

**Economics, Management and Entrepreneurship**  
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**Lecture - 28**  
**Evolution of Management Thoughts**

Good morning. Welcome to the 28th lecture on Economics, Management and Entrepreneurship. During the last 27 lectures we had very elaborately discussed the principles of economics has applied to business in particular. In that we first of all discussed about microeconomics, concepts of demand, supply, price elasticity of demand so on and so forth. Then we came down to the company level and discussed about various topics.

Break-even analysis, Costing both product costing and process costing, budgeting, accounting and finally the time value of money and how to compare among different economic alternatives. They are required because to carry out or to start an enterprise and to sustain the enterprise for a long time it is required that the company is financially viable and therefore the financial angle must be thoroughly understood. Financial background, the entrepreneur must definitely have.

At the same time to achieve the objectives of the company which is that of sustainability and growth the proper aspects of management must be very clear to the entrepreneur. So from today onwards we shall discuss about different aspects of management that are crucial to start and run a business. Let us understand that just as engineering has a foundation on Physics and similarly management has its foundation on or is founded on the Principles of Economics and Psychology.

Today we shall give a short introduction to how the management thoughts evolved during the last 150 years or so and then we shall elaborate in the future lectures on different generic functions of management before we actually venture into the different functional management aspects such as marketing, production, finance and so on and so forth. So today we shall devote our full lecture on realizing how the management concepts grow in the first place, and how became a discipline in its own right.

This historical perspective is very important because once the initial phase of development of management theory is understood then they can be put in today's context and then one can realize how important the management principles are in sustainability in the achievement of the objectives of sustainability and growth. So we start today our lecture on Evolution of Management Thoughts.

That means we shall talk about the beginning of scientific management or beginning of management are recognized as a science.

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## EVOLUTION OF MANAGEMENT THOUGHTS



Evolution of Management Thoughts.

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## Meaning of “Management”

The word 'Management' may be used to mean different things:

- the act of managing (i.e. the tasks of managing),
- the body of knowledge pertaining to the tasks of managers, and
- the managers themselves.

We would use the word “Management” to mean the body of knowledge pertaining to the tasks of managers.



First of all, let us understand that there are different meanings of management, and the word ‘Management’ itself may mean different things in different context. One it could be the act of management meaning the tasks of managing. It could also mean the body of knowledge pertaining to the tasks of managers; it could also mean the managers themselves. So when we talk about top management we are basically referring to the higher (()) (06:13) of management in a company.

In our discussion, we shall mostly use the second meaning of the word “Management”, the second meaning is the word “Management” to mean the body of knowledge pertaining to the tasks of managers. This means that we shall be concerned ourselves with mostly the principles of management, the body of knowledge that consists of the principles. Once the principles are understood we shall also focus on how these principles are applied in practice.

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## Popular Definitions of Management

- Management is 'getting things done'.
- Management is the process of 'working with and through individuals and groups to accomplish organizational goals'.
- Management is the 'task of planning, organizing, directing and controlling the efforts of others towards meeting a specific objective'.
- Management is 'concerned with efficient utilization of human, physical and financial resources, for socio-economic well-being of man, to the specific objectives of remunerative wages and good service conditions to employees, adequate return on investment, and quality product/service to the customer at the minimum price'.



Now we come to Popular Definitions of Management. The word “Management” is defined in many ways depending on the authors, various authors have defined the word “Management” in various ways there is not a single definition. So what we intend to do here is to reproduce certain definitions given by very celebrated authorities in the field of management and then we shall try to find out the common things underlined these definitions.

And then we shall focus on those things that would give us the right way of understanding the meaning of or the defining the word “Management.” The most popular way in which management is defined is ‘getting things done’. Normally, when we say I manage to get this work done it means that I got this work done. So when while say that it is “getting things done” it means that it is not me who did the work but I coordinated the work with the help of a group of people in such a way that the objective of the work or the work itself was achieved.

So it is organizing and coordinating among a group of people so that the work was done. So a very short colocal and very big way of defining the work of management is “getting things done”. This of course appears very superficial because there are many implicit meaning how does one get things done, how does one plan does, organize, coordinate and control so that work is that done. These aspects are not reflected are not made very explicit in this definition. But the basic intent of this definition is that the work gets done by a person with the help of others.

