



Near East University  
Faculty of Economics and Administrative Sciences  
Department of Business

**Man 400**

# Productivity Variables and Measurements

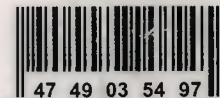
Submitted by : Gökmen Büyükgök

970242

Submitted to : Mr. Ali Malek

Date : June 14<sup>th</sup>, 2002

14/6/2002  
1600  
JH



NEU



## **ABSTRACT**

The organizations must be successful to survive in their industry. The most important thing for the success of the organization is the ability of keeping its resources (such as land, labor and capital) productive. By this way, the organizations must know the measurement and improvement of productivity to be aware of how well they are keeping their resources productive or using the resources efficiently and effectively that have already on their hands. With the help of measurement, the organizations can also be aware where they are in the market. That means how they have power to challenge with their competitors.

Thus, the productivity is a very important concept that every organization must focus on because it has many beneficial consequences such as opening the doors towards the world industry.

## TABLE OF FIGURES

### ACKNOWLEDGEMENT

I would like to thank to people, who helped me for my project. In my opinion, everybody needs help and for my project there some people, who helped me for my project.

Firstly, I would like to thank Mr. Karacan Mehmet. Manager in the Analysis of Production Resources Services. And thank to my advisor, Mr. Malek.

Also I would thank to my friends for their help.

Graph 1

Graph 2

Graph 3

Graph 4

Graph 5

## TABLE OF FIGURES

Figure Number	Figure Name	Page
Figure 2.1	Transformation of Inputs to Outputs	4
Figure 2.2	Productivity Growth in United States	8
Figure 2.3	Productivity Growth in Other Nations	9
Figure 3.1	The Contribution of Capital, Labor and Arts and Science of Management	18
Graph 1		
Graph 2		21
	The Graphs for Improvements of Productivity Overtime	
Graph 3		
Graph 4		
Graph 5		22

## III. MEASUREMENT OF PRODUCTIVITY.....23

3.1 The Need For Measurement	23
3.2 Productivity Measurement	24
3.3 Productivity Variables	27
3.4 Problems in The measurement of productivity	27
3.5 Importance of Productivity	30

## IV. THE EVALUATION OF TOI AS COMPANY.....28

## V. CONCLUSION.....30

5.1 Summary	30
5.2 Recommendation	32

## IV. RECOMMENDATION.....32

## REFERENCE.....33

## APPENDICES



## TABLE OF CONTENTS

<b>I. INTRODUCTION.....</b>	<b>1</b>
1.1. About The Topic.....	1
1.2. Hypothesis .....	2
1.3. Aims of the Research.....	2
1.4. Methodology.....	2
1.5. Limitations.....	3
<b>II. INTRODUCTION TO PRODUCTIVITY.....</b>	<b>4</b>
2.1 Definition of Productivity.....	4
2.2. Historical Background of Productivity .....	5
2.3. Why Productivity?.....	9
2.3.1. Importance of Productivity for Business.....	11
2.3.2. Importance of Productivity for Nations.....	12
<b>III. MEASUREMENT OF PRODUCTIVITY.....</b>	<b>13</b>
3.1. Why The Need For Measurement?.....	13
3.2. Productivity Measurement.....	14
3.3. Productivity Variables.....	17
3.4. Problems for The measurement of Productivity.....	19
3.5. Improvements of Productivity.....	20
<b>IV. THE EVALUATION OF TOFAS COMPANY.....</b>	<b>24</b>
<b>V. CONCLUSION.....</b>	<b>30</b>
5.1. Summary.....	30
5.2. Results From Tofas Company.....	32
<b>IV. RECOMMENDATIONS.....</b>	<b>32</b>
<b>REFERENCE.....</b>	<b>33</b>
<b>APPENDIXES</b>	

## 1. INTRODUCTION

This is my last term for education period. In this term, I have understood that the feelings of "happiness" and "sadness" are equal to each other. I feel them together, now. I am said because I will split up my friends. I am happy because I will start a new life.

I believe that "to start a new life"; a person has to learn some basic things, which will be helpful for his/her future life. I also learnt these basic things in Near East University. During my education period, I have taken many courses and learnt many things. According to me, in university the students try to draw a map, with involving vision, objectives by benefiting from teachers' knowledge, information and experience. In my opinion, our teachers always tried to teach us to make best decisions through any kind of subject. And I think that the rest depends on us. So I believe that the things I have learnt up to day will be a map for my objectives and I will try to apply them through my life in a best way.

I wanted to study on operation/production management because according to me, without production the life will not continue. Also some actions called operations have to be taken to produce. Shortly; without operations, no production and without production, no life!

### 1.2. About the topic

For my graduation project, I will work on the topic of *productivity*, which has been an important matter to businesses and to the nations for many years. Because all businesses and nations have to use their resources in an economical and useful way in order to survive in the industry and market. So that the managers' main role must be to keep resources productive. Otherwise they can go out of their businesses.

Like everybody, I want to be in a high statue for my future job life. So I thought that I have to start with studying on the topic of productivity. Because I want to be an operation manager and to be successful the first thing I have to do this to keep the resources productive. If this research is carried on successfully, the first experience can be gained by this study for me.



The concept of productivity is also used as a strategy. For example, when a company is in loss, the managers firstly plan how to increase the productivity. That means the managers must decide how the resources that are already in hands can be used as productive. So if I want to be an operation manager, I have to be ready such kinds of difficulties.

### **1.2. Hypothesis**

“The organizations success depend on the ability of keeping its resources productive”.

### **1.3. Aims of The Research**

- a. Try to give information about the historical background of productivity.
- b. To define what productivity means.
- c. To explain how it is measured.
- d. To describe the variable that, are needed for the measurement of productivity.
- e. To be a handbook for people who want to be operation managers.

In my research, there are four parts. Firstly I have made an introduction to the topic of productivity, which consists:

- Definition of productivity
- Historical background of productivity
- Importance of productivity for businesses and nations' economy

In the second part, the measurements of productivity are explained. Also, the variables, which are needed for the productivity measurements are involved in this part. And I also have tried to explain why it is necessary for the measurement of productivity. And productivity improvement is involved in this part

Thirdly, after needed information about the topic of productivity is gained, I will try to analyze a company to learn how they measure and improve productivity. I chose the Tofas Company, which produces passenger's automobiles under the license of Fiat. So the topic of productivity will be understood, clearly.

At the fourth part, the results that I have reached are explained. Also it includes that what does Tofas Company have problems in its productivity?

And finally I will make recommendations for Tofas Company and managers about productivity.

#### **1.4. Methodology**

I will make literatures study to get information for my research. Beside this, internet will be used to expand information. As I mentioned before, I will analyze Tofas company in order to support my research. But I am not sure if I will get enough information and at what degree they will help to me. Also there will be graphics and tables in my research.

In addition to these, I have benefited from the center of productivity in Turkey.

#### **1.5. Limitations**

I want my research to be a handbook for people, who want to be operation managers so I thought that the main subjects of productivity would be:

- A clear definition of productivity
- History of productivity
- Importance of productivity
- Measurement of productivity

Also I will focus on the process of productivity improvements. I will explain the importance of productivity not only for businesses but also for nations because recent years the globalization is very important.



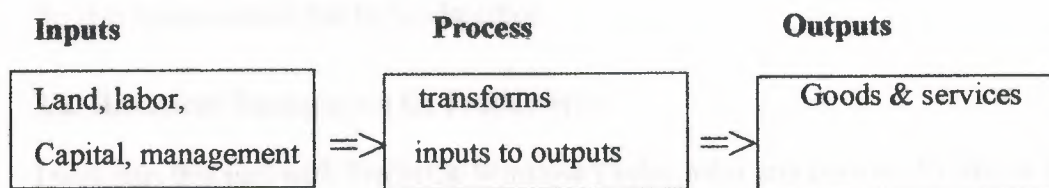
## 2. INTRODUCTION TO PRODUCTIVITY

### 2.1. Definition Of Productivity

Production is the creation of goods and services. It is the transformation of resources into products and services. Productivity implies the enhancement of production, which refers to a favorable comparison of the quantity of resources employed (inputs) to the quantity of goods and services (outputs). (See in Figure 1)

Figure 2.1

#### Transformation of Inputs to Outputs



Source: Richard J. Tersime, "**Production Operations and Management**", 2<sup>nd</sup> Edition, Elsevier Science Publishing Co. Inc., (New York, 1985).

In an economic sense, inputs are lands, labor, capital and management, which are combined into a production system. Management creates this production system, which provides the conversion of inputs to outputs. Outputs are goods and services.

**"Jaak Jurison"** Once productivity is recognized as an important output characteristic, the next problem is how to define and measure it. Productivity is a relative measure. That is, a country's or a firm's time against itself at some previous time

Source: Jaak Jurison and Paul Gray, "**Productivity in Office And The Factory**", Fisher Publishing Company, (United States, 1995), p.11.

Productivity has been an important concept since people began working in an organizational structure. It is the most fundamental indicator of economic performance.

Productivity is the relationship between:

- Products and services produced and
- The resources used to create them

Despite of these definitions, however the concept of productivity has no unique meaning or measurements. The reason for this is; the term of productivity is related with many different variables. And as a result of this, it helps many important recent problems to be reached a solution. This can be seen as an advantage. But beside this it can be a disadvantage for the firms or managers. For example; it can cause conflicts of terms and creates many arguments, which cannot be reached any solutions. So in order to overcome such kinds of problems, the measurement of productivity has to be done and the reason for this measurement has to be identified.

## **2.2. Historical Background Of Productivity**

I will start this part with Frederick Winslow Taylor, who was born on 20 March 1865. He is known as the father of scientific management. According to Frederick Winslow Taylor, the secret of productivity was finding the right challenge for each person then paying him well for increased output. He used time studies (which will be explained in the part of the productivity measurements) to set daily goal. Incentives<sup>1</sup> would be paid to those reaching their daily goal. Those, who did not reach their goal would get differential rate, a much lower pay. Taylor doubled productivity using time study, systematic controls and tools. He paid the person not the job. Also with his study, new departments such as personal and quality control arose.

