İSTANBUL ÜNİVERSİTESİ YAYINEVİ

Istanbul Management Journal, 90, 49-60

DOI: 10.26650/imj.2020.90.0003
http://imj.istanbul.edu.tr

Istanbul Management Journal

Submitted: 27.05.2021
Revision Requested: 08.06.2021
Last Revision Received: 08.07.2021
Accepted: 08.07.2021

RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Discussions on the Nature of the Scientific Management Approach in the Early Times of U.S. Industry

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Abstract

When the American Civil War ended in 1865, industrial organizations proliferated at an unpredictable rate. With the ascending number of industrial organizations, new problems emerged that the production process and management problems in the U.S. The discussion platforms were created and set up by owners, managers, and consultants of U.S. industry organizations to seek solutions to the joint problems. Management and production process problems had been discussed on these platforms. This study highlights the significance of science, art, and philosophical concepts related to the scientific management (S.M.) movement in the early period of U.S. industry organizations by focusing on these concepts' similarities and dissociations. The articles, books, and proceedings of the S.M. movement pioneers have revealed the root causes of the different opinions about the S.M. movement. Science, art, and philosophical viewpoints of scientific management have discussed S.M.'s pioneers and its period conditions. Different viewpoints indeed created an excellent ground for the development of S.M. However, the early phases of S.M. were opponents to the S.M. movement, and those who criticized the S.M. did so for it being an uncompleted and interest group related movement.

Keywords

Scientific management, Science, Art, Philosophy, Early U.S. Industries

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To cite this article: Kulli, B. (2021). Discussions on the Nature of the Scientific Management Approach in the Early Times of U.S. Industry. *Istanbul Management Journal,* 90, 49-60. http://doi.org/10.26650/imj.2021.90.0003

Introduction

From the end of the American Civil War in 1865 to the U.S.'s entry into WWI on April 6, 1917, many factories and production facilities swiftly opened in the U.S., and industrial life rapidly evolved. In the U.S. after the Civil War, private sector railway enterprises continued to develop, and all states in the country were connected by a railway network from the Atlantic to the Pacific coasts in 1869 (Ambrose, 2012: 355-357). Despite the rapid development of industrial organizations in America, conventional methods used to manage factories and production processes have brought some problems along with industrialization.

Management and production process problems discussed in the sector-based regional and national journals of the U.S. then continued to discuss international platforms, such as the American Society of Mechanical Engineers (ASME) and the Society to Promote for Science of Management (then Taylor Society). Discussions on the effectiveness and efficiency of manufacturing in U.S. industrial life evolved into S.M.-related inquiries, namely art, science, and philosophy. During the ASME meetings, that idea brought forward that scientific management is an art and science. Then, the Taylor Society and the honorary president, F.W. Taylor, also stated that scientific management has a philosophical basis.

Aim and Scope of Research

Although management has existed since ancient times, the trend towards the management of industrial organizations is relatively more recent. The general definition of management is doing business for a particular purpose through or with others. However, there are too many relative definitions of what management is. That variety stems from conceptual relativity, which expresses different definitions for the concept of management (Daft, 2012: 217).

However, what management means, in essence, has always been controversial and relative because it concerns different sides and actors. Although managing is an action performed by a person or a group, it can also have different trues and aspects for each facet. Management of an industrial organization structures and practices that operate an automobile manufacturing organization and industrial organization those operating railways intrinsically would be different. Even if the methods utilized in those industrial organizations are the same, their application and results may differ in industrial organizations and their environment.

F.W. Taylor considered most significant that optimization to all levels and all organization functions to carry out industry organizations most effectively and efficiently; and added, if it is not possible, organizations should develop their functions to be effective and efficient (Taylor, 1911: 35).

F.W. Taylor also argued that the scientific management movement was not a hollow approach to problems that only consist of theories. Then, he pulled apart that these theories should be combined with the experience and practices gained over time (Berber, 2013: 138-139). Taylor's view at the overhead sentence and the positivist understanding of that time suggested that the theories and applications of the scientific management movement could be applied to all organizations in U.S. industries.

The Closed System approach of that time is an approach that brings forward that organizations have minor interactions with their environment, and general environmental rules substantially shape those organizations. It expresses a situation that emphasizes the harmonies and relationships of art and experience, knowledge, society, solidarity, and science in which reinterpreted and applied the theoretical approaches. In this regard, the fundamentals of scientific management were discussed at the platforms in which representatives of organizations came together. Some believe that scientific management rose on the shoulders of those who pioneered; others put forward the idea that it brought about the conditions of that period, which caused the maturation of U.S. industry (Lemak, 2004: 25). The researchers, who consider scientific management within the spirit of the times, focused on the contributions of scientific management to processes, employees, social benefits, and disadvantages.