And it is, it has to be implicitly to be understood that the way the things got done are to be properly understood and properly implemented. Now let us look at certain other definitions. Management is the process of working with and through individuals and groups to accomplish organizational goals. Now in this definition-- the first definition is little extended by saying that to get things done it has to be done with the help of and with use of or with the association, cooperation of a group of people.

And this is highlighted in the second definition that says it is the process of working with and through individuals and groups to accomplish organizational goal. So when it says working it means that the person who is charged with the responsibility of getting things he is also He or She also a part of the individuals or groups who are interested with the work of with the objective of doing the work, that means He is not separate from the group.

So this the second definition, therefore say second definition therefore is an extension of the first definition, in the sense in 2 senses. One it says that group is thoroughly associated in doing the work and that the management itself is a part of the group, these 2 things are included in the second definition. The third definition says, Management is the 'task of planning, organizing, directing and controlling the efforts of others towards meeting a specific objective'.

Now in this third definition what is highlighted is the task of management that of planning, organizing, directing and controlling. So these are different functions or tasks specific tasks of management with the help of which the work gets done. So in this definition the tasks of management the functions of management are highlighted. The 4th definition is a little elaborate.

It says, Management is concerned with efficient utilization of human, physical and financial resources, for socio-economic well-being of man, to the specific objectives of remunerative wages and good service conditions to employees, adequate return on investment, and quality product or service to the customer at the minimum price. Now this definition is quite elaborate but it focuses on 3-4 things.

One it says, that management must be concerned with efficient utilization of all the resources that it has got with it, the resources are human resources, the people who are associated in doing the work, the employees of the organization, the financial resources, the cash, the investment made by the owners and the physical resources like material, machines, buildings they must not remain ideal, they must be efficiently utilized to do the work. So these aspects are highlighted here.

But at the same time what is also highlighted in this definition is that it says who are the main stakeholders of a company. There are 3 types of stakeholders that it talks about. One the employees, they must be properly paid remuneration and wage; they must be properly paid the organization must make enough profit, it must have enough income so that it can pay its employees well.

Number 2 is the customers for whom the products and services are made. Customers must be given their products in the best quality possible and at the least price or most reasonable price so that they buy your product. The customers must therefore must be satisfied. The investors who have invested their money in the business enough return on investment must be available at the end of the year so that the profit the investor get some profit or certain dividends.

This is the investor interest. And finally one the organization should not indulge in making products and services that are bad for the society at large. It should not create pollution for example which will affect the human population or the animal population. Now it should not pollute the environment. The society and the environment must not be affected by the work of the organization.

So this definition is very elaborate but it highlights many, many important aspects. It talks about efficient utilization of resources, it talks about satisfying the stakeholders of the company and it also talks about the efficient utilization of the resources.

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- 'analyzes alternatives, decides which alternative is the best, and acts (or motivates others to act) to accomplish some end'.
- Management is 'the process of designing and maintaining an environment in which individuals, working together in groups, efficiently accomplish selected aims'.

We take 2 more definitions. One it analyzes alternatives, decides which alternative is the best, and acts or motivates other to act to accomplish some end. Now this definition talks about how a decision is taken to act or motivate others to act to achieve the desire end. It says that it has to first of all have certain alternatives, evaluate those alternatives and they decide which alternative is the best way of achieving the goal and then acts to achieve that objective or the goal.

So this talks about little detailed aspects of how actions are results from planning, comparing—evaluating the alternatives and deciding an acting. The final definition is management is the process of designing and maintaining and environment in which individuals working together in groups, efficiently accomplish selected aims. So this definition is more about designing proper atmospheres a proper work environment which motivates the employees of the organization to work in cohesion, to work in a group to achieve the desire objective.

So this 5 or 6, I think 5 definitions highlight many aspects of management that we shall elaborate in course of our lecture, but understanding in-depth their meaning is very important and therefore I spent nearly 20 minutes' time on these definitions. Now that we have got these definitions and certain ideas regarding what management is about. Let us now take up some more topic or rather before we do that—

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## Common Themes in the Definitions

- Management is concerned with a group.
- Management is universal.
- Management is goal-oriented.
- Management is concerned with enhancing productivity.