But before Frederick Taylor, the Bureau of Labor in the interior made the first estimates of productivity in the interior department during mid-1880s.<sup>2</sup> The focus of these studies on labor productivity, which has motivated by the Bureau's concern for technological

---

<sup>1</sup> **Incentive means** something that tends to stimulate the action or greater effort.

<sup>2</sup> W. E. Deeming "**Out of Crisis**", (1986) Cambridge, MA: MIT Center For Advanced Engineering Study,



displacements of workers. Over the years, productivity calculations were refined and expanded to include a variety of measures. These data are also available today.

The Bureau of Labor Statistics is the primary source of productivity data in United States, although several private organizations and research institutes also publish productivity statistics.

After Fredrick Winslow Taylor (before the second world war), productivity movements continued as whole, with concentrating on rationalization in the workplace and usually on labor productivity. The image of management consultant was that of time-and-motion men, sharpening up individual working practices.

The National Product Center was responsible for putting productivity teams together and coordinating their programs. Also, the important function of National Productivity Center was set and develops other specialized organizations, which dealt with the concept of productivity.

At the beginning of the 1960s, the most important trend in productivity consulting, both of National Productivity Centers and private consultancies, was the recognition of the limitations of rationalization<sup>3</sup> and the need for three elements of skills, knowledge and attitude.

Japan Productivity Center was playing a leading role in promoting productivity consulting in Asia. In 1955, labor and management agreed on three principles of a national productivity movement:

- That improving productivity ultimately expands employment
- That labor and management should cooperate in defining and refining the specific models of productivity improvements
- That the benefits occurring from higher productivity should be shared equitably between labor, management and society at large.

---

<sup>3</sup> Rationalization means making reasonable conformable to reason.



In 1970, these principles contrasted with European Trade Unions, who affirmed that productivity improvements was a job killer. That means, "work," meant using physical power rather than brainpower.

The revolution against monotony caused crisis in 1968. As a result of this, the workers were more power in decision-making. The concept of productivity was forgotten and aim was on "control" and "participation" in the company's power structure.

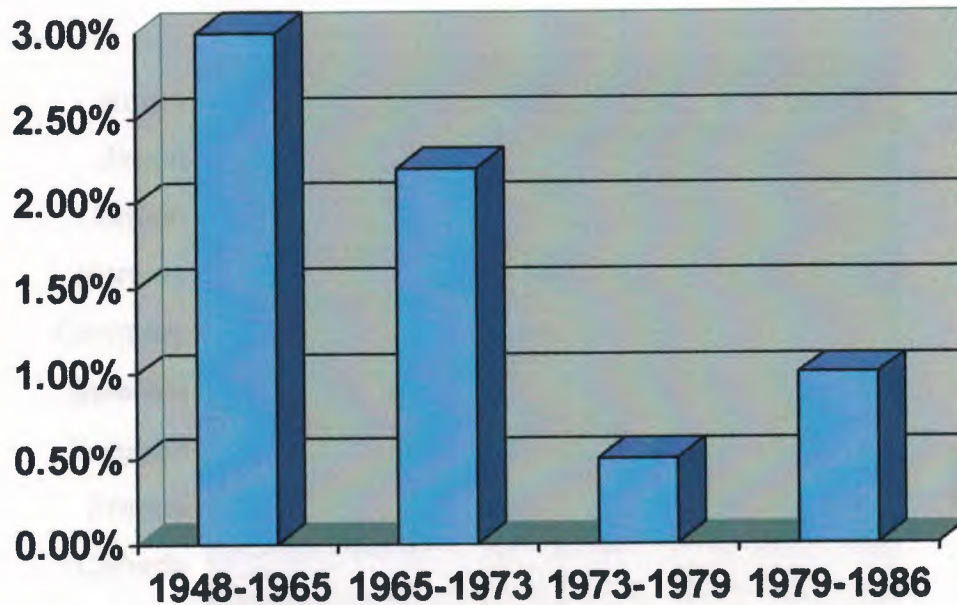
The productivity centers have also been established in many countries such as in Canada, in United States to provide business with easier access to modern management and productivity techniques. In addition to these, the Polish, Russian and Ukrainian National Productivity Centers' have already been integrated into European Association of National Productivity Centers (EANPC) as members. However, these countries have not yet developed a strong and competitive private consulting practice in productivity movement areas. The role of NPC is important for developing countries in providing productivity consulting services. One of the tasks of these NPC is to train and develop consultants in the fields of management and productivity improvements. But the major providers of productivity consulting services are private consulting firms in industrialized countries.

I want to conclude the evaluation of productivity with graphs, which shows the growth of productivity in United States between the years of 1948-1986 and other nations in 1980s. As it seen from the figure 2, from the end of Second World War to mid-1960s, the United States enjoyed a sustained growth rate, which averaged about three percent a year. Then the rate of improvement declined to a relatively two percent a year from 1965 to 1973. During 1970s, output per worker in United States grew only twenty percent, while it grew to % 145 in Japan, % 75 in Germany and % 77 in France.<sup>4</sup>

---

<sup>4</sup>*"The Rival of Productivity"*, Business week, February 13, 1984, p. 92.

**Figure 2.2**  
**Productivity growth in United States**  
**AVERAGE ANNUAL GROWTH IN OUTPUT PER HOUR**

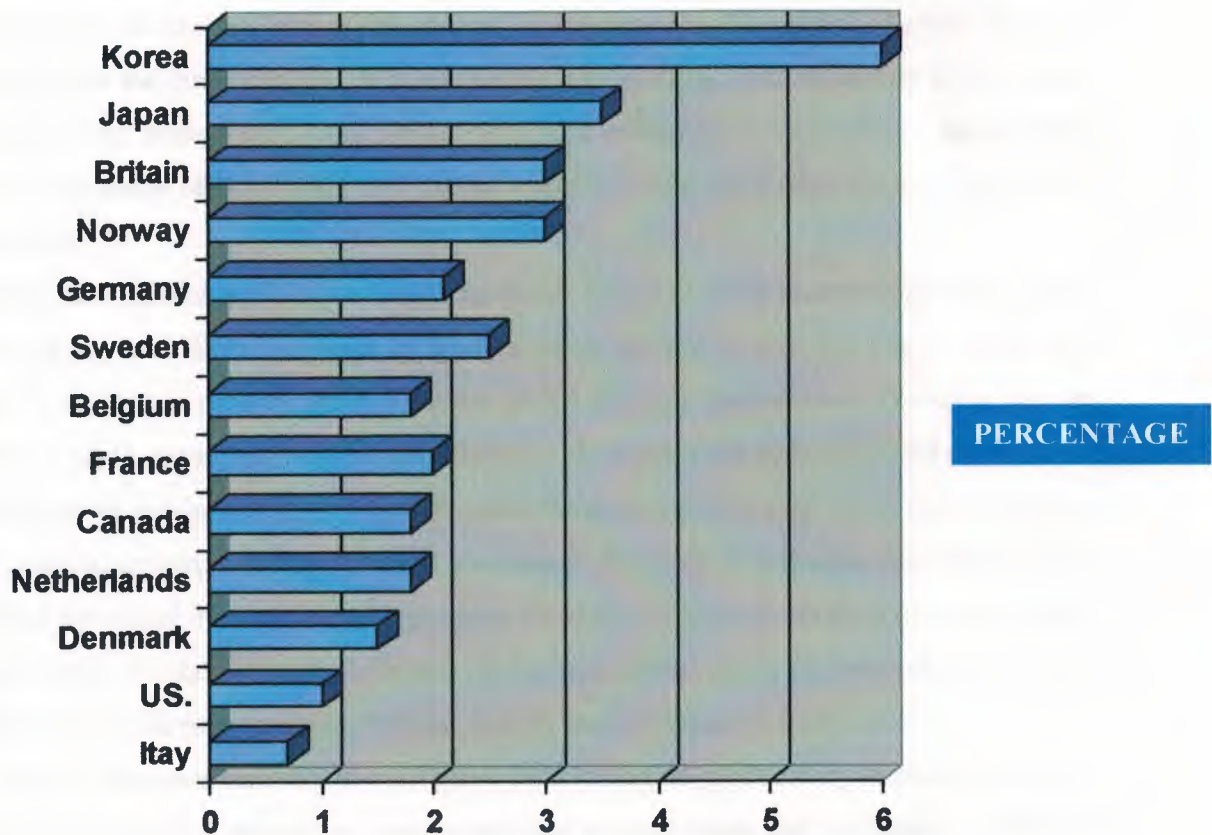


Source: "productivity: Why it is the No.1 underachiever", business week, April 20, 1987, p. 55.

Figure three shows us the comparative rates of improvement in output per worker in several countries during the early 1980s. Again as it seen from the figure, United States was far away from other nations in productivity movements such as Japan, Germany, and Sweden. So the United State's effort was toward the improvement of productivity in order to catch the other nations in productivity areas.

**Figure 2.3**

**Productivity growth in Other Nations**



Source: "productivity: Why it is the No:1 underachiever", business week, April 20, 1987, p. 55.

### **2.3. Why Productivity?**

The important the role of productivity is improving the company competitiveness and increasing national welfare. It is the main source of economic growth. As a rule, productivity is defined as the ratio of output to input of resources, which indicates how much and how well we produce with human and physical resources available.



Social and economic development means bringing a better future to the people. The ultimate goal of productivity improvement as a driving force of economic development is to improve the quality of life of the people.

This is a key factor that enables society to generate value added through an optimal mix of available resources-human knowledge and skills, technology, equipment, raw materials, energy, capital and intermediary services. Its growth contributes towards the prosperity of nations, makes companies competitive in the global market and thus contributes the quality of life. Without people's resourcefulness and efforts in improving productivity, human kind would have run out of means of survival and progress as the rate of increase of land, labor and capital could not keep pace with that of a population increase.

