country is high and is still measured in percentages whereas Japanese organizations claim a rejection of a few parts per million. When one analyses the causes for this high level of rejection, it if found to be in the manufacturing process.

In the manufacturing industries the quality systems should be properly installed. In many organizations the 'ISO 9000 fever' ends with just getting the certifications by the certifying authority. After this very few organizations initiate efforts to make conformance a way of life. Getting everyone to conform to the quality systems is a mark of increased productivity.

Another important area which offers enormous scope for increasing productivity is the reduction of cycle time. If our organizations were to compete in the global markets, their response time should match the world standards. Cycle time reduction is possible only if non-value adding activities are systematically identified and eradicated.

Creativity and lateral thinking is yet another area offering scope for improving productivity.

Another important area to increase productivity is the new product introduction lead time.

In addition to the above areas inventory turnover, implementing TQM, reduction of new product introduction lead time, improving the financial ratios, empowerment of workmen, increasing the morale at the work place, improving the team spirit among the various segments of the organization and improving the customer service by appropriate strategies offer excellent scope for increasing productivity in industries.

4. Critical to Quality (CTQ) Drill Down Tree

When we talk about productivity, quality comes into picture. Quality has a direct impact on productivity as better quality reduces rejection rate. Less rejection rate implies, less re-work and better overall productivity.

CTQ drill down tree which is shown in figure 4 is a tool that can be used in any process. It helps in the identification of precise metrics or parameters that can improve the quality.

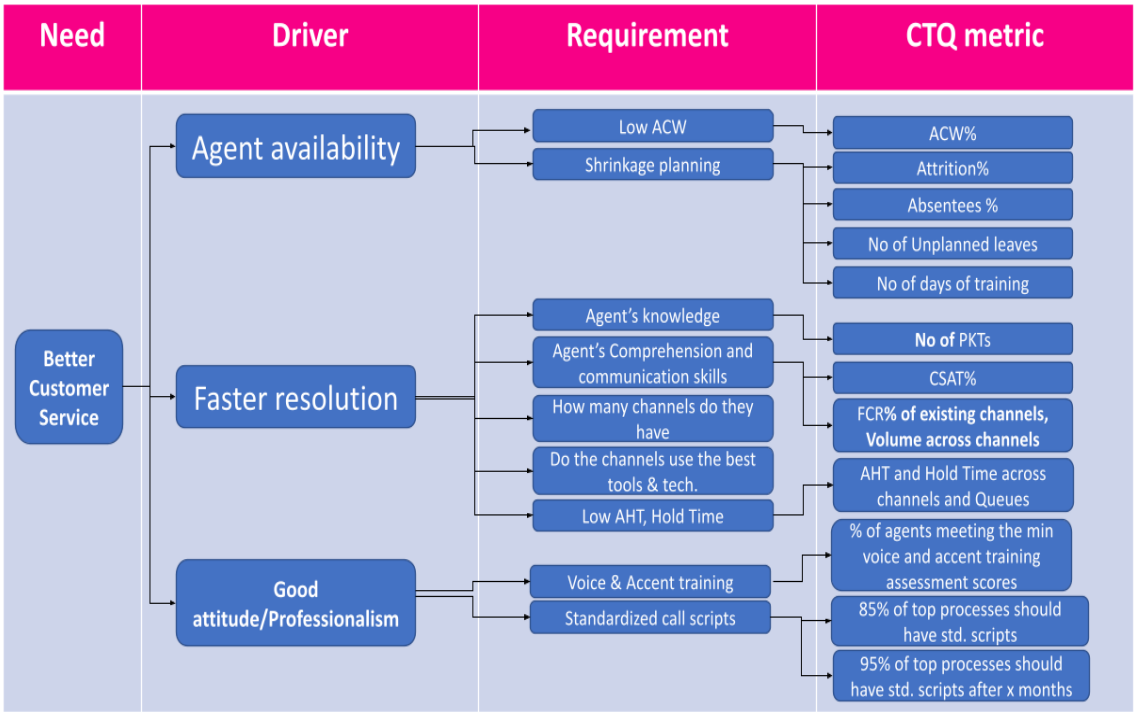

Figure 4: CTQ Drill down tree of customer service operations

Here, the business needs are converted into measurable metrics that have an impact on different aspects of the business that are important to the quality and productivity of a process.

The drill down tree branches out from the Business need, which is Better customer service, into Drivers, of the business needs. Furthermore, these Drivers are further disintegrated into Requirements that are crucial to the success of the identified Drivers. Finally, metrics are identified that have a direct impact on the operational requirements identified that have a direct impact on the quality and the overall productivity of the process.

This application of this method is not confined to any industry or a service and can be used in any process where quality and productivity are crucial for the success of the business.

5. Conclusions

1) The best way to increase productivity is to concentrate on 4 M's Vizmen, machine material and methods and analyse using cause and effect diagram..
2) The other important areas which can be concentrated for improving productivity are rejection level, implementation of quality management systems, total cycle time, creativity and innovation, motivation of employees, employees training etc.
3) In order to improve quality management CTQ Drill down tree can be very useful as it helps to identify business needs leasing to actionable insights.

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