Let us find out the common themes in these definitions. One, management is concerned with a group. Whenever we talk of management it is not a single persons' aim, it has to be group activity and that is where management is mostly applicable. The second aspect is that management is universal.

When I say management is universal it means that it has implications in all types of systems whether they are products, product manufacturing systems or service delivery systems whether it is hospital or an education institute or whether it is a auto manufacturing company or a television manufacturing company. Now it is universal, it is ubiquitous. When we are making a plan to make a tour of let us say Andaman, we will also have to manage this.

If we are conducting a festival in an institution Spring festival or Techno festival, then also we need to manage the event. So whenever there is a group activity management principles are very relevant, they are universal, they are ubiquitous. Management is goal-oriented. Everywhere throughout our lecture we shall focus on deciding on certain goals or objectives, certain aims. If you do not have specific aims or objectives or goals we shall define each one of them separately the meaning of the what goal, the meaning of the word objective and etcetera.

But for the time being, let us assume that they are synonyms. Unless we have an end we shall do anything we like without knowing what exactly we want to be or what we want to achieve



therefore goals must be fixed. So these definitions all along say to achieve an end, to achieve an objective or a goal, to accomplish a task to achieve a goal, so these definitions also highlight the goal orientation of management.

It is also concerned with enhancing productivity and similar such measures. Productivity means produce more by efficient utilization of your input resources. Use less input produce more output, that is productivity. And we shall discuss little more later on the various meaning of the word productivity. But basically it talks about efficient utilization of the resources that we have with us or with that the organization has with it.

So these are different connotations from that we have derived from the definitions that we have outlined earlier for the word 'Management'.

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## **Management - An Art or Science**

- All art forms, like music, painting and architecture, depend on observation, experience, and individual judgment.
- For long, medicine and engineering had remained more like 'art'.
- But the use of 'the scientific method' has helped in organizing knowledge about these subjects. This underlying organized knowledge has transformed medicine and engineering into subjects of science.
- Management had remained an art. But it is in transition from an art based on experience to a profession based on underlying organized knowledge and structure of principles of science, just as medicine and engineering.



Now that we have done this let us go further and talk about a very interesting topic of whether a management is an art or a science. In this context, we would like to give some idea regarding art for example. We know that music is an art, painting is an art, architecture and medicine they use to be art particularly medicine and architecture they continued to be art for very, very long time. But today medicine is no longer an art. Architecture has also his wide aided by the scientific approaches that have been forwarded by many pioneers in the field.

So all though medicine and architecture remain at for 1000s of years, today they are no longer art. Similar is the story with management. Management have gone through a complete metamorphosis in the last 150 years. At one time it was an art, it depended on the judgment of the person who was managing the work, who was getting things done. But today this decision or this judgment is backed up by different ideas that are generated from scientific approach to the problem.

And we will see that many problems managerial problems can be solved by scientific approach. However, a number of management problems still elude scientific solutions and depends still on the art management as an art. This is what we are trying to say in this slide. Medicine and Engineering had remained more like an art in the past but today with the use of scientific method that has helped in organizing knowledge about these subjects.

Medicine and engineering have been transformed into subject of science. Management had remained an art. But it is in transition from an art based on experience and judgment to a profession based on underlying organized knowledge and structure of principles of science, just as medicine and engineering.

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## **Evolution of Management Thoughts**

- Taylor – The Father of Scientific Management
- Fayol – The Father of Modern Management
- Mayo – The Father of Humanistic School of Thought
- Others (Gantt, Frank and Lillian Gilbreth, Drucker)



Now let us dwell on certain events that happened 100 years ago or more on how management as a science developed. And the credit of management growing as a scientific profession is given to

Fredrick Taylor. So it is important to know how Fredrick Taylor developed these ideas, what his ideas are and how relevant those ideas are in today's context. Well, all though we shall talk about Taylor who is also called the father of Scientific Management.