This research analyzes the scientific management movement by comparing its facets of science, art, and philosophy, which pioneers, and opponents put forward. Within this scope, it focuses on how the expressions of science, art, and philosophy were related to the concept of management in the early period of U.S. industrial organizations, particularly between 1865 and 1917, which was the growth phase of industries in the U.S. The views of pioneers in the platforms for solving managerial problems in factories and production facilities were utilized in the research. The research focuses on the period between the 1865 Civil War and April 2, 1917, that the U.S. entry into WWI. At that period, the American Industry expanded unprecedentedly in scale before the unseen .

Research Questions and the Methodology

Regarding the aim and scope of research, the research questions were determined as below:

(1) What were these S.M.-related concepts that were subject to discussions in scientific management platforms?"

"(2) What were similarities and separations among them, and how did they come about?"

It is reached to the official reports and publication bulletins of the ASME and the Society to Promote the Science of Management, the articles, books of the scientific management pioneers. In the 115 issues of the Bulletin of Taylor Society published by the Society to Promote the Science of Management for 20 years, the books and papers of ASME members were analyzed by document analysis method, one of the qualitative research data collection methods. A process map of the concepts was revealed within the framework of the research questions shown above (Table-1).

The idea of management is science; found a voice for the first time in Henry Towne's 1886 manifesto (Towne, 1986). In 1894, Henry Metcalfe at an ASME conference bandy about that management was an art and a science, referring to his book The Cost of Manufactures and the Administration of Workshops, Public and Private. According to Metcalfe, activities expressed as science and art should be carried out together for better management practices and experiences (Metcalfe, 1894). Even though Henry Towne and Henry Metcalfe's views emphasized management as a science, A.H. Church and L.P. Alford argued that management has not got the foundations and systematicity to be a science (Church and Alford, 1912).

F.W. Taylor, in his The Principles of Scientific Management titled book, which he prepared for ASME in 1911, tells us the relationship between the S.M. approach and philosophy (Taylor, 2004). On the other hand, R.F. Hoxie and H.B. Durry criticized the S.M. in their separate but related articles. While Hoxie treated employees as the ever-rotating part of the wheel of U.S. industry, Durry focused on the deprivation of employees' legal rights and questioned why the S.M. approach that accepts them as they were could not be developed (Hoxie, 1915).

It reviewed within the research framework that platforms that discussed U.S. industry organizations' management and production processes problems. On these platforms, people who were engineers, managers, business owners, management experts, and consultants, besides French, British, and other countries' businesspersons, participated in the discussions. These discussion platforms were by a majority below listed as American Railway and Industry journals, American Society of Mechanical Engineers minutes, bulletin, and reports of the Society to Promote the Science of Management (Table-2).

Although the pioneers in these platforms are in close relationships and relatives, they have sometimes played active roles in more than one platform. For example, Scientific management pioneers such as F.W. Taylor, Henry Gantt, Morris L. Cooke, and Frank Gilbreth were ASME members. They have also played an active and leading role in the Society to Promote the Science of Management and then Taylor Society.

In the change and development of those platforms, faced problems by organizations became familiar and were significantly handled. For instance, discussed in the American

Railway and Industry journals, the factory and engineering problems evolved and began to be discussed more deeply as management and production process problems in ASME. The Society to Promote the Science of Management, on the other hand, was founded by the people who are mostly ASME members and focus on management problems after ASME's fundamental engineering problems (Kulli, 2019). In all these platforms, the arguers focused on how industrial organizations would be more effective and efficient. To achieve this, arguers put forward the theories, rules, formulas, and products based on their experience and practice due to observation and research. Scientific management paradigm, the dominant view has formed that man is a gear of the machine. Ignoring the social interaction of the employees, the view that all human beings are the same was standard in this period.

Transposition of Management Problems in U.S. Industries to Discussion Platforms

After the Civil War, the industrial organizations and railway networks that developed together became the harbinger of industrial development in the country and the rapidly increasing immigration (Nevins & Commager, 2005: 331-335). Despite the increasing domestic demand and developing industry in America, doing business changed from conventional methods to relatively modern methods. This change caused problems in managerial processes as well as in production processes.

The fact that the manager and the owner of the business were the same people and that only one managing business owner was dealing with all of the problems had brought management problems in the factory and railway management on the vast private enterprise railway network (Taylor Society, 1922: 209-246). Business owners with an engineering background first addressed management problems in industrial organizations. They sought to increase efficiency and productivity by discussing the platforms created through railroad and industry journals (Jenks, 1960). In this discussion platform, the business managers, most of whom are engineers, who seek solutions for each other's problems, founded the American Society for Mechanical Engineering (ASME) in 1880 with the initiative of John E. Sweet to bring the problems to a national level (Hutton, 1915).