In the past, nations and people fought for better access to these factors to generate value. The strong took from the weak to enjoy a better quality of life. But the contemporary world no longer permits shifts to value added through exploitation. The only way to survive and prosper today and in the future is to become more innovative and productive. With higher productivity resulting in higher foreign exchange reserves, a nation can buy the needed resources as long as it can compensate for price differentials with higher value added generated from processed resources. Changes in nature of services now make them exportable. A vital factor is skills and intellectual capital levels of the workforce, which add value in the processing of material, energy and information resources.

Primarily, the quantitative and qualitative contributors to productivity improvement were land, technological innovation, and investment in new plants and equipment, quality of labor force, systems improvement, application of the principles of economy of scale, government policies and regulations and management's ability to create the optimal mix of these factors. Technological innovations increased value added by introducing new products and services into the marketplace through more efficient processes. Investment in new plants and equipment made labor substitution more effective. The skills, knowledge, attitudes determined the levels of quality of output when combined with preceding factors. Systems improvement arising from application of industrial and process engineering increased efficiency. Application of economy scale made it possible to reduce the cost of operations. Government regulations and policies determined the

availability of physical and scientific infrastructure educational and training systems the health of financial market. The ability of management to create the best combination of all the above contributory factors and their effective use determined competitiveness of the organization. Goods and services are purchased and consumed when offered for the lowest price with the highest quality, delivered at the moment when needed and followed with proper after-sale services. Finally, fair and equitable distribution of productivity improvement enabled people to enjoy a better quality of life.

Indeed, productivity objectives, accepted by all parties concerned, become the important instrument of distribution of wealth, sound industrial relations and democratic workers' participation. It is also the best approach in balancing efforts between different economic, social and environmental objectives.

Source: Prokopenko Joseph *"Productivity Promotion Organizations: Evolution and experience"* Geneva, 1999, ILO.

### **2.3.1. Importance Of Productivity for Business**

The productivity concept means ensuring that scarce labor and material resources are used in the most efficient way possible. It can play a major role in developing long-term strategic role and company's objectives. It also helps to integrate different functions (human resource management, marketing, production management etc.) and facilitate their balanced development. It is an important source of social developments as well. That means, every one benefits from increased of productivity.

Employers benefit from increased sales, improved profitability, increased competitiveness, greater stability and growth, less waste, lower rates of absenteeism and staff turn over.

Workers benefit because more productive, successful companies provide more stable employment, better and working conditions, more job satisfaction, better career opportunities, better management-labor relations and more participation through increased group activities.

Customers (clients) benefit toward better<sup>4</sup> quality, less expensive products and improved services.



### **2.3.2. Importance Of Productivity For Nations**

The concept of productivity is also important for nation's economy for several reasons.

The nation's productivity improves:

- The nation's ability to compete in international market
- Leading to sustained economic growth: this economic growth gives the nation a bonus that can be spent to enrich the lives of its citizens through an improved standard of living.

If an organization produces more and better goods and services with the same amounts of resources (inputs), it increases its productivity. If it produces the same amount of goods and services with fewer resources, it also increases its productivity. The increased productivity helps offset the effects of inflation in country.

When increases in hourly wages rates are greater than gains in productivity per labor hour, the unit labor costs for goods and services increases. Increased costs can lead to reduce profits or higher prices both of which contribute to inflation.

As a result, it can be said that the improvement of productivity is very important for growing of company's financial positions and nation's for competing better in international market. Therefore, everybody (managers, employers, workers, customers) must try to keep productivity high because of its major benefits.



### 3. MEASUREMENT OF PRODUCTIVITY

#### 3.1. Why the need for measurement?

The productivity measurement is important for the productivity improvements because you can decide to improve productivity only by measuring it. It is an effective tool in decision-making at all economic levels. The results of productivity measurements can be used how to make investments or reallocation of resources in a best way.

Productivity measurement indicates where to look for opportunities to improve and also shows how improvement efforts are faring.

In enterprises productivity is measured to help for analysis of efficiency<sup>5</sup> and effectiveness.<sup>6</sup> Its measurement can stimulate operational improvement: installation and operation of a measurement system can improve labor productivity with no other organizational change or investment.

Also with the help of productivity measurements, the managers can be aware of how effectively they are using resources for the production of various goods and services. Productivity measurements provide managers early warning about the potential problems, which affects the improvement of productivity. That is, they heighten awareness

So depending on the consequences of productivity measurements, managers can establish more realistic targets and checkpoint for diagnostic activities during organization development process.

At the national level, productivity is an important indicator of a country's economic strength. It is the key determinant of a nation's standard of living. If a nations fails to

---

<sup>5</sup> *Efficiency* tells us how well actually needed output is generated from available capacity is being used.

<sup>6</sup> *Effectiveness* compares present achievement with what could be done if resources were managed more effectively.

keep productivity at needed level or high, it can face some problems such as adverse balance of trade, increase in unemployment rate. Also productivity measures the competitiveness in global marketing. By the results of its measurements, the nations can compare themselves with other countries or with the average of industry in the world on efficiency and growth rates. With globalization, many industries in advanced industrialized nations are facing increased competition from low-wage developing countries. These industries can remain competitive only by increasing productivity at home to offset the low-wage advantage of their competitors in the less industrialized world.

In addition to these, productivity measurements provide perspective on a firm's financial data. For example, decline in productivity can threaten its long-term survival.

### **3.2. Productivity Measurements**

The measurement of productivity is an important element in the evaluation of the relative efficiency of factor utilization domestically and internationally.

In a formal sense, productivity is ratio. It is a comparison of what is produced and what is used to produce it. It compares outputs with inputs. That means it divides outputs by inputs. It is expressed as the following equation:

$$\text{Productivity} = \frac{\text{Units of Output}}{\text{Units of Input}}$$

For the measurement of productivity, output must be countable over time, a direct result of identifiable activities. Otherwise, how will we identify the quantity of output? And inputs can be divided as labor, materials, capital and energy.

The measurement of productivity can be classified into two groups:

- 1. Single-Factor measures**
- 2. Multifactor measures**

#### ***Single factor measures***

Each input can be used as a partial measure of productivity.



The most common single factor productivity measure is labor productivity. Labor productivity refers to the quantity of output produced by a given quantity of labor input. We can consider on the labor productivity from two views.

Let's first consider the microeconomics of Labor Productivity. Suppose that two workers are given the same tools and equipment to perform a task, such as splitting wood. The worker who splits more wood in a given hour is said to be more productive at that task. Since the goods and services produced by labor have value, more productive workers add more value than less productive workers. The implication is that highly productive workers in a market economy command higher wages and salaries than their less productive fellow workers. In fact, under competitive conditions microeconomic theory predicts equilibrium wages will equal the added revenue generated by a marginal unit of labor (marginal revenue product).

From a macroeconomic point of view, productivity gains are the key to improvements in material standard of living. If Labor Productivity remained unchanged, then rising wages would increase the cost of producing a given quantity of output. If this occurred across the economy, then prices would rise, even under competitive conditions, undermining any real gain in worker purchasing power. On the other hand, if Labor Productivity is rising, then nominal wage growth is expected to outpace inflation, implying rising real wages and purchasing power.

Two key factors that can affect productivity are advances in technology and improvements in education and training. Differences in Labor Productivity are a key determinant of wage differences between industrialized and developing countries. In order for an economy to make further gains in material standard of living, workers must continue to invest in education and training, and firms must continue to invest in new technology.

There are many inputs that are used for calculating the single factor measures such as machine, material etc. For example, machine productivity is expressed as output per machine or for material productivity it is measured as output per ton.



While single factor productivity measures are useful indicators, they have some serious shortcomings, too. It can be easy to increase productivity of one factor by replacing it with another. For example, a firm may invest in new technology that reduces the number of labor hours needed to produce a particular product. Of course by reducing the labor hours, the labor productivity will increase but beside this, at the same time capital input will increase, too. Economists call this effect "capital-labor substitution". To count the capital-labor substitution effect economists developed total factor productivity (Grossman, 1993). This measure takes into account the contribution of both labor and capital in the production of goods and services. It is expressed as:

$$P = O_v / (L+C)$$

Where "P" is equal to the total productivity factor

L = labor

C = capital

$Q_v$  = value added input

The capital input "C" is the total cost of all capital resources devoted to the production of goods and services, including working capital (cash, accounts receivable and inventories) and fixed capital such as equipment. It also neglects the effects of intermediate goods and services so it is necessary to measure the value added output,  $Q_v$  in the numerator.

### ***Multifactor Measures***

It is the expansion of capital-labor substitution. It takes into account all inputs factors and gives as a result the "total productivity". And total productivity is calculated from the following formula:

$$P_t = O_t / (L+C+R+Q)$$

Where  $P_t$  = total productivity

$O_t$  = total output

L = Labor

R = raw material

Q = other miscellaneous goods and services

Here the intermediate goods such as purchased items or outsourced labor are treated as inputs and therefore they must also be included in the output.

The term of total productivity measure makes the information available on trade-offs among factors and allows managers to make more informed business decisions.

The total productivity measure is useful at the firm or business unit level of the organizations. But the single factor measures (such as labor productivity measures, machine productivity or capital-labor substitutions) are useful for day-to day operational control at lower levels of the organization.

There are many factors that affect the productivity. Some of them are changes in employment, hours worked, the education, age and composition of the workforce, levels of capital investment and savings, government regulations, capacity utilization, inflation etc. all these effect the productivity favorably and unfavorably.

For example, for labor productivity work conditions and hours worked are very important. If there is much noise in the area of work, labor can get tired, quickly so she/he will reduce her/his performance. Of course this will affect the labor productivity, negatively. Also long-work hours affect the labor productivity, negatively again.