There are others like Fayol and Mayo who are also credited with giving new ideas to principles of management. Fayol is called the father of Modern Management and Mayo the father of Humanistic School of Thought. And there are a large number other contributors to the arena of the management thoughts. We will of course not be able to discuss many things, but definitely I would like to talk about these 3 towering personalities who have contributed maximum to the thought process of management particular in its initial phase of development.

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## Fredrick Winslow Taylor [1856 –1915] The Study of Shoveling (1889)

- Bethlehem Steel Company, USA,
- 400-600 men handling a variety of materials, that included coal, ore, and ash.
- Taylor was interested to find out the best shovel sizes for the materials carried.



First, Fredrick Winslow Taylor, born in 1856 and continued up to 1915. There is a mistake here. This should be 1889. Fredrick W. Taylor famous for giving the foundation of Management as a science. The work that he did, he did lot of work but the work that received the attention of the (( )) (29:45) fraternity engineering fraternity is the study on Shoveling that he carried out in Bethlehem Steel Company, USA in the year 1889.

Bethlehem Steel Company he studied a problem where 400 to 600 people were handling a variety of materials like coal, ore and ash. Now density-wise you will see that are iron ore will be the highest followed by coal followed by ash. And Taylor was interested, he was a young

engineer. He was interested to find out the best Shovel size for the materials carried, okay. What should be the size of the Shovel for different types of materials that are been that were been carried. Remember or notice that the materials coal, ore and ash has different densities.

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**Observation:**

Each man had his own shovel to handle the materials.

While shoveling coal, the load carried in the shovel was about 3.5 lbs, while it was 3.8 lbs for ore.

**Hypothesis:**

Different shovel sizes should be used for materials of different densities to maximize worker productivity.

**Testing of hypothesis and Analysis of the test results::**

He selected two good, experienced shovellers.

He gave them large shovels that carried large load.

He successively reduced the shovel size by cutting off their tips.

He noted the amount shoveled per day – a measure of the worker productivity.



Now he observed that each man was choosing his own shovel to handle the materials and there was a specific shovel that was assigned to him and the person was using his own shovel to handle the materials and that was nothing very surprising about it, normally I use my own tool. So similarly, a worker was given a shovel and he was using that shovel so apparently it was not very surprising. But Taylor thought otherwise.

He thought that it is possible to design the shovel size so that the person's productivity in terms of tons' shovels, tons of material shovel in a particular time period is maximized. So first he observed and he found that while shoveling coal, the load carried in the shovel was about 3.5 pounds while it was 3.8 pounds for ore. So it was little more compare to ore, compare to coal. So he made a hypothesis based on this observation.

That different shovel sizes could be used for materials of different densities to maximize worker productivity. He says if it is ash a different shovel size should be used, it is ore another shovel size should be used and if it is coal still some other size of the shovel should be used. There

should be different sizes depending on the material that is shoveled. This was his hypothesis and he was not sure whether this hypothesis would be true.

So what he did was that he carried out certain experiments or tests and analyzed those results. Testing of hypothesis and analyses of the test results. So what he did, he selected 2 good, experienced, shovellers and then he gave them large shovels that carried large load. He successively reduced the shovel size by cutting off their tips then he noted the amount shoveled per day and use that as a measure of the worker productivity. That is the analysis of the result.

So he met them, use different shovel sizes and then he noted down the amount shoveled per day and that was the measure of the productivity of the worker.

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***Conclusions:***

The maximum material was shoveled per day when the load on the shovel was 21.5 lbs (for distances up to 4 ft. and heights less than 5 ft.).

This meant that small shovels were needed to carry heavy load (ore) and large shovels were needed to carry light load (ash), so that the load carried in a shovel was constant.

Thus, Taylor accepted his original hypothesis that different shovel sizes should be used for materials of different densities.

The maximum material was shoveled per day when the load on the shovel was 21.5 pounds. The maximum material went up to 21.5 pounds per day compare to only 3.5 or 3.8 pounds. This meant that small shovels were needed, this was his conclusion that small shovels were needed to carry high density load such as ore. And large shovels were needed to carry light load, so that the load carried at anytime on a shovel was constant.

So if the density is high the shovel size is small therefore the volume carried was small so that density\*volume is same as when it was carrying ash low density and large volume, so that the

load carried was constant. So what was happening earlier was that when a particular person was using the same particular shovel for ore he was carrying more material because the size of the shovel was high large so the weight of the shovel of weight of the material carried was large so his productivity had come down.

