UNIT 4 SCIENTIFIC MANAGEMENT APPROACH

Structure

4.0 LEARNING OUTCOME

After reading this unit, you should be able to:

- know the importance of scientific management approach in the administrative theory;
- understand the contribution of the Tailor towards the scientific management approach;
- discuss the basic principles of scientific management; and
- explain the relevance and criticism of scientific management approach.

4.1 INTRODUCTION

In the previous units we have discussed the meaning, importance, significance of public administration. We also discussed the typology of organisations and evolution of administrative theories. In this unit we will be discussing the contribution of F.W. Tailor to the scientific management approach.

Scientific Management Approach is one of the important approaches in the field of administrative theory. This theory came in the wake of new industrial revolution that has taken place during the later part of the nineteenth century. Scientific Management approach is an attempt to solve the problems of complex organisations that have emerged as a result of industrial development. Frederick Winslow Taylor is generally

regarded as the pioneer of the scientific management approach, which paved way for the modern management approaches and techniques.

F.W. Taylor was born in a German town in Pennsylvania on March 20, 1856. He received education in France and Germany. He also received Mechanical Engineering degree from Stevens Institute of Technology of Hoboken, New Jersey. At the age of eighteen he joined the Enterprise Hydraulic Works, Philadelphia and served as apprentice for four years. In 1878 he went to work at Midvale Steel Company as a labourer and he became the Chief Engineer of that company in 1884. He became General Manager of Manufacturing Investment Company in 1890. In 1893 he opened an office in New York as a consulting engineer.

As an engineer he is instrumental in the development of new technologies, he invented several tools to increase the production. Some of the important tools he developed were cutting tool, a heat-treating tool, a steel hammer, hydraulic power loading machinery, boring and turning mills etc. He was always interested in improving upon the techniques of management. He emphasised on the scientific way of developing the tools as well as scientific way of performing the job. He has passion for efficiency and scientific way of work in the organisations.

4.2 F.W.TAYLOR: HIS WRITINGS

The contribution of Taylor for the scientific management approach can be traced in his major writings. His writings bear his intimate observation of the work at the work place and his desire to improve the production and efficiency in the organisation. The major writings of Taylor are, A Piece Rate System (1885), Shop Management (1903), The Art of Cutting Metals (1906), The Principles of Scientific Management (1911) and The Testimony before a Special Committee of the House of Representatives (1912).

4.3 TAYLOR ON DEFICIENCIES OF MANAGEMENT SYSTEM

F.W. Taylor's important ideas on scientific management approach are explained in his writings. In 'A Piece Rate System' he propounded three basic principles. (1) Observation of work through time study (to complete the work and to determine the standard rate) for completion of work, (2) differential rate system for completing piecework and (3) payment to men not to positions. In his article on "Shop Management' he focused basically on organisation and management of workshop. He dealt about the need to maintain low production unit costs and payment of high wages, applying scientific methods of research, standardisation of working conditions, need for training and cooperative relations between workers and managements.

Taylor's stay at Midvale Steel Company and his close observation and study of different operations in different factories, made him to know the defects in their management. They are: lack of clarity of responsibilities by workers and managements, lack of standards of work, restricted output because of soldering of work, lack of job clarity which promotes soldering of work, lack of scientific base for

decisions, lack of division of work, and placement of workers at different jobs without considering their ability, skills, aptitude and interest.

His work on 'The Art of Cutting Metals' is based on extensive research of thousands of experiments conducted over a period of 26 years. He developed instruments for cutting of steel, studied motion and time and analysed how workers handle materials, machines and tools when they perform different works. Taylor felt that there is a best way to do every work and scientific selection of right men for right job is essential for maximum production in any organisation.

4.4 SCIENTIFIC MANAGEMENT APPROACH: THE CONTEXT

As mentioned above the scientific management approach developed in the early phases of industrial revolution. It tried to address some of the problems of industrial society. The basic concerns of industrial society were to improve efficiency, to reduce the cost of production and to increase the profits. This can be achieved through two-pronged strategy. One is related to improving the technology and the techniques of work along with efficient management of workers. The second is expansion of market to the new colonies. Taylor was trying to address the first concern of the industrial society. Hence he emphasised more on scientific knowledge of doing things and scientific way of managing organisations.