Another example for the factor that affects the productivity is capital investment. If a firm does not invest enough money for needed equipment for the production, this will decrease the machine productivity. That means the firm fails to follow the technology changes because of lack of capital.

### **3.3. Productivity Variables**

The United States has had an average annual productivity increase for nearly a hundred years and this productivity increase consists of three factors<sup>7</sup>, productivity variables:

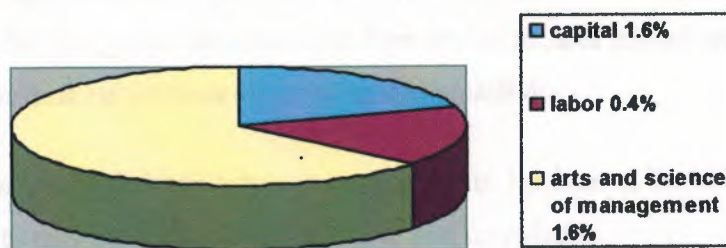
---

<sup>7</sup> Salaman Fabricant, (1969), A Premier on Productivity, New York Random House, pp. 649-698.

1. Labor, which contributes %0.5 to the increase.
2. Capital, which contributes %0.4 to the increase.
3. Arts and science of management, which contributes %1.6 to the increase.

**Figure 3.1**

**The Contribution of Capital, Labor and Arts and Science of Management**



Source: Jaak Jurison and Paul Gray, **"Productivity in Office And The Factory"**, Fisher Publishing Company, (United States, 1995), p.11.

The variable of labor contributes to labor productivity, which refers to quantity of output produced by a given quantity of labor input. To take the best productivity from labor, she/he must be educated, healthier, better motivated through achievement of organizational goals, better retooled with latest technology and work under flex time, which helps not to reduce his/her performance.

The variable of capital is focused on the tools that are used for the manufacturing of goods and services. Capital investment provides these tools. But if there is an increase in inflation and taxes, the cost of capital investment increase, become more expensive. When the capital invested per employee drops, it is expected to drop in the productivity, too. Productivity of capital can be increased by making capital work harder. And if the turnover of capital<sup>8</sup> is higher by keeping the other things equal, we can have higher productivity

<sup>8</sup> Turnover of capital= net sales/ invested capital



The arts and science of management is a factor of production and economic resources.<sup>9</sup> And the variables of arts and science of management provide the best opportunity for increases of productivity. Because management includes improvements made through the application of technology and utilization of knowledge.

In order to make improvements toward the application of technology and capital utilization, training and education are playing very important roles. Education is an important high-cost for the firms. Because if a firm wants to take higher performance from labor, it has to inform its workers about what she/he will do.

Also if she/he has not enough knowledge, it must educate her/him to be informed and also must be trained to expand his/her abilities, skills and knowledge.

### **3.4. Problems For The Measurement Of Productivity**

The things that I have tried to explain are developed for the measurement and improving performance in manufacturing operations, where outputs and inputs are easily quantifiable. If these things that are explained in this part applied with good management judgment, then productivity measurements are powerful tools. But while measuring the productivity, managers can face some problems with:

- Time
- Quality
- Knowledge work

By measuring and managing time as key resources in the business operations managers outperform their competitors. (Stalk and Hout, 1990).

Time differs from other resources. It cannot be purchased like labor or capital equipment, it is not free. for example, if two companies are producing identical products with the same amount of resources (inputs), traditionally their productivity measures are the same. But if one firm produces goods and services faster than its competitors, it will have a

---

<sup>9</sup> Frederick Harbison and Charles Myers, *Management in industrial world international analysis*, New York: Mc-Grow-Hill, 1959.

great chance to present the products and services firstly. So this firm will be more productive because of producing the products and services in a less time than its competitors. That is, the less time it takes to get results, the more productive the organization!

Companies that recognize the key role of time in their operations usually have productivity measures for tracking performance based on time. For example, I have explained in introduction part, Frederick Taylor doubled the productivity by using time study standards. According to his study, the workers were paid depending on their performance, high wages, low performance, and low wages! The measures of time are based on the business objectives. Some measurements of time are turn around time, product development cycle, customer response time and order fulfillment time.

The relationship between quality and productivity is misunderstood. Most of managers think that only high level of quality can be achieved by expense of productivity. (Jaak Jurison, ). The improvements in quality actually lead to increased productivity. (Deming, 1986).

High quality means acceptable products by customers so customers have to be monitored in order to determine changes in their expectations.

Knowledge work is another problem that can be occurred during the measurement of productivity. We have said that in order to measure the productivity; output must be quantifiable and counted. But it is difficult the measure of productivity in knowledge work and white-collar employees. Lawyers, scientist, architects, engineers are some examples fir this topic. Their output is mostly intangible.

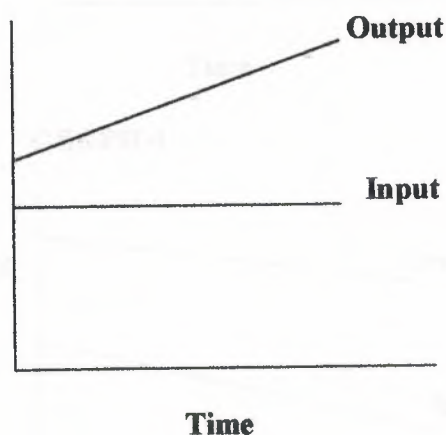
The number and size of firms totally engaged in knowledge work is increasing in advanced industrial economies. Therefore, it is becoming more important to measure and enhance the productivity.

### 3.5. Improvements Of Productivity

As I have discussed at the previous parts, productivity measurement is important for the improvements of it. If a firm does not measure its productivity, it will not be aware of how it is doing better or where it is now. And if a firm is not at expected level in productivity, by the help of measurements it can make best decision to improve it. Also managers or firms can make the measurements overtime. There are five ways to improve productivity overtime. I will try to show them by graphs.

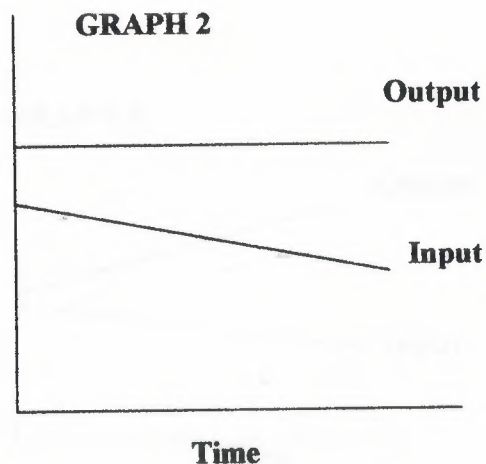
**GRAPH 1**

As it is seen from the graph 1, while the improvement of productivity, input is kept same and output is increased. Thus more output with the same level of input.



**GRAPH 2**

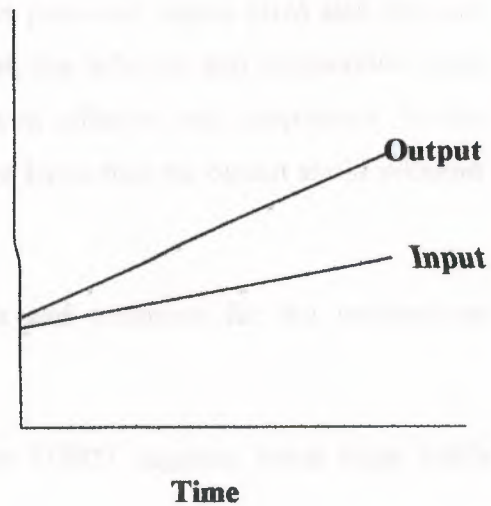
In this graph, output is constant with lowering the input. That means, producing the same level of output, but with less input.





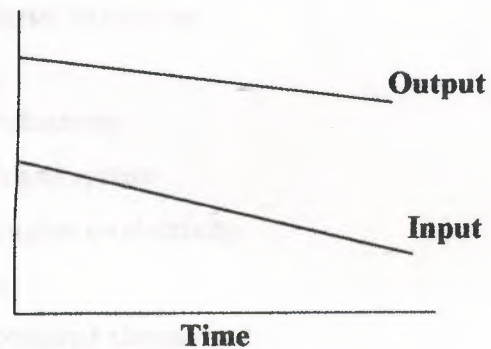
**GRAPH 3**

In graph 3, output grows faster than inputs.  
There is an increase in both output and  
Input but increasing the amount of more than  
the amount of input



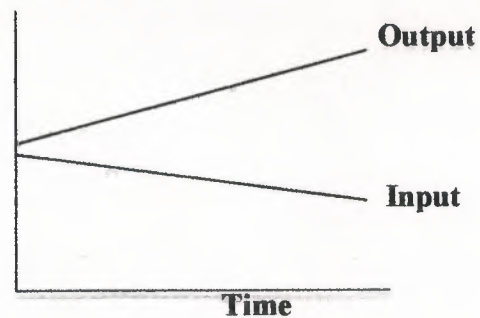
**GRAPH 4**

In graph 4, there is a slower output decline  
than input. Here in this case the outputs and inputs  
Are decreasing but mostly the inputs decrease.



**GRAPH 5**

As it can be seen from the graph 5, there  
is a reverse relationship between inputs  
and output. Output is growing with  
decline in input. Thus, here it is aimed  
To produce more output with less input.



But these formulas are not real cases for the improvement of productivity. The  
measurement of productivity must be done in a single set of units, money. The value of

inputs and outputs depend on the price and price changes overtime because of inflation and competition. So depending on this the outputs price and inputs price also changes overtime. In order to apply this five improvement, the inflation and competition must held equal. That means there will not be changes in inflation and competition. So the prices of outputs will remain same. But as all of us know that we cannot avoid inflation and competition in country.

In addition to these, there are many processes and programs for the productivity improvements.