Now according to his principle, if the ore was to be shoveled then a smaller size shovel was good or better and when ash is to be transported or a shoveled then a bigger size shovel would be more suitable. Thus, Taylor accepted his original hypothesis that different shovel sizes should be used for materials of different densities. This was his conclusion.

So he made first of all certain observations regarding the way things were happening in Bethlehem company, second he made hypothesis, third he tested under certain conditions so was to either accept or reject his hypothesis, he analyzed the results and finally concluded that his original hypothesis is, is okay, it cannot be rejected, it has to be accepted.

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**Taylor put his findings into practice in the following ways:**

A tool room was established and special shovels were purchased.

The foreman notified the tool room in advance the work his gang men would do that day.

Large size shovels were provided for shoveling ashes, middle-size shovels for coal, and small-size shovels for shoveling ore.

When implemented, productivity increased from 16 to 59 tons/day.

Now Taylor put his findings into practice in the following ways. A tool room was established and special shovels were purchased. The foreman notified the tool room in advance the work his gang men would do that particular day that means whether they would carry ash or whether they carry ore. Large size shovels were provided for shoveling ashes, middle-size shovels for coal, and small-size shovels for shoveling ore.

When implemented, the productivity increased from 16 to 59 from 16 tons per day to 59 tons per day about nearly 3.5 or 4 times productivity improved. Now look at the implementation. What he did was that certain procurement was made different sizes of shovel were procured and they were kept in the tool room. Then the foreman informed the tool room in advanced that that particular day ash will shoveled or coal will be shoveled or ore will be shoveled.

Accordingly, the shovels of that size were issued to the persons. Now contrast this with the previous practice were the worker use to select his own shovel and was using it. Now this is a change in the practice of management. The way it was been managed, the workers were choosing their own tools, they were now said that no, tools will be issued to you depending on the type of work you are going to do.

So this is a change in the philosophy the management philosophy that Taylor propounded way back in 1859, nearly a century and up ago.

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## Elements of Scientific Method

- Observe
- Hypothesize
- Test and evaluate
- Conclude

The study of shoveling had all these elements.

Taylor rightly coined the term 'Scientific Management' to emphasize the scientific approach the management should take to accomplish its tasks.



The methods that Taylor followed was similar or was akin to the elements of scientific method. Scientific method is a celebrated method that is used in science to prove or disprove hypothesis. The same method known as Scientific method is also used in social science to test hypothesis and to either reject it or accept it.

And scientific method are these 4 elements of making observation, making a hypothesis which is usually called a null hypothesis and then test the hypothesis, reject the hypothesis or do not reject the hypothesis. And Taylor had exactly followed this sequence to arrive at his conclusions. And this got wide attention in the management and engineering fraternity of those days in USA.

And Taylor coined the term 'Scientific Management' to this approach to emphasize the scientific approach management should take to accomplish its tasks. So this he coined the term 'Scientific Management' to emphasize that management at least in the subfloor is not an act it can be supported by the same scientific method that is used in science and social science to understand the nature of relationship and to improve and design the systems.

The similar approach is can be utilized also in management. So he termed he coined term 'Scientific management'.

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## Essence of Scientific Management

- Presented in two books entitled
  - Shop Management' (1906)
  - The Principles of Scientific Management' (1911)
- Use the elements of 'the scientific method', rather than 'rules of thumb', for each element of a man's work.
- Management should plan the method of doing a work, rather than leave it to the worker to choose his/her own methods and select his/her own tools and equipment.
- Management must select the best worker for each particular task and then train, teach, and develop him, instead of allowing him to select his own task and train himself as best as possible.
- There should be equitable division of work and responsibility between management and worker.



And in fact, he had written 2 books. One in 1906 calling it Shop Management, the other in 1911 calling it Principles of Scientific Management. Now his other contributions are the following, he uses the elements of scientific method rather than thumb rules for each element of a man's work. Management should plan the method of doing a work, rather than leave it to the worker to choose his/her own methods and select his/her own tools and equipment.



