

Frederick taylor's scientific management



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Introduction

Frederick Winslow Taylor (1856-1915) an American engineer made major contributions to the development of organizational theory and practice and is considered as the father of scientific management. His publication of “ *The Principles of Scientific Management* ” in 1911 was a major milestone in the evolving management theory (Rose, 1988).

Does ‘ Frederick Taylor’s Scientific Management reflect an approach to managing that is no longer appropriate for today’s managers’, or is it still appropriate for today’s managers is the subject (of this paper).

The workplace I will be referencing is, Jebel Ali Container Glass Factory (‘ JACGF’). ‘ JACGF’ based in Dubai, was established in 1998, and is engaged in the manufacture and sale of glass containers for food and beverage industry. The company’s clientele includes large and reputable multinational food and beverage companies such as Coca-cola International, PepsiCo International, with all the products manufactured against confirmed orders.

In my critical evaluation of the ‘ statement’ in question, I will be discussing Taylor’s theory and critically evaluate this ‘ statement’ through subsequent developments in management theory, with particular reference to examples from my workplace ‘ JACGF’ with which I am familiar, and finally state my conclusions.

Discussion: Frederick Taylor’s Scientific Management

Taylor stated the principal object of management should be to secure maximum prosperity for the employer, coupled with the maximum prosperity

for each employee (Taylor F. W., 1911). His *Scientific Management* was presented to achieve this principal objective, by eliminating waste and inefficiency. He believed through methodical study and scientific principles it was possible to establish the 'one-best-way' of carrying out a task or job, with the focus being on the design and analysis of individual tasks, and once this method of work had been established it had to be adhered to consistently, as opposed to the 'rule-of-thumb' approaches adopted by many managers at that time.

The key elements in developing the 'one-best-way' being, firstly it is the accumulation of knowledge about work tasks and then the creation of a set of basic rules and practices or the development of a 'science', for each element of a man's work by simplifying the work and breaking down the task into smaller tasks, which replaces the old rule-of-thumb method. "In the past man has been first; in the future the system must be first," (Taylor F. W. 1911). Secondly to select, and then train, teach and develop workman, whereas in the past workman chose his own work, trained himself as best he could. Thirdly, management cooperates with the workmen to ensure all the work being done in accordance with the principles of the 'science', which has been developed. Fourthly, segregation of the 'work' and 'responsibility' between the 'workmen' and the 'management', the management takes over all work for which they are better fitted than the workmen. With this, maximum output is achieved instead of restricted output and the development of each man to his greatest efficiency, higher wages and prosperity.

The ideas of 'scientific management', being the earliest attempt to profound a theory for managing organizations, dramatically increased productivity across all industries at that time, it was designed to meet the circumstances or situations of that time, and its appropriateness was questioned once the circumstances and situations changed. Indeed, the concept of arranging work based on careful analysis of tasks for maximum productivity is deeply embedded in our organizations (Geoffrey Colvin, 2000).

The approach sought to address a clear way of managing organizations, but incorporated a negative view of human nature, which was a practice at that time. One of the main drawback being, it ignored the social context and workers need, where they were 'relegated' to be simple parts in a greater machine, which resulted in workers feeling of exploitation, contradicting from harmony and cooperation envisioned by Taylor. The workmen that were being managed at that time, in his study, were mostly illiterate migrants and there were no stringent labour laws and regulations in place unlike in today's context. Scientific management regarded workers as uninformed, and ignored their ideas and suggestions, and did not accept variance among individuals. Scientific management emerged, as a result of the dominance of the US experience in management theory, the *Social*, *Political* and *Economic Forces* relates to a time and place reflecting this dominance, and not global.

Scientific Management with reference to examples from a workplace familiar to the author and in reference to other developments on Management Theory

Example 1 – “ Job On”

After a production run of a particular product, ' JACGF' implemented a “ Job-Off” meeting and all the departments (units), bring their records, of all the modifications that were done for the setting (machine set-up) to increase the efficiency, reduce the stoppages and optimized the glass weight of the product in relation to glass distribution, capacity, height and diameter of the product. Optimum machine-speed settings and the optimum temperature settings are recorded, and quality issues and corrective actions are identified under different categories of defects. This gives a ' clear set of instructions' related to the ' settings and parameters' for the next job run of the *same product* to avoid trial and error method, and as the starting ' settings and parameters' for a *new product* similar to this product. Along with this, ' JACGF' implemented a “ Job-On” meeting before starting a new production run, to ensure everything is planned, and the new run starts-off with the ' one-best-way' identified in the previous “ Job-off” work instructions.