4.5 SCIENTIFIC MANAGEMENT: THE BASIC PRINCIPLES

To overcome the deficiencies in the management Taylor formulated four new principles / new duties to be assumed by the management which are known as the principles of scientific management. They are:

1. The development of a true science of work
2. The scientific selection of workmen and their progressive development
3. Bringing together of science of work and the scientifically selected workers
4. The equal division of work and the responsibility between management and workers

4.5.1 The Development of a True Science of Work

Taylor believed that there is a need to develop science of work. He further believed that there is one 'best way' of doing every job. This can be achieved by systematic study of any work and replacing the old thumb-rule method by developing a scientific method. This requires gathering mass of traditional knowledge, recording it, tabulating it and in many cases finally reducing it to laws rules and even to mathematical formulae. And later these laws and rules are to be applied to the everyday work of all workmen of the organisation. The scientific method of work saves worker from unnecessary criticism of the boss and the management to get maximum work from worker. It also results in establishing a 'large daily task' to be done by the qualified workers under the optimum conditions.

4.5.2 Scientific Selection and Progressive Development of Workmen

To ensure effective performance of the scientifically developed work there is a need to select the workers on scientific basis. It is the duty of the management to study the character, the nature and the performance of each worker with a view to finding out his limitations and possibilities for his development. Taylor believed that every worker has potentialities for development. Every worker must be systematically and thoroughly trained. Scientific selection involves selecting a right person for a right job. It is also necessary to ensure that the employee accepts the new methods, tools and conditions willingly and enthusiastically. There should be opportunities for advancement to do the job to the fullest realisation of his normal capabilities.

4.5.3 Bringing together of Science of Work and Scientifically Selected Workers

The third principle of the scientific management is bringing of science of work and scientifically selected and trained workmen together. Taylor says 'bringing together advisedly because you may develop all the science that you please and you may scientifically select and train workmen just as much as you please, but unless some men bring the science and workmen together all your labour will be lost'. Taylor felt it is exclusive responsibility of the management to do this job. He believed that workers are always willing to cooperate with the management but there is more opposition from the side of management.

4.5.4 Division of Work and Responsibility between Worker and Management

Traditionally the worker bears the entire responsibility of the work and the management has lesser responsibility. But Taylor emphasised on equal responsibility between worker and management. This division creates understanding and mutual dependence between them. This results in elimination of conflict and mistrust between the worker and management. Taylor thinks that scientific management can be justly and truthfully characterised as management in which harmony is the rule rather than discord.

4.6 SCIENTIFIC MANAGEMENT: OTHER IMPORTANT CONCERNS OF TAYLOR

In addition to the above four basic principles Taylor also expressed the concern for the following in the scientific management method. They are:

- Mental Revolution
- Functional Foremanship
- Work Study and Work Measurement
- Standardisation of Tools
- Selection and Training of Workers
- Task Prescription
- Incentive Schemes
- Work as an Individual Activity
- Trade Unions
- Development of Management Thinking

- Division of Work

Mental Revolution: Taylor was of the view that scientific management requires a great revolution that takes place in the mental attitude of management as well as the workers. Instead of focusing more on the division of surplus they should together turn their attention towards increasing the size of the surplus until the surplus become so large that it becomes unnecessary to quarrel over how it should be divided. Both should stop pulling one another and instead both should work together in the same direction to increase the surplus. They should realise that the friendly cooperation and mutual help results in increasing the surplus. Once the surplus increases there is ample scope for increasing the wages for the workers and increase in profits for the management. It is along this a complete change in the mental attitude of both the sides is required. Taylor further emphasised that the scientific management involves change in the attitude of the workers and the management with regard to their duties and responsibilities and towards their fellow workers. It demands the realisation of the fact that their mutual interest is not antagonistic and mutual prosperity is possible only through mutual cooperation. The principle object of management is to secure maximum prosperity for the employer as well as the employee. Taylor believed that there is no conflict in the interest of employees, workers and consumers. His major concern was that the results of higher productivity should equally benefit the employer, worker and consumer.

Functional Foremanship: Taylor is critical of linear system of organisation in which each worker is subordinated to only one boss. He replaced this system with what is called functional foremanship. In the functional foremanship the worker receives orders from eight different specialised supervisors. Thus he divided work not only among the workers but also at the supervisory level. Out of the eight functional supervisors, four functional foreman, namely the gang boss, the repair boss, the speed boss and the inspector will look after the execution of work and the remaining four will take care of planning aspects. They are the route clerk, the instruction clerk, the time and cost clerk and the shop displinarian. Through this functional foreman system Taylor wanted to create the narrowly specialised supervisor for each type of skilled work. He thought this will result in efficiency rather than one supervisor looking after all the activities. He further believed that in this type of organisation a foreman can be trained quickly and specialisation became easy.