This is what I was trying to tell you. The work on shovel clearly showed that that management had made a plan as to how to carry out a work and not allow the worker to choose his methods of doing the work. Management must select the best worker for each particular task and then train, teach and develop him, instead of allowing him to select his own task and train himself as best as possible.

And there should be equitable division of work and responsibility between management and worker. That means a worker should know what his responsibilities are and management should also be aware of his own responsibilities. The management is supposed to plan the methods of work the tools and the techniques that the worker should follow. He should select the best worker, he should give the best possible training to do the work in the way the management decides and then the worker will do the work.

So this division of labour of planning and execution between management and worker was Taylor's original idea.

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### Other Notable contributions of Taylor

- He is the inventor of High Speed Steel (HSS) that trebled production.
- He developed a 'tool-life equation' that is extensively used even today to estimate the life of a tool.
- He introduced the use of stopwatch to study the time of doing an operation. This led to the practice of 'stop-watch time study'.
- He introduced wage incentive systems to pay higher wages to more productive workers. The 'piece-rate system' is his idea.
- He suggested a 'functional organization' of flow of authority in which he called for managers with specialized knowledge to guide the workers to do their work efficiently. He thus introduced the idea that specialization can be achieved in managerial functions.



Now other notable contributions of Taylor are the unique contribution of inventing High Speed Steel that almost trebled production in particularly in the machining process. Taylors 'tool-life

equation' is extensively used today by production engineers to estimate a life of a tool. Taylor also introduced this stopwatch time study to find out the time of doing an operation.

He introduced also the wage incentive systems, he said, a person who is more productive a worker who is more productive should be paid higher wage. And 'piece-rate system' the more you produce the more wage you earn was his idea. He suggested also a 'functional organization' of flow of authority in which managers with specialized knowledge will guide the workers to do their work efficiently. We will talk about functional organization in some detail later.

So you can see the Taylor in his lifetime not only contributed to the original termed Scientific Management but he also proved it by many of his contributions. The wage incentive system, the tool life equation and talking about functional organization are all his ideas. Therefore, that Taylor is called father of Scientific Management is fully justified.

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### ***Fayol – The Father of Modern Management***

Henry Fayol [1841-1925] was a French contemporary of Taylor. A Mining Engineer, he joined a coal mining company and ultimately became its Managing Director.

In 1916, he authored a book entitled 'Administration Industrielle et Generale', which, in English, means 'General and Industrial Management'.

- Fayol was concerned with functions of top management (administration). He enunciated certain theories of administration and stressed that they are equally applicable to all forms of organized human co-operation.



Now we shall quickly go through some other works by his contemporaries. Fayol was a contemporary of Taylor. He is from France. A Mining Engineer, and became the Managing Director of that company. His contribution is given in the book which he authored in 1916 on Administration Industrielle et Generale which in English means 'General and Industrial Management'.

Here Fayol is more concerned not with subfloor management but with top management like administration. So he is more concerned with theory of administration and he is called the father of Modern Management.

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Six activities basic to all individual organizations are:

Technical  
Commercial  
Financial  
Security  
Accounting  
Managerial

Five functions of management:



planning  
organizing  
command  
coordination  
control

And he says that their different activities that are basic to all individual organizations. There are Technical activities, Commercial activities, Financial, Security, Accounting, Managerial. He was the first person who suggested that management has got various functions. We will in fact devote a full lecture on this functions of management and he told about planning as a first function, organizing, command, coordination and control.

As I said, we shall discuss on these functions of management elaborately in our forth coming in our next lecture in fact.

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## Mayo – The Father of Humanistic School of Thought (1880-1949)

A Harvard sociologist.

Introduced the humanistic school of thought into the theory of management.

He was leading a team which was analyzing the effect of illumination on the worker productivity in assembling relays in Western Electric Company at Hawthorne.



The team worked with a hypothesis that better lighting condition has a favorable effect on worker productivity.

Then we talk about Mayo, the father of Humanistic School of Thought. He was also a contemporary of Fredrick Taylor. He was from Harvard University. He is a Sociologist. And introduced the humanistic school of thought into the theory of management. Like the story of shoveling there is a story about the Western Electric Company at Hawthorne known as Hawthorne story.