In this example the approach to managing was based on the principles of scientific management. There was a systematic collection of knowledge about work processes, the removal of worker discretion and control over their activities, and the creation of standard rules and procedures, i. e. development of a ' science' for each element of work, in performing the task. Though the scope of whole process was much wider the approach and methodology was within the framework of ' scientific management'. With this approach to managing, costs were reduced, output increased and profitability increased. In return the workers benefited from higher pay and incentives, improved living and working conditions and overall increase in

the morale of workmen. The principal object of management profounded by Taylor i. e. maximum prosperity for the employer and maximum prosperity for the employee was achieved. The difference in the approach between this example and 'scientific management,' is that in this example, other management practices were incorporated along with the principles of scientific management, and using Information Technology, a sub-field of *management science perspective*, reflecting the management information systems, which provides relevant information to managers in a timely & cost-efficient way.

Taylor's scientific management was concentrated on the workmen or the productivity of the individual worker, but the '*administrative principles*' approach of management brought forward by Henri Fayol, Mary Parker Follett, and Chester I. Barnard focused on the total organization. Henri Fayol(1841-1925), in his *General and Industrial Management* (Henri Fayol, 1949) discussed 14 general principles of management, most of which are part of management practice 'today' even at 'JACGF', including Unity of Command, Division of Work, Unity of Direction, Scalar Chain. These principles can be applied in any organizational setting unlike Taylor's theory, which are focused on 'workmen' and 'machines operated by workmen'. Fayol identified five basic functions of management: planning, organizing, commanding, coordinating and controlling, which are still valid in the general approach to today's management theory. Abraham Maslow (1908-1970) a contributor to the *human resources perspective*, profounded the theory of hierarchy of needs, which started with physiological needs, and progressed to safety, belongingness, esteem and finally, self-actualization needs. Where

as Taylor's 'scientific management' did not try to understand the humanistic perspective or the higher needs of workmen. The higher wages was structured to the level, where it fulfills the physiological needs, and higher wages above this 'scientifically formulated' increase (e. g. 60% more than present); was identified as detrimental to 'scientific management'. Another contributor to the *human resources perspective*, Douglas McGregor (1906-1964), challenged 'Taylorism', McGregor believed that the 'scientific management' perspective as profound by Taylor, is based on theory X assumptions about workers: { *the average workman has an inherent dislike of work and tries to avoid it if possible, and due to his dislike of work most workman must be coerced, controlled, directed, and avoids responsibility with relatively little ambition, and above all seeks security* }. McGregor proposed theory Y in contrast to Taylor's 'scientific management' as a realistic assumption about workmen in guiding management thinking: { *the average workman does not inherently dislike work, workman will exercise self-direction and self-control, and does not need external control in the performance of objectives or tasks, the average workman learns under proper conditions to accept and seek responsibility* } (Douglas McGregor, 1960). Very few companies today uses theory X only, which has similarity to Taylorism, where as many companies including 'JACGF' uses Theory Y techniques.

Scientific Management assumed a universalist view, i. e. what is applicable for one organization is applicable for another organization and management concepts thought to be universal, where as in business education always an '*alternative view*' exists, every situation is believed to be unique, principles

are not universal, managers learn by experiencing different situations and face the task of deciding the methods that will work in a new situation. 'JACGF' adopted the '*contingency view*', contingency view integrates the *universalist view* of 'scientific management' and the *alternative view*, which states certain contingencies or variables exist to identify and understand situations. 'Scientific management' did not extend to think in this direction at that time, where manager's has to learn and identify the patterns and characteristics of their organization and fit the solutions.

Example 2 – “Job-Change”

The average job run of a product was ten days, and the 'job-change' or conversion from one job to another took an average of eight hours, this was accepted as an 'industrial standard'. The "Job-On" meeting was further enhanced to include the job change procedures, and a work instruction for job-change was issued to minimize the job-change time. After detailed planning, by the departmental heads, all the tools and equipment were assembled, to minimize the *time and movement*. And accordingly the job-change is carried in a scientific manner based on a 'clear set of rules and procedures'. With this 'JACGF' reduced the job-change time to four hours, a reduction of 50%.

This example is a direct 'scientific management' approach to managing, the difference between example 1 and example 2 from an operation view, is that in example 2, the one-best-way was appropriate for every single job or job-change where as in example 1, the one-best-way is specific to that job (product) only and another best-way for another job (product). Example 2 is

uniform for the whole process where as example 1, is specific for a particular product and not the whole process.