One process, which is defined by Alan Lawler (1985) suggests some steps while improving the productivity. These are as follows:

1. Identify and put into order of priority the objectives of enterprise
2. Identify criteria for output within organizational limitations
3. Prepare an action plan
4. Eliminate or offset the known barriers to productivity
5. Develop productivity measurement methods and system
6. Motivate workers and managers to achieve higher productivity
7. Maintain the moment of productivity efforts
8. Keep productivity by monitoring the organizational climate.

All these steps are to be considered only a kind of checklist, which should and could expand or reduced depending on the specific tasks and circumstances.

#### 4. THE EVALUATION OF TOFAŞ COMPANY

In this part, I will analyze the Tofaş Company. The reason for this is:

- To learn how Tofaş measures its productivity
- What kinds of factors affect its productivity
- How they improve their productivity if there is a decrease in their productivity
- What they are doing in order to keep productivity at high level
- Why they need to keep their productivity high

But before explanation of this information, I want to give general information about Tofaş.

Tofaş, Turkish Automobile Factory was established in Bursa on May 2, 1968 for producing cars under the license of Fiat. The factory started to be done in 13 April 1969 and finished in twenty-two months. First its open area was 735.800 m<sup>2</sup> then buying some area it became 928.800 m<sup>2</sup> and closed area became from 62.000 m<sup>2</sup> to 350.000 m<sup>2</sup> by making new investments.

Totally 4975 people are working in the company. Eighty-five of them are managers and the others are blue-collar workers. And the 671 of them are working monthly, others are working hourly.

Tofaş, which produces automobiles is the biggest company in Turkey. It has started production on 12 February 1971 with model of "124" and its production continued to 1876. it started to produce model of "131" in 1977. after 1990 the model of Tempra, Tipo Tempra SW, Una SX were produced. In 1998, the production of model "178" (which are defined as world automobiles such as Fiat, Palio, Siena) have been started.

Shortly, at the beginning it was producing "124" model, currently it produces the world automobiles.

It has many benefits for the country's economy. Some of them are as follows:

- They help developing of domestic industrial



- They provide continuously and systematically income to treasure
- They help for the increase of exportation

At the beginning it was not enough successful in exportation of automobiles but after 1990 there has been steadily increasing in exportation of its products. Because it was helped by the Fiat. By this, it has started to export items.

In addition to these, it has exported 75.000 automobiles in 2001 and the aim is not to decrease this number under for the exportation in 2002.

Tofaş's market share usually changes, but despite of this, its inside market share is average of %15 for Turkey.

It has a contractual agreement with Fiat, which is in Italia. It uses its name. That is, it produces its cars under the license of Fiat. We can understand that its vision is to be a global market. (as all of us know that license is a form pf global entry) as a result of this, it expands its strategy. Also by this way, it can benefit from the technology of Fiat for its production process.

## **MISSION STATEMENT (See in Appendix 1)**

### **Corporate vision**

- To be a global market and have market shares in the world
- To be the largest production of automobiles, light trade vehicles and their items
- To best in the customer satisfaction in its area in Turkey
- To be best in satisfying the workers expectations in its area in Turkey

### **Mission Statement**

#### **1. Reasons for existence**

Its mission is to help for developing a national economy. Also it is producing and selling light trade vehicles and items of them under the license of Fiat by providing needed materials to satisfy the expectations of its dividends at the end of work.

#### **2. Value for society**

High quality service, safety and security in their personal automobiles and insurance.

### **3. Principals and Values**

- The customers are very important and they are the more important resources for Tofaş Company.
- They create resources for continuous development.
- They apply Total Quality management in order to produce high quality products and services with low cost and experienced workers.
- They always try to overcome all problems that they face.
- Work ethic and trust is very important for them.
- Globalization is the main topic for them.
- They are competitive and professional.
- They make decisions on time.
- They have important benefits for Turkey economy.

### **Productivity in Tofaş (See in Appendix 2)**

Tofaş uses labor and machine while measuring productivity. They measure labor on the bases of atelye. That means, total labor of productivity in one unit (department) such as assembling unit or painting unit.

For machine productivity they do not measure the productivity of all machines. Only they measure the productivity for machines, which are critical for capacity. Because they think that it is not economical and needed to measure the all productivity of machines.

They use some parameters for the measurement of productivity. These are:

1. Standard time for products. (For example, suppose that for 1 dobro standard time is 25 hours.)
2. Quantity of product that is produced daily. (for example, 300 dobro are produced daily.)
3. The number of workers in the factory and their total work hours. (for example, there are 1000 workers and 1 labor works for 9 hours.)



So the total work hour is equal to  $1000 \times 9 = 9000$  hours. The hours when the permission is taken are exceeded and the hours are added when the labor works extra. In addition to these, the times for labor are calculated on the bases of cards, which are used while entering to factory and leaving the factory in electronic conditions.

4. Production lost: The times that are not worked because of some reasons (such as cutting of electricity, lack of resources, delaying of services) must be recorded by the chief, who is responsible. Simple, productivity is measured as ,  $a \times b = c - d$

Thus,  $25 \text{ hours} \times 300 \text{ automobiles} = 7500 \text{ hours}$

$1000 \times 9 = 9000$  total worker hours

So we can say that there is 1500 hours lost ( $9000 - 7500$ ). This lost time must be recorded and presented by the chief, who is responsible in that unit with including detailed information such as cutting of electricity, lack of resources etc.

$$25 \times 300 = 9000 - 1500 (\text{lost time}) \rightarrow \text{so equation is true.}$$

In this condition there is %20 lost in production, which is calculated as  $1500/7500$  so there is %80 productivity in labor.

To improve productivity, they decrease the standard time by automation, improvement of technology, developing methods, improvements of tools and equipments that are used for production.

Also they try to eliminate the factors, which causes lost time during the production process such as lack of raw materials and energy, using wrong equipments, delaying of services.

The factors that affect that productivity are tried to be reduced successfully in Tofaş Company. For example the work conditions are very healthy and security for labors. Depending on the procedures, the labors, which work in pressing unit, have to use earlap. Beside this, labors, which work in welding unit, must use glasses to keep their eyes from the lights of weld. In painting unit labors are using mask.



In addition to these, labors that are working in these units are rested for 15 minutes for each 1 hours in order not to make them get tired. Because of these precautions, the productivity is not affected negatively. All ergonomic conditions such as lighting, cooling and heating are considered and provided successfully. Also, these conditions are controlled by the work security and worker healthy unit, which is established inside the factory.

Although Tofaş is successful in keeping the conditions well, it has a problem, which is a factor that affects the productivity. This problem is the lack of higher technicians, who are the people between managers and administrative personal, engineers and workers.

It is not only the problem of Tofaş, but also the Turkish industry, which is still developing in transition to globalization.

The people between the worker and engineers, managers and administrative personal are very important in order to provide better flow of information between them. Also these people have to be more creativity and practicable. They firstly must understand, what engineers or managers want from them and tell them to workers and administrative personal in a detailed way. If these people really do not exactly explain, what the managers or engineers want, there can be some difficulties in the production process (such as using wrong materials). Thus, this will directly affect the productivity in a negative way.

All variables that are important for productivity measurement are important and watched in Tofaş Company such as machine, material etc. thus only labor productivity is not important for Tofaş.

Tofaş tries to keep productivity high. To do this they develop new objectives and determine the ways, how to reach them in a best way. To do these:

- They apply kaizen, which means a continuous development in order to increase the power of competition. (See in Appendix 3)

- They use circles in order to solve the problems that occur in the area of workers.
- They also use total quality management in order to satisfy the customers' and workers' expectations and increase the image of Tofaş Company on society, they benefit from the management of workers and managers, develop politics and strategies and use resources an efficient and effective way.

Productivity increases when the employees use their resources more efficiently. When this has happened it is the third part of my argument. In order to increase, with the help of productivity improvements, the managers also decide if it is really needed to improve productivity and how they can use the productivity. If they do not reach the expected level in production, they decide to improve this by for example changing production equipment, improve work including some extra training, if they reach the expected level, they can also decide to improve productivity in order to have high level of productivity.

It is also very important for the nation's economy because it helps the nation to improve its income level, which can provide a sustainable economic growth. Thus, with the increase of productivity, production also increases and with a high quality.

## 3.2 Results From Tofaş Company

Tofaş, where I have worked, use circle use of productivity circle. It is a multinational company, which produces automobiles under the license of Ford.

Although it is very necessary to overcome the factors, which affect the productivity, it is not that difficult. It has two solutions, which is an important factor for Tofaş. It is not only a problem for Tofaş, but also for the Turkish economy, which you are familiar as developing, you. The problem is that for lack of high education, you are parallel between workers and workers, managers and administrators personal. These people are responsible for the lower flow of productivity. (Source: Interview with a manager in Tofaş)

## **5. CONCLUSION**

### **5.1. Summary**

Productivity is the relationship between the resources used (inputs) and the products and services are produced (outcomes).

Productivity indicates how the organizations use their resources in an efficient ways that I have explained I the third part of my research. In addition to these, with the help of productivity measurements, the managers can decide if it is really needed to improve productivity and how can improve the productivity. If they do not reach to expected level in productivity, they decide to improve this by for example preparing productivity improvement programs with including some steps. Conversely, if they reach the expected level, they can also decide to improve productivity in order to have high level of productivity.

It is also vary important for the nations' economy because it helps the nation to compete in international market and provides a sustainable economic growth. Thus, with the increasing of productivity, production also increase, but with a high quality.

### **5.2. Results From Tofaş Company**

Tofaş, which I have worked on, takes care of productivity mush. It is a manufacturing company, which produces automobiles under the license of Fiat.

Although it is very successful in eliminating the factors, which affect the productivity favorable or unfavorable, it has also problem, which is an important factor for Tofaş. It is not only a problem for Tofaş, but also for the Turkish industry, which gas not finished its development, yet. The problem is that the lack of high technicians, who are people between engineers and workers, managers and administrative personal. These people are responsible for the better flow of information between them.(managers-administrative personal and workers-engineers)



Productivity is very important for Tofaş because they are not competing only in domestic industry but also in international industry. So for them, it is important to keep productivity at high levels for globalization. That means, it is not enough to be productive, but also keep it at high levels.