The majority of ASME members were engineers. Some people direct their work to optimize engineering practices and members who focus on managerial problems in factories and production facilities (Brown, 1925). Henry R. Towne (1889-1890), elected as the eighth president of ASME, was one of the ASME presidents dealing with managerial problems in society. Henry Towne divided the ASME members into two. He referred to them as managers and engineers in his manifesto entitled Engineer as an Economist, which he presented at an ASME meeting in 1886. H. Towne emphasized that the number of engineers who could demonstrate both executive and engineering qualifications in ASME was minimal.

According to H. Towne, successful management could be mentioned in industrial organizations only when members with both characteristics led them. He added that when managerial problems in factories and production facilities were dealt with by scientific methods, U.S. industry organizations would show success and development (Towne, 1986). In his 1886 speech, Towne called that period the progressive era in which the railways and industry developed rapidly in the U.S. In the progressive era, enterprises that held the railway network of America operated by private and legal entities started to increase their capital by borrowing from banks to increase their capital in a short time. Despite their increasing capital, many railway organizations decided to go bankrupt when their businesses started to have problems based on prices in the railway network, an oligopoly. Later, in 1898, Bankruptcy Law was enacted by the American government (Saros, 2011: 39-40). H. Towne's emphasis on the necessity of management to be scientific also comes to the fore here. He emphasized that rules and formulas should be put forward based on scientific methods rather than practical knowledge in industrial organizations. The basis of drawing attention to managers and engineers in industrial organizations was to realize management practices and specify the rules and formulas applied in management.

Following Towne's work at ASME, Henry Metcalfe also carried out studies seeking solutions to management problems. H. Metcalfe took H. Towne's idea of the scientificity of management one step further, and in a presentation he made at ASME in 1894, he argued that management was a science and an art. According to H. Metcalfe, when combining science and art concepts in management and adaptation to managerial processes in factory and production problems, this can be expressed as management science (Metcalfe, 1894).

Metcalfe's treatment of management as an art and science reveals the conditions of that period. In the process of restructuring the American industry, the searches of industrial organizations to develop and their expectations of creating a system within a particular set of rules and formulas confirm this. In The Cost of Manufactures and the Administration of Workshops book, H. Metcalfe expresses the concept of art as all the methods, knowledge, and rules involving certainty in action realization. The concept of art was the realization of works in a particular order, with predefined and generally accepted means. Management is an art definition of H. Metcalfe, which focuses on identifying common problems in industrial organizations that developed after the American Civil War and sought solutions (Kulli, 2019). He also emphasized that management is a science that systematically develops cumulative knowledge while analysing and revealing all individual experiences and practices, including those of business owners, managers, and employees within the organizations. Thus, forming a set of rules and formulas. It refers to it as what enables the development of industrial organizations (Metcalfe, 1894).

Science in the generally accepted as sense what is understanding the universe and accessing correct information to develop an approach through a world view, to create a method and to conduct research, and to present an inference, a product, a collection of information as a result of this systematic effort (Arslan, 2017: 73-74). While pointing to management science, Henry Metcalfe argues that it is parallel to the common sense of science. It was the transformation of applications into information obtained in a more common form by examining all processes in an industrial organization, observing employees, and examining process-employee interaction harmony. In this case, as Metcalfe states, the information obtained will cumulatively become a set of rules and/ or formulas.

The definitions of art and science that were put forward by Henry Metcalfe related to management were in parallel with the concepts defined above. Henry Metcalfe's definition of the art of management expresses all the rules, knowledge, and methods that contain certainty. It integrated management science with standard rules and specific research methods in establishing the framework of the early phase of American industry. It was to transform the definition of management science, which expresses the set of rules or formulas that can be applied by industrial organizations into practice by combining it with the practices of the enterprise when necessary. As has been examined, in the scientific management paradigm, Metcalfe's contemporaries and later have frequently pointed to two integrated concepts he put forward. Although there were different perspectives, Metcalfe's view reveals the management of early American industrial organizations, at least in certain pointed aspects.

The Bankruptcy Act of 1898, enacted in Henry Towne and Henry Metcalfe's ASME period, enabled industrial organizations to consider their development problems. Specifically, with the scientific management paradigm, productivity and efficiency have become the two most essential concepts in all industry organizations (Hutton, 1915).