Work Study and Work Measurement: Taylor advocated the need for systematic study of work. The use of time study can help us in finding out the optimal way of study carrying out a task. He considered it as an essential component of scientific management. It involves measuring and studying the ‘unit times’. Taylor conducted several studies to find out the standard unit of work to be carried out by an individual worker. He studied each and every movement of the worker in performing a particular task with the help of a stopwatch. By studying each and every movement of the work we can eliminate the unnecessary movements of the workers and find out the time required for the each movement. With the help of time study and work-study it is possible to perform a particular task with a lesser movement. The purpose of work-study is to eliminate not only unnecessary movements but also to eliminate the slow movements and fatigue of the workers there by it is possible to find out ‘the best way’ of performing each activity.

Standardisation of Tools: Taylor maintained that in addition to determining the best methods, the management also should standardize the tools in the light of the needs of the specific jobs. In an experiment at Bethleham Steel Works on shovelling of coal, Taylor found that the average shovel load varied from 16 to 38 pounds. Further experiments showed that good workers were able to shovel more tones per day if they used a shovel carrying the load of 21 to 22 pounds. Subsequently Taylor found that with the different types of materials to be shovelled, about 15 different types of shovels were needed. From then on when workers arrived in the morning they received written instructions on what to shovel and what type of shovel to be used. After three and half years 140 men were doing the work formerly handled by 400 to 600 workers. This shows that by using a proper instrument for each type of work we can achieve more work with the help of less number of workers.

Selection and Training of Workers: Taylor insisted that each worker should be given the job for which he was best suited. According to Taylor 'one of the very first requirements of the worker who is fit to handle the pig iron as a regular occupation is that he shall be stupid and so phlegmatic that he more nearly resembles in his mental makeup the ox than any other type' (cited in Bertram Gross, 1964, p.123). Taylor further felt that "there is work for each type of man, just as for instance, there is work for the dry horse and work for the trotting horse. There is no type of work, however, that suits all types of man" (Bertram Gross, p.123). It is therefore essential to find the realistic ways of judging their capacities of different workers. The management should give them formal training and clear instructions on precisely how to perform the prescribed motions with the standardized tools and materials. (Bertram Gross, p.124)

Task Prescription: Not only the tasks be divided and optimal methods of achieving the tasks be prescribed, the worker should also be given clear description of what he should do. Here Taylor emphasises that the tasks should be well planned in advance and the worker be given clear instructions concerning his particular task to be done. Proper task prescription will provide clarity to the worker as well as the management.

Incentive Scheme: Taylor suggested that the pay should be linked to the piece of work done by the worker. Payment should depend upon his achieving the prescribed output. In the event of achieving a greater output, then a bonus payment should be made to the worker. The bonus paid should be generous and consistent. This system will provide encouragement to the workers to produce more.

Work as an Individual Activity: Taylor is always opposed to any kind of group activity. He believes that people are motivated by personal ambition, and that once put into a group the individual looses his individual drive. He believes that the influence of the group makes one produce less. Further he argued that female workers were prone to such personal pressures and indeed separated them in such a way that verbal interaction was impossible. (Clegg and Dunkerley, 1980.p.89).

Trade Unions: Since Taylor was critical of group activity he was also against trade union movement. He regarded trade unions as unnecessary under his system of work. The employer according to him was on the same side of the workers. The goal of the workers and the employers is the same. Acceptance of scientific management principles would reduce conflict between workers and the management. Since

management itself laid down what was the 'fair day's pay' for fair day's work through objective rationale means, the need for trade unions does not arise.

Development of Management Thinking: Taylor through scientific management saw the development of management as a science. It implies that specific laws could be derived for management practice and those laws relate specifically to wage rates and ways of doing work. Arriving at these laws involved management in the use of scientific method.

Division of Work: Taylor felt that not only there should be a division of labor on a shop floor but also the division of work between the worker and management. According to Taylor the main function of management should be planning for future. The responsibility of worker is to concentrate totally on carrying out the given task. He believed that there were distinct personality types for performing planning function and doing function. The planning function relates to the managements and doing function relates to the workers. He also recommended minute division of tasks for each individual in the organisation.