By this they will not know that they are doing well with the resources that is already in their hands. Also, they will have a responsibility to compete in economy and market. So because of these reasons, I think that the managers should only be productivity in their activities and they try to keep it at high levels.

Now when we look at the Tofaş it is successful in keeping their productivity but they also have a problem with the human resources, which is lack of high performance. There are the people who play an intermediate role between the engineers and workers. These people should be productive, because they provide the flow of information between the engineers and workers. So if these people are not efficient and provide company with production, they should be trained and educated to be more productive and productive. Tofaş Company should solve this problem in a detailed way, because it is a very important problem for the Tofaş as industry that makes them.

## VI. RECOMMENDATIONS

Before I have mentioned that the productivity is very important for all organizations. So the managers should take care of the productivity very carefully. If they do not take care of the productivity they will have some difficulties in keeping their resources productive and by this they will not know that how they are doing well with the resources that is already in their hands. Also productivity helps organizations to compete in international market. So because of these favorable consequences the managers should provide productivity in their activities and also try to keep it at high levels.

Also when we look at the Tofaş it is successful in keeping their productivity but they also have a problem with the human resource, which is lack of high technicians. These are the people, who play an intermediate role between the engineers and workers. These people should be practicable, creativity because they provide the flow of information between the engineers and workers. So if these people are not efficient and prevent company to be productive, they should be trained and educated to be more practicable and creativity. Tofaş Company should focus on this problem in a detailed way, because it is a very important problem that the Turkish industry also suffers from.

## **REFERENCES**

1. Dictionary: **"Webster"**.
2. Deeming, W. E. **"Out Of Crisis"**. Cambridge, MA: MIT Center For Advanced Engineering Study. 1986.
3. **"The Rival of Productivity"**. Business week. February 13, 1984. p. 92.
4. Salaman Fabricant, (1969), A Premier on Productivity, New York Random House, pp. 649-698.
5. Harbison Frederick and Myers Charles. **"Management in industrial world international analysis"**. New York: Mc-Grow-Hill. 1959
6. **"Productivity: Why it is the No:1 underachiever"**. Business week. April 20, 1987. p. 55.
7. Grossman, E. S. **"How To Measure Company Productivity."** In Handbook for Productivity Measurement and improvement. Productivity Press. 1993.
8. [www.tofas.com.tr](http://www.tofas.com.tr).
9. Karacan Mehmet. Manager in the Analysis of Production Resources Services.
10. <http://www.consultpr.com/history.htm>
11. Tersime Richard J.. **"Production Operations and Management"**. 2<sup>nd</sup> Edition. Elsevier Science Publishing Co. Inc.(New York, 1985).
12. Jaak Jurison and Paul Gray, **"Productivity in Office And The Factory"**, Fisher Publishing Company, (United States, 1995), p.11.
13. National Productivity Center in Ankara.



## DEĞERLERİMİZ

- MÜŞTERİLERİMİZ VELİNİMETİMİZDİR,
- EN ÖNEMLİ SERMAYEMİZ İNSAN KAYNAĞIMIZDIR,
- AMACIMIZ, SÜREKLİ GELİŞMEK İÇİN KAYNAK YARATMAKTIR,
- DAİMA "EN İYİ" OLMAK VAZGEÇİLMEZ HEDEFİMİZDİR,
- ÜSTÜN İŞ AHLAKI VE DÜRÜST ÇALIŞMA İLKELERİNE UYMAK DÜSTURUMUZDUR,
- KARŞIMIZA ÇIKAN HER TÜRLÜ ENGELİN, BÜTÜN AÇIKLIĞIMIZLA ÜSTESİNDEN GELMEK HEDEFİMİZDİR,
- HER TÜRLÜ KONUDA İYİLEŞTİRMeye YÖNELİK ÖNERİLER YAPMAK EN ÖNEMLİ ÖZELLİĞİMİZDİR,
- GLOBALİZASYON ANA İLGİ ALANIMIZDIR,
- REKABETÇİ VE PROFESYONEL OLMAK TUTKUMUZDUR,
- KARARLILIK VE ZAMANINDA KARAR ALMA VAZGEÇİLMEZ DAVRANIŞ BİÇİMİMİZDİR,
- BİZİ GÜÇLÜ KILAN, TÜRK VE İTALYAN ENDÜSTRİSİNİN İKİ BÜYÜK DEVİ, KOÇ TOPLULUĞU VE FIAT-AUTO S.p.A.'NİN KÜLTÜRÜNÜN SENTEZİNDEN OLUŞMAMIZDIR,
- GÜCÜMÜZÜ ALDIĞIMIZ TÜRK EKONOMİSİNE GÜÇ KATMAYI HEDEFLERİZ.

## MİSYONUMUZ

TOFAŞ'IN MİSYONU, İHTİYACI OLAN KAYNAKLARI SAĞLAYARAK, FIAT LİSANSI ALTINDA OTOMOBİL, HAFİF TİCARİ ARAÇ VE BUNLARIN PARÇALARINI ÜRETMEK, SATMAK VE PAYDAŞLARININ İŞ SONUCU BEKLENTİLERİNİ GERÇEKLEŞTİRMektir.

## VİZYONUMUZ

- TÜRKİYE'DE EN BÜYÜK OTOMOBİL PAZAR PAYINA SAHİP OLMAK (OLMAYA DEVAM ETMEK),
- TÜRKİYE'NİN EN BÜYÜK OTOMOBİL, HAFİF TİCARİ ARAÇ VE BUNLARIN PARÇALARININ ÜRETİCİSİ OLMAK (OLMAYA DEVAM ETMEK),
- TÜRKİYE'NİN EN BÜYÜK OTOMOBİL VE/VEYA HAFİF TİCARİ ARAÇ İHRACATÇISI OLMAK,
- MÜŞTERİ TATMİNİ KONUSUNDA TÜRKİYE'DE KENDİ SAHASINDA EN İYİ OLMAK,
- ÇALIŞANLARIN TATMİNİNDE KENDİ SAHASINDA TÜRKİYE'DE EN İYİ OLMAK,
- TOPLUM ÜZERİNDEKİ ETKİDE KENDİ SAHASINDA TÜRKİYE'DE EN İYİ OLMAK,
- FIAT-AUTO ŞİRKETLERİ İÇERİSİNDE EN REKABETÇİ ŞİRKET OLMAK.

-----Original Message-----

From: gokmen buyukgok [mailto:bgok79@hotmail.com]  
Sent: Wednesday, May 08, 2002 12:47 PM  
To: mehmetkar@tofas.com.tr  
Subject: PROJE...

ıygunler ben kıbrıs lefkosadan yakın doğu unıverstesından gökmen büyükgök.  
ben 4.cu sınıfta ısıetme okumaktayım.mezunıyet projem ıcın asagıda  
verdıgım soruları size zahmet cevaplırsınız bana maıl atarsanız  
cooksevinırım"

#### SORULAR

1)VERİMLİLİK(PRODUCTIVITY) NEDİR? NASIL ÖLCÜLÜR? YANİ HANGİ KRİTER  
KULLANIYORSUNUZ? TIME-STANDART MI?

verimlilik ölçümünde biz işçi ve makina verimliliği ölçüyoruz. işçileri  
atelye bazında, yani bir bölümde çalışan işçilerin toplamının verimliliğini  
(örneğin montaj-boya gibi) ölçüyoruz.makinaların ise kapasite açısından  
kritik olanların verimliliği ölçülüyor. tüm makinaların verimliliğini  
ölçmek  
ekonomik değil. gerekli de değil.

2)İŞÇİ VERİMLİLİĞİ NASIL ÖLCUYORSUNUZ?(LABOUR PRODUCTIVITY)

işçilik verimliliği için gerekli parametreler;  
a-ürünlerin standart zamanı (örneğin 1 ad. doblo st. zamanı 25 saat olsun)  
b-günlük üretilen ürün adedi (örnek günde 300 adet doblo üretisin)  
c-işçilerin toplam çalışma saati.puantaj bilgilerinden hareketle bu gün  
fabrikada kaç işçi var.örneğin 1000 işçi. 1 işçi 9 saat çalışıyor.  
işçilerin  
toplam çalışma saati 9000 saat.(günlük 9 saatten izin alanlar düşülür,  
fazla  
mesai yapanlar eklenir. elektronik ortamda her işçi o gün yemek arası hariç  
kaç saat çalışıyor kart basma ile hesaplanıyor).  
d-üretim kayıpları. her işçinin amiri herhangi bir nedenle üretime  
çalışılmayan saatleri (elektrik kesilmesi, arıza, malzeme yokluğu, servis  
gecikmesi, eğitim vb.) veritoplama terminalleriyle kayıt altına alır.  
kabaca verimlilik hesabı:  
 $a*b=c-d$  olmalı.  
yani  $25 \text{ saat} * 300 \text{ oto} = 7500 \text{ saat}$  harcanması gerek. teorik olarak bugünkü  
üretim için gerekli saat 7500.

$1000 \text{ işçi} * 9 \text{ saat} = 9000 \text{ saat}$  fiili olarak pratikte harcanmış.  
bu durumda 1500 saat kayıp oluşmuş. bu 1500 saatin detayını (arıza, mlz  
yokluğu, elektrik kesilmesi vb. kod bazında detaylı) o bölümün sorumlusu  
bildirmelidir.

sonuç:  $a*b=c-d$  olmalı yani;

$25 \text{ saat} * 300 \text{ oto} = (1000 \text{ işçi} * 9 \text{ saat}) - (1500 \text{ saat üretim kaybı})$

formülü doğrulanmalıdır.

bu durumda  $1500 \text{ saat} / 7500 \text{ saat} = \%20$  üretim kaybı oluşmuş demektir. yani  
%80

verimlilikle çalışılmıştır.

bu değerler sanaldır.