The search for solutions to managerial problems and production processes became extremely important in U.S. industry organizations that focus on efficiency and effectiveness with the developing industry. As a consequence of this endeavor, those addressed the problems in a systematic approach, different from the previous ones. All the steps that had an impact on the production process were disintegrated to the smallest detail. The parts that did not create added value were eliminated through movement and time studies.

The scientific management movement shaped around the managerial problems that ASME's tried to find solutions to and separated and developed as the 1910s initially focused on the production and factory problems. The scientific management movement is based on five main principles. The movement was an approach put forward in industrial organizations where preferred science instead of practice and experience,

harmony instead of conflict and incompatibility, solidarity instead of individualistic approach, maximization of production instead of a specific limit of production capacity, and the development of employees who were seen as a part of the center gear in the industries (Taylor, 2004: 140-142).

Engineering activities in America started to gain momentum in the early 1900s. In line with that mobility, ASME decided to focus on engineering rather than management issues. Thereupon, the member of ASME who dealt with the management problems founded the Society to Promote for Science of Management in 1911 (Brown, 1925: 134-139). Under the leadership of F.W. Taylor, the association focused on management and production processes and became a supporter of the scientific management movement (Taylor, 1922: 209-246).

The works of F.W. Taylor in association supported the predictions of H. Metcalfe and H. Towne, who were also ASME members. F.W. Taylor referred to both Metcalfe and Towne in his book, The Principles of Scientific Management, which points out the systems valid for all industrial organizations and pointed out scientific management as a science that has universal validity with the analysis of practices (Taylor, 2004: 72-117). Besides, he pointed out the measurements that should be taken in the implementation of scientific management practices in each industrial organization. These were applications such as F.W. Taylor's time study, F. Gilbreth's motion study, and H. Gantt's workflow chart. According to F.W. Taylor, efficiency and productivity in all industry organizations could be increased within systematic rules. Attributed with F.W. Taylor's name, the scientific management movement became well-known for both the practices in the U.S. and the studies of the Society to Promote for Science of Management in Europe. The movement gained supporters from many industry organizations in a short time (Brown, 1925). In a zeitgeist way, the scientific management movement motivated the industrial organizations in the reshaping world to maximize their production and promoted them to advance (Wren & Bedeian, 1994). F.W. Taylor believed that the scientific management movement was a philosophy of continually improving processes and continually improving part of the process, and stated this in his 1911 book, The Principles of Scientific Management. When he died in 1915, the name of the Society to Promote the Science of Management was changed into the Taylor Society (Taylor Society, 1916: 1-20).

In the Taylor Society, the group named management experts by F.W. Taylor himself tended to see the Scientific Management Movement, which they pioneered, as a marketing tool that would bring themselves and their work to the fore rather than contributing to the scientific management movement. In this view, Taylor Society, the flag carrier of the scientific management movement, shaped its activities to serve its members rather than promoting and developing a movement and creating funds for

them. As a result, the Taylor Association continued its activities for about 21 years, ended its activities in 1936, and joined the American Association of Industrial Engineers (Kotnour & Farr, 2005).

Views Based on Three Concepts Associated with the Scientific Management Movement

H. Towne's put forward the idea that management is a science in 1886, supported by some members who came after him in ASME. After Towne's speech in 1894, H. Metcalfe took Towne's view one step further and supported the view that management was an art and a science. The view of Metcalfe pointed out that the management contains facts based on experience that should be analyzed and used as a systematic framework of rules.

In parallel to the views of H. Towne and H. Metcalfe, F.W. Taylor had stated in his Scientific Management Principles book that management is both a science and a philosophy. The scientific management movement found comprehensive supporters worldwide, especially in America, Europe, and Asia. Although the scientific management movement found a wide range of followers and supporters, some thought that management was not a science yet. Furthermore, those cited that the scientific management movement has adverse effects on society. A.H. Church and L.P. Alford, in their book The Principles of Management, published in 1912, stated that management was far from being a science yet (Church and Alford, 1912). Behind this view, the management theories did not go beyond personal views and applications in a single field (Church and Alford, 1912). Church and Alford, criticizing the scientific management approach shaped by the thoughts of a group of practitioners in the Taylor Society, emphasized the necessity of different ideas to support the theory for the development of scientific management. Church and Alford proposed principles for management to be a science. These were systematic use of experience, economical control of labor, and the promotion of workers' effectiveness. Systematic use of experience refers to the observation, recording, and analysis of the experience and practices of employees in industrial organizations and applying them as a systematic set of rules. The economic control of labor emphasizes that managers should divide labor, coordinate, optimize (protection), and fair wage distribution within a sure bureaucracy. The work areas should be designed according to the usage areas and should have appropriate hygienic conditions to ensure the workers' activities, to control the personal effectiveness of workers, The views put forward by Church and Alford were at variance with the principles stated by Taylor in his 1911 book.