4.7 SCIENTIFIC MANAGEMENT MOVEMENT

Louis Brandeis first used the word scientific management in the year 1910. In the earlier days Taylor usually referred to these techniques as the "Task System" or "Task Management". Later Taylor welcomed the more appealing nomenclature and declared "management is a true science resting upon clearly defined laws, rules and principles" (Bertram Gross, p.127). He felt that his work covered the entire sphere of Industrial Management. He was convinced that same principles could be applied with equal force to all social activities "to the management of our homes; management of our farm; management of our business of our tradesmen; of our Church; our philanthropic institutions; our universities and our government departments". (cited from 'Scientific Management' of Taylor by Bertram Gross, p.127)

Very soon Taylor became very popular. His close associates such as Henry Grantt, Frank Gilbreth and Lillian Gillberth etc., carried out further research in the area and published many articles and books. Many followers of Taylor served as advisors to hundreds of companies. Engineering Schools began to give courses on shop management and industrial management. Schools of business administration also started giving courses in these areas. Many special disciplines rooted in scientific management have emerged.

In brief scientific management became a "movement". It offered the hope of resolving industrial problems through the use of objective principles. The movement soon became replete with popularisers, traditionalists and dissidents. It had a tremendous effect on industrial practices in the United States. The movement soon became international, spread to Germany, England, France, Sweden and other European countries. Its greatest success however was in Russia. In 1917 immediately after the Bolshevik revolution, Lenin welcomed Taylor's techniques to Russia. He referred to Taylor's system as "a combination of subtle brutality of bourgeois exploitation and a number of its greatest scientific achievements". (Bertram Gross, p.128) The movement seems to have been supported by all contending factions at the higher

levels of the Russian Communist Party. Taylor's ideas were built into the curriculum for the education and training of the engineers who subsequently tended to monopolise managerial posts in the Soviet industry.

4.8 CRITICISM

Though scientific management became a movement and offered solutions to some of the industrial problems, it was equally opposed and criticised by many people. The scientific management has emerged at a time when capitalist development had reached the stage of requiring organisational changes in the functioning of industrial enterprise. Hence it is considered more as a pro-capitalist theory. The critics considered that the scientific management helped more the owners of industries than the workers. The trade unions were against scientific management methods. They considered Taylorism as not only destroying trade unionism but also destroying principles of collective bargaining. They felt that the scientific management was a menace to the community at large as it causes continuous increase in unemployment. Trade unions felt that Taylor was more interested in mechanical aspects of work and not much concerned about the total work situation. As a result there were a number of agitations by labour unions in America, which led the American Congress in 1912 to appoint a special committee of the House of Representatives to investigate in to Taylorism. The trade unions in 1915 succeeded in getting an amendment to the Army Appropriation Act forbidding the use of stopwatches or the payment of premiums or bonuses in army arsenals.

A still stronger attack was made by the investigation conducted by Professor Robert Hoxie on industrial relations. The Hoxie Report concluded that the approach of Taylor and his associates dealt only with mechanical and not with the human aspects of production.

A strong criticism came from Harry Braverman who in his book 'Labour and Monopoly Capital' (1974) argued that an analysis of Taylor's work enables us to distinguish three general principles of scientific management (Clegg and Dunkerly, 1980). They are:

The principle of dissociation of labour process from the skills of the workers: The Taylorism in other wards results in separation of worker from the knowledge that the worker might poses, particularly that knowledge deriving from a craft or traditional process. Now the labour process therefore is dependent upon managerial practices rather than worker abilities.

The principle of separation of conception from execution: By this Braverman refers to the division under the scientific management of manual and mental labour. The implementation of Taylorism leads to a situation where the organisation of work is the prerogative of the management where as the worker has to simply execute the work. In other words this is separation of 'mind' from the 'hand'. Those who work with hand and those who work with mind are two separate entities. This results in alienation of labour from the labour process.

The principle of use of monopoly over knowledge to control each step of labour process and its mode of execution: This principle is logically derived from the pervious two. It shows that the Taylorism results in the managerial section monopolising the knowledge of work and controlling the worker in each and every aspect of execution of the work. This results in domination of managerial class over the workers.