3)VERİMLİLİK NASIL GELİSTİRİLİR?(PRODUCTIVITY HOW TO IMPROVE)

yukarıdaki örnekten de anlaşılacağı gibi verimlilik arttırımı 2 türlü  
olacaktır.

1- std. zaman azaltılması (27 saatin azaltılması): bunun için otomasyon, teknoloji iyileştirme, metod geliştirme, layout iyileştirme, kullanılan alet vb. iyileştirme ile mümkün  
2-%20 olarak örnek verilen kayıpları iyileştirme. bunlarda arıza, malz. eksikliği, eğitimsizlik, kötü parça kullanımı, yanlış alet/takım kullanımı, enerji eksikliği, servis gecikmesi gibi faktörlerin ortadan kaldırılması.yani işletmeye gelen tüm işçilerin %100 sadece üretim için çalışmalarının sağlanması ile elde edilir.

ABI SIMDIDEN TESSEKKURLER"BANA BUKONULARLA ILGILI MAIL ATARSANIZ  
COOKSEVINIRIM"TESSEKKURLER"  
TELIM:0533-8641272

UMARIM YETERLİ OLMUŞTUR.BAŞARILAR DİLERİM.  
END.YÜK.MÜH. MEHMET KARACA  
TEL:0-224-2610350/24500



birkac sorum daha var eger cevaplarsaniz cooksevinirim`  
sorular

1)iscilik verimliligi nasıl olculuyor`  
DAHA ÖNCEKİ MAİLDE ANLATMIŞTIM.

2)iscilik verimliligini etkileyen faktorler nelerdir`

- ÇALIŞANIN EĞİTİMİ VE BECERİSİ
- İŞ ORTAMI (ISI-NEM-IŞIK-SICAKLIK VB.)
- ÇALIŞMA YERİ DÜZENİ (LAYOUTLAR VB.9
- KULLANILAN İŞ ARAÇLARI (ALET, TAKIM, APARAT VB.)
- KULANILAN MALZEME (YETERLİ KALİTEDE OLMALI)
- YETERLİ KAYNAKLARIN SAĞLANMASI (ENERJİ, MALZEME)
- MOTİVASYON (ÜCRET VE SOSYAL TEŞVİKLER)
- YÖNETİM DESTEĞİ (EĞİTİM,ÜCRET,ALTYAPI VB.)

3)isciler calisma sartlarindan etkileniyorlar mi`etkileniyorlarsa bu verimliligi nasıl etkiliyor`

ÇALIŞMA ORTAMINDAKİ GÜRÜLTÜ, SICAKLIK, NEM, IŞIK VB. ERGONOMİK KOŞULLAR İŞÇİLERİN VERİMLİLİĞİNİ ETKİLER. ÖRNEĞİN SICAK ORTAMDA ÇALIŞMA İLE NORMAL BİR ORTAMDA ÇALIŞMA FARKLIDIR.

4)genelde verimliligi etkileyen faktorler nelerdir`bu faktorler verimliligi olumsuz yonden etkiliyorsa,nasil cozume ulasililiyor`ornekte verebilirmisiniz`

YUKARIDA İŞÇİLİĞİ ETKİLEYEN FAKTÖRLER GENELDE TÜM VERİMLİLİK İÇİN GEÇERLİ

MSN

## Çevrimli Dostlar

Arkadaşınızın e-postasını göndermek için tıklayın

E-posta adresi

Adınız

E-posta adresi

Adresiniz

MehmetKAR@tofas.com.tr

bgok79@hotmail.com

RE: selam..

Tue, 28 May 2002 13:21:16 +0300

-----Original Message-----

From: gokmen buyukgok [ ]  
 Sent: Sunday, May 26, 2002 7:54 PM  
 To:  
 Subject: selam..

merhaba mehmetabi nasılsınız"bengokmen" kıbrıstan"abı coksagolun  
 bilgilericin"birde su soruları sorcaktım"

1-verimliliği yuksek tutmada basarılımsınız?

VERİMLİLİK ARTIŞI İÇİN HER SENE YENİ HEDEFLER BELİRLENİYOR VE BU HEDEFLERE  
 ULAŞMAK İÇİN HANGİ ARAÇLARDAN FAYDALANILACAKI TESBİT EDİLİYOR. ÖRNEĞİN  
 KAİZEN UYGULAMALARI, KALİTE ÇEMBERLERİ, TOPLAM KALİTE ARAÇLARI, ÖNERİ  
 SİSTEMLERİ VB.

VERİMLİLİK ARTIŞI KALICI VE SÜREKLİ KILINMAZSA REKABET GÜCÜ KAYBOLACAKI İÇİN  
 SÜREKLİ İYİLEŞTİRME SAĞLANMASI ŞİRKETLERİN AYAKTA KALMASI İÇİN ZORUNLUDUR.  
**TOFAŞ ULUSLARARASI REKABETE AÇIK BİR ŞİRKETTİR.BU NEDENLE VERİMLİLİĞİ YÜKSEK  
 TUTMAK ÇOK ÖNEMLİDİR.**

2-tofasın pazar payları(turkiyede)

**TOFAŞIN PAZAR PAYI SÜREKLİ DEĞİŞKENLİK GÖSTERMESİNE RAĞMEN İÇ PAZAR PAYI  
 (TÜRKİYE İÇİN) ORTALAMA %15' TİR.**

AYRICA 2001 YILINDA ORTALAMA 75.000 OTO/YIL İHRACAT YAPILMIŞTIR. 2002 YILI  
 İÇİNDE 75.000 OTO/YIL HEDEFLENMEKTEDİR.

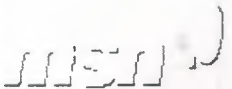
3-birde mehmetabi ben projemde referans kısmına sizide ekliycem"bilgi  
 aldığım kisileri"mesleginiz nedir?referans kısmında yazcamda"

BEN END.YÜK.MÜHENDİSİYİM.12 YILDIR TOFAŞTA ÇALIŞIYORUM. ÜRETİM KAYNAKLARI  
 PLANLAMA VE PROGRAMLAMA MÜDÜRLÜĞÜNDE -- ÜRETİM KAYNAKLARI ANALİZİ SERVİSİ  
 YÖNETCİSİYİM.

mehmetabi cok tessekkurler verdiginiz bilgilerden dolayı"gorusmek uzere  
 saygilar,selamlar"gökmen (yakın dogu univestesi-KKTC)

MSN Photos is the easiest way to share and print your photos:

MSN



## Çevrimiçi Dostlar

Arkadaşınızın e-postasını gönderdiğinizden emin olun.

KAIZEN

Hotmail

Home

Inbox

Compose

Address Book

MehmetKAR@tofas.com.tr

bgok79@hotmail.com

RE: merhaba...

Tue, 28 May 2002 13:37:39 +0300

-----Original Message-----

From: gokmen buyukgok [ ]  
Sent: Tuesday, May 28, 2002 10:59 AM  
To:  
Subject: merhaba...

selam mehmetabi, pazargunuyazmistim "birde abi susorulari yaparsaniz  
coksevinirim" projem haziran 15 teslim "sorular:  
1-tofas ta isciler calisma ortamindan memnun mu? veya uretim icin kullanilan

makinalarin seslerinden rahatsiz oluyolarmi? oluyorlarsa bundan nasil  
etkileniyorlar ve bunun sonucunda verimlilik nasil etkiliyor?  
TOFASTA CALISMA ORTAMI ISCI SAGLIGI VE IS GUVENLIGI ACISINDAN SON DERECE  
UYGUNDUR. PROSES GEREGI GURULTULU OLAN BIRIMLERDE (ORNEGIN PRES HATLARI)  
KORUYUCU TEDBIR OLARAK CALISANLARIN KULAKLIK TAKMASI ZORUNLUDUR.  
AYRICA KAYNAK HATLARINDA KORUYUCU GOZLUK KULLANIMI ZORUNLUDUR. BOYA  
HATLARINDA MASKE ILE CALISILMAKTADIR.  
AYRICA PROSES GEREGI BU TARZ ISLERDE CALISANLAR DAHA COK DINLENME  
YAPTIRILARAK ORTAMIN ETKISINDEN UZAKLASTIRILMAKTADIR. BOYA KABINLERINDE  
CALISANLARA HER SAAT 15 DAK. KABIN DISINDA DINLENDIRILMEKTEDIR.  
BU TEDBIRLERDEN DOLAYI VERIMLILIGI ETKILEYECEK COK OLUMSUZ SARTLAR ORTAYA  
CIKMAMAKTADIR. TUM ERGONOMIK KOSULLAR (AYDINLATMA-SOGUTMA-ISITMA-NEM- TOZ  
-VB.) GOZONUNDE BULUNDURULMAKTADIR.  
AYRICA TUM BU FAALİYETLER FABRIKA ICINDE KURULMUS IS GUVENLIG VE ISCI  
SAGLIGI BIRIMI TARAFINDAN SUREKI DENETLENMEKTEDIR.

2-tofas ta iscilik verimlilik ne kadar onemli? sizce diger (ornegin makina  
verimlilikinden ) daha mi onemli?  
TUM VERIMLILIK KALEMLERI ONEMLI VE IZLENİYOR. PROSES GEREGI EL ISCILIGI  
YOGUN YERLERDE (MONTAJ HATLARI VB.) ISCI VERIMLILIGI ONEMLI, TEKNOLOJİ YOĞUN  
ALANLARDA (MEKANİK-TALAŞLI İMALAT CNC VE NC TEZGAHLARIN YOĞUN OLDUĞU  
BÖLÜMLER) MAKİNA VERİMLİLİĞİ ÖNEMLİ. BOYA GİBİ ÖZEL TESİSLERDE İSE TESİS  
VERİMLİLİĞİ (BOYA KABİNLERİNDEKİ ROBOTLAR- BOYA FIRINLARI VB) ÖNEMLİDİR.  
SONUÇTA HER VERİMLİLİK KALEMİ İZLENİYOR. ÖRNEĞİN MONTAJDA İŞÇİLİK  
VERİMLİLİĞİ ÖNEMLİ ANCAK ORADA KRİTİK BİR MAKİNA VAR İSE ONUNDA VERİMLİLİĞİ  
İZLENİYOR. ANCAK MEKANİK HATLARDAKİ TUM TEZGAHLARIN VERİMLİLİĞİNİ İZLEMEK  
YERİNE PAHALI VE KAPASİTE İÇİN DARBOĞAZ OLUŞTURAN KRİTİK TEZGAHLAR  
İZLENİYOR.

mehmetabi sorular bunlar birde pazargunu yazdığım sorular vardı  
cevaplarsınız coksevinirim tessekkurler.lefkosa-KKTC yakin dogu universtesin

den gokmen.1991gokmen.