On the other hand, Church and Alford criticized the restriction of the scientificity of the management movement to a particular group (Church and Alford, 1912). In addition to the principle of prioritizing the owners of industry organizations supported by Taylor and his referred management experts, Church and Alford also considered

the conditions of workers and managers. According to their put forward, scientific management would only be possible in environments where discussed the different ideas and employee situations in the industrial organization have protected.

Some people suggested what necessary arrangements should be made for the management to be scientific. Those people did not wholly oppose the scientific management movement (Berber, 2013). R.F. Hoxie and H.B. Durry were some of them. Hoxie argued that those who led the scientific management movement must constantly challenge the assumptions of those who led the scientific management movement. Also, according to Hoxie, scientific management was an extension of the development of the industrial revolution in the era that they found. S.M. could only take place when a particular infrastructure was provided.

According to Hoxie, industrial conditions must remain constant realized to scientific management. On the other hand , there was an understanding of maximizing production with the increasing worldwide demand in the early 1900s. That situation made it extremely difficult to apply scientific management to organizations. According to Hoxie, scientific management was an approach that was far from adapting to the conditions of the age, pushing the limits of the workforce, and creating problems in social life (Hoxie, 1915). H. B. Durry, on the other hand, confirmed Hoxie and pointed out that S.M. emerged after the American Civil War with a zeitgeist approach and that the S..M. was effective in increasing the production amount of industrial organizations since production turned into mass production at that period. Moreover, the scientific management was in a structure that conflicted with the labor unions during their period. While the unions in the horizontal structure in America were skeptical about the change, F.W. Taylor and Scientific Management supporters saw unions as an obstacle to growth and a structure that haunted workers. Durry also focused on the worker's and manager's scientific management practices to draw a genuinely scientific framework by examining this contradictory situation (Durry, 1912). According to Durry, the most critical link between employee and employer was the wage gap. However, workers perform science and artistic jobs for low wages. In this regard, he emphasized that it was essential for employers to develop different motivations to direct workers to work. In this sense, Durry stated that a scientific approach developed in the interests of a particular group rather than serving and developing humanity in a sense.

Conclusion

The U.S., which started to develop after the Civil War and increased rapidly with immigration in the 1890s, turned into mass production in the developing industry. The scientific management movement, which emerged with a zeitgeist approach, was the highest limit of current developments. The most considerable criticism of the

scientific management approach was that it continued its development as a system of rules and practices handled by the same people for specific years, 1910-1936. Due to the untestable scientificness and the handled by a specific group of people criticized too many times.

Almost all circles accepted the view that management was art. Contrary to the concept of art, which emphasizes beauty and aesthetics today, the concept of art in American understudy expresses specific rules and practices. When considered in this framework, practices and experience gain importance in examining every job in detail and eliminating unnecessary movements. The concept of art refers to the use of these practices and experiences as a set of rules. In this respect, the fact that management was an art and science was not an expression that separates management but the main concept that supports the complexity and progress of management.

Stating that management did not only consist of systematic rules and practices, F.W. Taylor put forward the view that scientific management was philosophy with its knowledge-based structure. To spread this belief, F.W. Taylor supported the accumulation of knowledge and the development of theoretical infrastructure as a strong character in the early years by discussing the scientificness of the management and the opinions of different people in the Bulletin of Taylor Society. However, the people who came after Taylor and whom he attributed as management experts, aside from presenting theoretical and conceptual studies, aimed to market their practices to industry organizations in other countries, especially in the U.S., under the umbrella of scientific management. With this development, which damaged the basis of the scientific management movement to be scientific and based on philosophical dogmas, understanding changed in the U.S. and the world in a short period of about 20 years.

Nowadays, the scientific management approach is still one of the most discussed approaches. This situation is quite normal for the scientific management movement that matters at hand in the classical management thought paradigm. Basic analogies can find the root of the problems and quests seen in industrial organizations and use essential practices in today's industrial organizations. However, the relations among the organizations have changed, and complexity and diversity level has increased. Besides, new paradigms and approaches have emerged in time. Due to that change, developments in society have caused and created diverse descriptions for Scientific Management for each period. The societies in that different period interpreted its approach related to their applications and conditions, and in the future, those societies will continue to do so.

Peer-review: Externally peer-reviewed.
Conflict of Interest: The author has no conflict of interest to declare.
Grant Support: The author declared that this study has received no financial support.

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