Several others criticised scientific management. Even the managers at that time were critical of scientific methods. They did not appreciate his comments on 'thumb-rule' methods. Managers were opposed to the Taylor's ideas of training programmes for the managers. It is interesting to note that Taylor had to resign from Midvale Steel Works and Bethlehem Steel Company because of the differences with the company managers.

The other critics of Taylor's scientific management include Oliver Sheldon, Mary Parker Follette, Elton Mayo, Peter Drucker and others. They charged that Taylor's scientific management was impersonal and underemphasised the human factor. This criticism led to a series of experiments in industrial sociology and social psychology. The studies of Elton Mayo and other researchers on human relations have rejected Taylorism. Taylor's philosophy that men were generally lazy and try to avoid work has also been criticised.

Another criticism of Taylor is that he did not properly understand the anatomy of work. His emphasis on minute division of work was criticised on several grounds. Firstly, the work gets de-personalised and the worker becomes a mere cog in the machine. The worker lacks the sense of participation in the work; the worker has no outlets to exhibit all his potentialities. Secondly, Taylorism may lead to automation of workers, which may have psychological consequences. Peter Drucker, management expert, aptly says that the organisation became a piece of poor engineering judged by the standards of human relations as well as those of productive efficiency and output.

Taylor's functional foremanship was criticised by many saying that it will lead to confusion when each worker kept under the control of eight supervisors. A worker may not be able to satisfy eight supervisors in all the aspects.

4.9 SCIENTIFIC MANAGEMENT: RELEVANCE

Scientific management helped many industrial organisations in the United States to overcome the problems of workers. In the similar way Taylorism spread to England to resolve industrial crises in that country. At a time when there is an industrial unrest and increasing unemployment, the scientific management came to the rescue of industrial organisations. Any developing country like India which are facing similar industrial problems can learn lessons from scientific management. With the application of principles of scientific management it is possible to improve the efficiency of organisations. As it is discussed earlier, even the socialist societies such as Russia have welcomed the scientific management principles, which are developed in the context of capitalist economy. This shows the relevance of Taylor's scientific management to the organisations irrespective of the nature of economy.

4.10 CONCLUSION

The above discussion on scientific management shows that the Taylor's scientific management was responding to the problems of the early industrial organisations. Taylorism provided certain practical solutions to the problems of industries and they got benefited from scientific management. Taylor firmly believed that there is a 'best method' for doing any work. One has to find out the best method by systematic study of work. Taylor emphasised that the management has to take up equal responsibility for the work done in the organisation. He also emphasised that there is a need to select the right type of persons to perform the job and also train them in improving the performance. Apart from systemic study of the work, the standardisation of tools and procedures are necessary. There is also a need for complete understanding and cooperation between the worker and the management. They should instead of focusing on increase in the wages and profits; they should give importance to increase the production.

Taylor's ideas have helped the industrial societies to overcome the basic problems of low production and labour problems. Because of the scientific nature of Taylor's ideas they have spread not only to the European countries but also to the socialist societies like Russia.

4.11 KEY CONCEPTS

Bonus: It is an incentive given to the worker who produces over and above the prescribed amount of work.

Division of Work: In the context of scientific management Taylor emphasised on equal division of work and responsibility between the worker and management.

Functional Foremanship: Taylor suggested eight different supervisors at the work place as against the earlier practice of one supervisor looking after all the activities of the workers under him.

Mental Revolution: It means the change of attitudes of both the workers and the management. They should work with mutual cooperation and mutual interest focusing on increase in the production rather than asking for it's sharing.

Scientific Management: Scientific management became popular with the writings of F.W. Taylor. It broadly indicates undertaking of any work in an organisation in a systematic, planned and organised manner. It includes evolving a correct way of doing work and selecting a suitable individual to perform that work.

Scientific Selection: Selecting the right person for the right job in the organisation and imparting them the necessary skills.

Work Measurement: Measuring of the amount of work done by the individual with the help of a stopwatch with an objective to establish a standard unit of work to be done by the worker.

Work Study: It indicates the study of different aspects of work and time and motion involved in completing the work. The objective of work-study is to fine out the best method of doing any work.

4.12 REFERENCES AND FURTHER READING

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4.13 ACTIVITIES

1. Do you think that the then prevailing deficiencies in the management system have forced Taylor to propose scientific management approach. Discus.

2. Do you think that the scientific management principles are applicable in modern administration? Explain.

3. Do you think that scientific management approach has widened the horizons of the discipline of public administration?