Example 3 – “ New-Job”

To avoid the problems associated with new mould designs where jobs have to be taken off the production line due to design defects of the moulds itself, as design defects costs money and time, *sample moulds* were ordered. Each machine has 12 individual sections, for which 36 individual moulds are needed, so instead of ordering and receiving the whole requirement ‘ JACGF’ started ordering a ‘ sample mould’ (i. e. one section only, consisting of three individual moulds). The job-change was redesigned to facilitate the trial run of this ‘ sample mould’ to ensure the design is correct, in compliance with the customer’s requirements related to design specifications, and to arrive at the ‘ set rules and procedures’ or the scientific setup of the best-way of operating to achieve the optimum product at the highest efficiency, which was previously done through the “ Job-Off” procedures. This whole procedure is done within the four hours of the job-change, which was previously considered as lost time, now turned into product development time, i. e. while changing from product X to product Y, the trial run of the product Z is done. When product Z is finally run the “ Job-On” meeting has all information needed to start-off, and fine tuning, and corrections in the set up if required are done during the run, and recorded by each department involved for the “ Job-Off” meeting. With this a ‘ clear set of rules and procedures’ are created for the next run of the same product.

Is there a thing called ‘ one-best-way’ of carrying out a task or job, and once this method of work is established should it be adhered to consistently.

Example 3 superseded the one-best-way identified by Example 1 and 2, where the requirements of Example 1, was incorporated to the process of Example 2. Example 3 came into operation by trying to solve a particular problem related to 'mould designs', at a different time horizon (2005). So 'one-best-way' today is not the 'one-best-way' tomorrow, but the approach to managing was the same.

The initial problem originated because 'JACGF' operates in an *open system*, interacting with the environment. In systems theory inputs are acquired from the external environment and goes through the transformation process to discharge outputs back to the environment incorporating the feedback mechanism for improving the system. 'Scientific management' thought organizations to be *closed systems* without external disturbances, where as in today's global context it is not. 'JACGF' also encourages *sub-systems*, which are independent parts of a system, being managed as a coordinated whole, with *decentralized decision making and empowerment*, which are contrary to the principles of 'scientific management'.

Empowerment originated from Mary Parker Follett's (1868-1933) ideas; she stressed the importance of people rather than engineering techniques as profound by Taylor in his 'scientific management'. The concepts of empowerment, facilitating rather than controlling employees, and allowing employees to act depending on the authority of situation, (Mary Parker, 1918, 1924) brought in new thinking, which were not presented by Taylor, and broaden the scope of management study. Toyota's just-in-time inventory control system was successful due to the *decentralized decision making*, where workmen were *empowered* to make decisions, and cultural values

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changed encouraging every workman to think creatively to improve his work and view problems as opportunities to learn and improving (*“ The Economist”*), which is critically contradicting to ‘ scientific management’ approach.

Chester I. Barnard (1886-1961) brought about the concept of ‘ informal organizations’, which is evident in all formal organizations, even at ‘ JACGF’, which includes cliques and naturally occurring social groupings. His arguments were that organizations are not mere machines and informal relationships are powerful forces that can help the organization if properly managed. And the ‘ *acceptance theory of authority*’, which states that people have ‘ free will’, and can choose whether to follow management orders, Manager should treat employees properly, as their acceptance of authority may be critical to organization success in important situations (William B. Wolf, 1968 & David D. Van Fleet, 1982). These theories critically contradict Taylorism, where Taylor believed the workmen to follow orders without questioning, and the aspect of work relating to conception or ‘ brain work’ is removed from the control of the worker and centered within the management structure, where as the above theories are based on a more ‘ *humanistic perspective*’ on management. These were further developed by the Human Relations Movement, and studies such as Hawthorne Studies which concluded that money mattered a great deal, but productivity increased partly as a result of the increased ‘ feelings of importance’ and ‘ group pride’, employees felt by being selected for such an important project (F. J, Roethlisberger and W. J. Dickson, Management and the worker).

Being associated with the food & beverage industry, JACGF's approach also necessitates incorporating 'Total Quality Management', which focus on managing the total organization to deliver quality to customers in dealing with global competition. The approach infuses quality values to every activity of the company and the employees are intimately involved in the process, and incorporating the principles of '*continuous improvement*'. 'Continuous improvement', critically contradicts with the one-best-way of Taylorism, where the implementation of small, incremental improvements, in all areas of the organization is done on an ongoing basis.