Send and receive Hotmail on your mobile device:



**KAIZEN**

Uygulamaya başlangıcı : Ocak / 1997

Amacı : Müşterinin istediğini zamanda, istenilen adette, minumun maliyette ve maksimum kalitede üretmektir.

Uygulaması : Difizyon planına göre kaizen yapılacak bölgeye 1-2 hafta içerisinde hedefler belirlenerek mavi-beyaz yaka personelin katılımı ile 1 hafta süreyle o bölgede iyileştirme faaliyetleri kendi içlerinde gruplanarak önce analiz, planlanıp ve uygulamaya alınır. Yapılan çalışmalar sonucunda hedeflerden karşılaştırılıp yönetim kurulu ve katılan personele sunuş yapılır. (yan sanayiden katılım bulunmaktadır)

**İSTATİKSEL PROSES KONTROL (İPK)**

Uygulamaya başlangıcı : Temmuz / 1992

Amacı : Mamul veya prosesten alınan ölçümler yoluyla imalat sürecini kontrol altında tutulmasını sağlamak.

Uygulaması : Proses veya makina yeteneklerini belirleyerek düzenli aralıklarla proses veya üründen ölçümler alarak kontrol altında tutulmasını sağlamaktır.

## OTOKONTROL

Uygulamaya başlangıcı : Kasım / 1993

Amacı : Çalışanın, yaptığı işin sonucunu kendi kontrolünde tutmasını, ürün kalitesi için sorumluluk duygusunun ve bilincinin gelişmesini sağlamak.

Uygulaması : Proses ve makina yeteneğinin kontrol altına alınması, kontrol sıklıklarının saptanması ve çalışanın kontrollerini kartlarına işleyerek tatbikini yapması.

## İYİLEŞTİRME PROJE EKİPLERİ (İPE)

Uygulamaya başlangıcı : Haziran / 1993

Amacı : Sorun çözmeye birimler arası yaklaşım sağlayarak katılım ve ekip çalışmasıyla; ürün kalitesi, üretim süreci ve iş yöntemlerinin geliştirilmesini sağlamak.

Uygulaması : Planla-Yap-Dene-Uygula (PDYU) çevrimi ile problemi tanımlama, teşhis ve analiz etme, çözümü doğrulama, uygulama ve standartlaştırma sıralamasını takip eder.

## HATA TÜRÜ VE ETKİLERİ ANALİZİ (FMEA)

Uygulamaya başlangıcı : Nisan / 1994

Amacı : Hata / arızaya meydan vermeyecek ürünlerin ortaya konmasıdır.

Uygulaması : Hata ve arızaya yönelik üç temel unsur Olasalık (probability), Ağırılık (severity), Belirlenebilirlik (detectability) üzerine kurulmuştur.

# TOFAŞ'DA KULLANILAN TOPLAM KALİTE ARAÇLARI

## KALİTE ÇEMBERLERİ

Uygulamaya başlangıcı : Aralık / 1984

Amacı : Çalışanların kendi sahalarındaki problemleri tesbit ederek çözmelerini sağlamak

Uygulaması : Gönüllü olarak oluşturulan çemberlerin "Beyin Fırtınası" yöntemi ile sorunlarını tesbit ederek 7 kalite tekniği kullanarak çözüm önerileri üretmeleri

## YAYGIN EĞİTİM (Q7 PROGRAMI)

Yaygın eğitim, Kalite çemberleri, iyileştirme proje ekipleri ve kalite geliştirme grupları (Proje grupları) elemanlarının kullanacağı tekniklerin eğitim sürecidir.

Kalite geliştirme faaliyetlerinin 7 temel tekniği olan Q7, şu tekniklerden oluşur.

- a- Beyin fırtınası
- b- Sebep - Sonuç (Kılçık) diyagramı (Ishikawa Diyagramı)
- c- Gruplandırma (Stratification)
- d- Pareto Analizi
- e- Histogram (Çetele; Çubuk Diyagramı)
- f- Saçılım diyagramı (Korelasyon Diyagramı)
- g- Takip ve Kontrol Şemaları



## **CEDAC**

Uygulamaya başlangıcı : Haziran / 1991

Amacı : Katılımla çözülebilecek, kronik problemlerde tüm çalışanların görüşlerini almak.

Uygulaması : Problemle ilgili bir panoda oluşturulan sebep/sonuç diyagramına çalışanların görüşlerini asmaları yoluyla çözüme katılmalarının sağlanması.

## **TOPYEKÜN ÜRETKEN BAKIM (TPM)**

Uygulamaya başlangıcı : Şubat / 1993

Amacı : “Benim Makinam” kavramını yerleştirmek, harici bakım işlerini asgariye indirirken, kaliteyi makinada garantilemek.

Uygulaması : Topyekün üretken bakım, bir bakım tekniği olmasının ötesinde; imalat çalışanlarının yönetime katılım şeklidir.

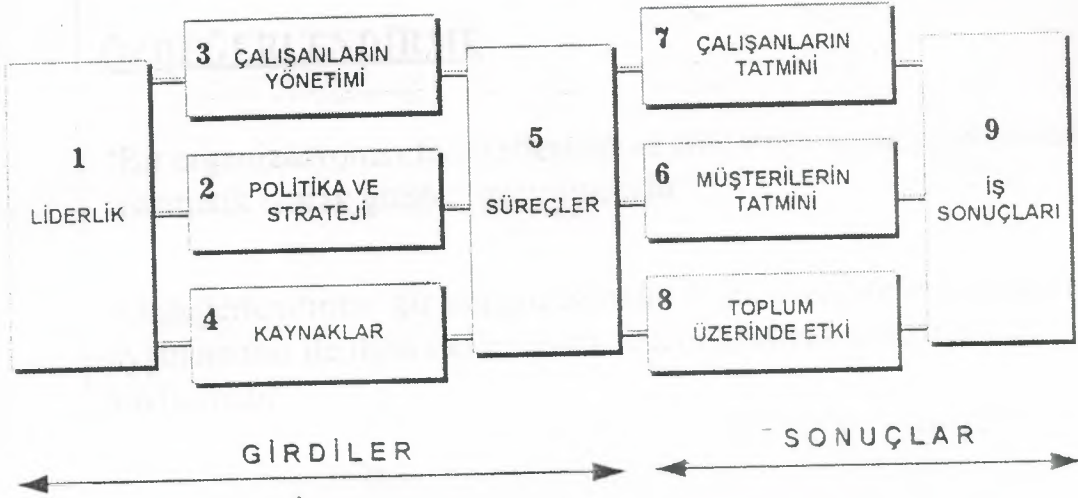
## **TOFAŞ ÖNERİ SİSTEMİ (TÖS)**

Uygulamaya başlangıcı : Ekim / 1995

Amacı : Çalışanların iyileştirmeye yönelik yararlı görüşlerini ortaya çıkarmak, organizasyonu sahiplenmelerini sağlamak.

Uygulaması : Öneri formu vasıtası ile direk ilk amire verilir, çalışanlar verdikleri önerilerin sonuçlarını görsel olarak panolardan izleyebilirler.

# TOPLAM KALİTE YÖNETİM MODELİ



Müşteri Tatmini, Çalışanların Tatmini ve Topluma Katkı hususlarında başarıya ulaşmak için Politika ve Strateji, Çalışanların Yönetimi, Kaynaklar ve Proseslerin etkin bir Liderlik anlayışı ile yönlendirileceği, böylece Faaliyet Sonuçlarında da mükemmele ulaşılabilceği üzerine kurulmuştur.

## PUANLANDIRMA

### GİRDİ KRİTERLERİ

Yaklaşımın *mükemmellik* derecesi

Yaklaşımın tüm fonksiyonlara yayılma derecesi

### SONUÇLAR KRİTERLERİ

Sonuçların *mükemmellik* derecesi

Sonuçların *kapsamı*

# ŞİRKET ÖZDEĞERLENDİRMESİ

## ÖZDEĞERLENDİRME

“Bir organizasyonun faaliyetlerinin ve elde ettiği sonuçların düzenli ve sistematik olarak gözden geçirilmesidir.”

“Özdeğerlendirme, bir organizasyonun Toplam Kalite'nin nesnel biçimde uygulanması ile ilgili ilerlemesini değerlendirecek sistematik bir yaklaşımdır.”

E.F.Q.M. - Guidelines

Özdeğerlendirme yaklaşımının benimsenmesinin, bir organizasyona önemli faydalar sağladığı anlaşılmıştır. Özellikle:

- Mükemmel bir modele kıyasla ilerlemenin ölçülmesini mümkün kılar.
- Geleceğe yönelik iyileştirme faaliyetlerinin önceliklerinin tespit edilmesinde ve stratejik yönlendirmenin yapılmasında temel oluşturur.
- Çalışanların ve ekiplerin mükemmelin aranması konusundaki enerjilerini açığa çıkarır.
- Girdiler ve sonuçlar arasındaki ilişkiyi netleştirir.
- Diğer organizasyonlarla “benchmarking” yapılmasında temel oluşturur.
- .....