There the managers were studying the effect of illumination on worker productivity. That means if the work area is properly illuminated they were having a hypothesis that if the work area is properly illuminated then the worker productivity will rise. They were already conducting such a study. And they were having hypothesis that better lighting condition has a favorable effect on worker productivity.

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Efficiency experts at Hawthorne hypothesized that better lighting condition has a favourable effect on worker productivity.

They selected two groups of workers. One group (Control Group) worked in a room with similar lighting conditions as the workshop, whereas the second group (Test Group) worked in another room with lighting conditions that were controlled at desired values.

As expected, the worker productivity increased for the Test Group when the illumination was better.

What was not expected, however, was that the worker productivity also increased for Control Group.

No definite conclusions could be drawn.

 They therefore invited the sociologist Mayo and his associates of Harvard Graduate School of Business Administration to conduct a study.

So what they did, they selected 2 groups of workers. One group called a Control Group worked in a room with similar lighting conditions as the workshop, and a second group called a Test Group worked in another room with lighting conditions that were controlled at desired values. That means the Test Group was they were working in a place where the illumination was sometimes very good and sometimes very bad. So that was the Test Group.

They found that the worker productivity increased for the Test Group when illumination was better. What was not expected, however, was that the worker productivity also increased in the Control Group although there was no better illumination, it also increased in the Control Group. So they could not explain why when the illumination was not better in the Control Group their productivity is rising, so no definite conclusions could be drawn.

They therefore invited the sociologist Mayo and his associates of the Harvard Graduate School of Business Administration to conduct a study.

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Conducted the study in the telephone relay section of the company.

They selected a group of women workers and introduced the following working conditions for them:

- scheduled rest periods
- company lunches
- shorter work weeks

The output of the workers rose dramatically.

Later they withdrew the privileges, output rose to a new time high.

This result was baffling.

The only explanations that the team could offer were:

Human factors were at work.

They conducted the study in the telephone relay section of the company. They selected a group of women workers and introduced the following working conditions for them. They gave them scheduled rest periods, company lunches and shorter work weeks. And they found that their output has rose dramatically. So when these privileges were given to these women workers their output improved dramatically.

And later they withdrew these privileges. They found that instead of their output coming down it rose to a even new time high. This result was baffling. So they then said the only explanation that they could give was that Human factors were at work. It means what?

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Women felt that they were an important part of the company.

They apparently looked upon themselves as participating members of a congenial, cohesive group as a special or select organization.

The relationships elicited feeling of affiliation, competence, and achievement.

Work to the group members became more meaningful and interesting, leading to increased output.

Mayo concluded that human factors were more important than technical and physical factors.

This was the beginning of 'the humanistic school of thought' which demanded greater recognition of the human element in any organized activity.

It meant that women felt that they were an important part of the company. They apparently looked upon themselves as participating members of a congenial, cohesive group as a special or select organization. The relationship elicited feeling affiliation, competence, and achievement. Work to the group members became more meaningful and interesting, leading to increased output.

Mayo concluded that human factor was more important than technical and physical factors. And this was the beginning of 'the humanistic school of thought' which demanded greater recognition of the human element in any organized activity.

So friends, there are many contributions, we have selected just 3 contributions to give a historical perspective. Taylor coined the term 'Scientific Management' and said that work methods must be planned for by the management. The best worker should be followed and trained so that the productivity rises. His ideas were applicable mostly at the subfloor.

Elton Mayo of the Harvard Business School, he and his associates on the basis of their study they said that the employees they contribute quite a lot. They have to understand that they are part of the organization. They must be committed to the work. If that commitment comes, if they feel that they are one in the organization, they are important in the organization, the feeling of importance, the feeling of belongingness if they then they will rise to the organization, meet their challenges and do work.

So the technical aspects, is important but the human aspects are even more important. This was the new school of thought the humanistic school of thought. And then of course we talked about Fayol of France, who said that management is universal and there are generic functions of planning, organizing, commanding, coordinating and controlling. These are the different functions of Management that are very generic in nature.

These aspects I have discussed here because I think that they will give you an insight as to how management principles have developed over the years. Thank you very much.