Example 4 – “ Warehouse Management”

Though the glass melting furnace capacity is 320 tons per day, JACGF had only two glass making production lines capable of producing 240 tons per day up to 2006, when the mismatch in the capacities was eliminated. This increased the capacity but brought about the problems of warehousing and loading containers for shipment. The constraints of loading containers resulted in receiving complaint's, and claims from the customers, for breakages of products occurring in the high seas, arising from improper loading. To solve this 'JACGF' brought in a carefully selected warehouse supervisor, who mathematically re-designed the loading plan to reduce the free space inside the container to avoid breakages at mid sea, and was able to load, an additional pallet of products, now 21 pallets of glass containers were loaded to a 40ft container, to the previous load of 20 pallets. The outcome of this was a reduction in the shipping cost and eliminating breakages at high seas. Further a methodology was created for the warehouse 'folk lift operators', ('operators') by identifying the 'one-best-

way’, where instead of the previous mode of operation, where different ‘ operators’ (3 per each bay) pick-up the pallets from different locations and load containers one by one, segregation of the loading was done. The first operator brings the pallets near the loading bay, the second operator takes the pallets, up the loading bay ramp, and the third operator loads the pallets inside the container.

This example is quoted to illustrate that for a different specific situation for today’s managers, the same ‘ scientific management’ can be an approach to managing. In this example, it was a direct approach to managing using the principles of scientific management as profound by Taylor, which proved that the principles of scientific management is appropriate for today’s managers.

Today, organizations are better described as learning organizations, which incorporates *Employee Empowerment* and *Open Information* , which is completely contradicting to ‘ Taylorism’. In learning organizations, people are a manager’s primary source of strength, not a cost to be minimized. ‘ JACGF’ adopt this perspective, and believe in treating employees well by providing competitive wages, good working conditions, as well as by investing time and money in training programs, and opportunities for personal and professional development. Employees need to understand the whole organization in addition to their part in it, and is encouraged to share information, which are contrary to the principles of scientific management.

Today’s workplace is technology driven, ideas, information and relationships are becoming more important than production machinery, products, and structured jobs (Kevin Kelly, 1998). This is evident even in factories like ‘

JACGF', where employees focus on opportunities rather than efficiencies alone, and unlike Taylorism there is a requirement to be flexible, creative and unconstrained by rigid rules or structured tasks.

New electronic technologies drive the organizations and the way it is managed, contrasting to 'scientific management', today many organizations depend on employee's minds rather than their physical bodies, where manager's make use of the creativity and knowledge of every employee, which is very much evident even in factories like 'JACGF'.

Though Taylor's scientific management is considered old and classical by modern textbooks, and criticized by all the subsequent management theories, and claims, that it is no longer appropriate, can we ignore it, can we do without it, can an organization operate without clear rules or division of labour, even in today's world, or is it still applicable in today's management, depending on who is being managed, and the specific management needs of the 'organization'. Can we blindly apply Taylor's theory for all operations, or all companies, but it can be used as the basis of a starting point, as was carried out in Example 1, 2 & 3. Without a systematic collection of knowledge about work processes, the removal of worker discretion and control over their activities, the creation of standard rules and procedures, i. e. the development of a 'science' for each element of work, in performing the task. Example 1, 2, 3, & 4 would not have been possible. Through methodical study and scientific principles is it possible to establish the one-best-way of carrying out a task or job. And once this method of work is established should it be adhered to consistently or can it be adhered to consistently. Is there a thing called one-best-way of carrying out a task or job

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and nothing can supersede it. Does Frederick Taylor's scientific management reflect, an age of time when his approach to managing was appropriate and in a different time it is not appropriate. Is the approach to managing, a 'definite science', and who is being managed, a 'defined man'.

Within 'JACGF' an approach to managing that is appropriate to one manager, of one department, does it reflect an approach to managing that is appropriate for all managers, of all the departments. 'JACGF' is one company in one industry and an approach to managing that is appropriate for today's managers of JACGF, reflects an approach to managing that is appropriate for today's managers, in all the companies, across all the industries, in a global manner, or not.

Conclusion

Taylor's early 20th century theory of 'scientific management' originating from the early US experience in management theory, is largely not appropriate for today's managers as an approach to managing, however, the theory's basic tenets can still be applied in certain industries, provided it incorporates and supplements the concepts derived from modern management theories. My conclusion, which is based on a company that has expatriates for its entire workforce, Taylor's theory does apply although partially, and is still appropriate for today's managers and should be used along with all the other management theories, as an approach to managing based on the specific needs of the organization.

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