Journal of Economics and Management Sciences; Vol. 8, No. 1; 2025
ISSN 2576-3008 E-ISSN 2576-3016
https://doi.org/10.30560/jems.v8n1p103

Research on Scientific Management Innovation in the Era of Digital Economy

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Received: January 29, 2025; Accepted: February 24, 2025; Published: February 26, 2025

Abstract

With the rapid development of digital economy, the wide application of information technology is reshaping the operation mode and management structure of enterprises. At the heart of the digital economy is data-driven decision making, intelligent management, and networked collaboration, which provide unprecedented opportunities and challenges for enterprises. By combining the successful cases of specific enterprises, this paper aims to provide practical strategies for business managers to help them better adapt to the rapid changes of the digital economy and improve management efficiency and decision-making ability. Finally, this paper hopes to provide a new perspective and thinking for the future scientific management research in the era of digital economy.

Keywords: digital economy, management innovation

1. Introduction

In the 21st century, digital economy, as a new economic form, is causing profound changes on a global scale. With the wide application of information technology, the digital economy takes data as the core, redefining the operation model of enterprises and the way of market competition. At the same time, consumer demand is also changing, personalized, real-time and intelligent become the new trend. Under such circumstances, the traditional scientific management theory is facing unprecedented challenge. Since the theory of scientific management was put forward by Taylor, it emphasized to improve production efficiency through scientific methods and standardized processes, and achieved remarkable results. However, these theories are weak in the face of big data analytics, artificial intelligence, and rapid market feedback. Therefore, enterprises must re-examine the principles of scientific management and innovate on this basis to adapt to the new opportunities and challenges brought by the digital economy. This paper will explore the innovative path of scientific management in the context of digital economy, aiming to provide theoretical support and practical guidance for business managers to help them effectively cope with changes and remain invincible in the competition.

2. The Characteristics and Influence of Digital Economy

Scientific management theory was proposed by Frederick Winslow Taylor in the early 20th century and is regarded as the cornerstone of modern management. Through observation and experiment, Taylor proposed scientific methods to improve labor productivity and efficiency, emphasizing the optimization of work processes through systematic management. The basic principles of the theory can be summarized as standardization, division of labor and incentive mechanism.

First, standardization is one of the core principles of scientific management. Taylor believes that by developing uniform work processes and operating standards, randomness and uncertainty in work can be significantly reduced. This not only increases productivity, but also reduces the possibility of errors. For example, in manufacturing, standardized work processes can reduce the differences between different workers on the same task, thus ensuring product consistency and quality stability. Through standardization, enterprises can better plan resources, rationally allocate human and material resources, and thus maximize production efficiency.

Secondly, division of labor is another important principle of scientific management. By breaking down complex tasks into simple units, Taylor ensured that each employee could maximize their performance in their areas of expertise. This practice not only improves work efficiency, but also allows employees to focus more on their work and improve professional skills development. However, the overexecution of the division of labor may also lead to monotonous and unchallenging work of employees, which will affect their work enthusiasm. Therefore, when

implementing the division of labor, enterprises need to find a balance, while improving efficiency, but also pay attention to employees' career development and work pleasure.

Finally, incentive mechanism plays a crucial role in scientific management. Taylor proposed that through material and spiritual rewards, employees' enthusiasm and creativity can be effectively stimulated. A pay-for-performance system, for example, can motivate employees to work harder by linking their earnings directly to their performance. In addition, companies can also enhance employees' sense of belonging and accomplishment through non-material rewards, such as recognition and promotion opportunities. However, the traditional incentive mechanism often lacks flexibility and can not adapt to the differences of individual employees and the changing market environment. Therefore, in today's digital economy, companies need to re-examine incentives to adapt to diverse employee needs and market changes.

Although scientific management theory has achieved remarkable results in the industrial era, its applicability is also questioned in the context of the digital economy. Traditional management models often rely on static data and historical experience, but in a rapidly changing market environment, enterprises need to rely on real-time data to make flexible decisions. In addition, with the general improvement of the quality of employees, a single division of labor mode may suppress the creativity and initiative of employees, affecting the long-term development of enterprises. Therefore, scientific management theory needs to be innovated to adapt to the new challenges brought by the digital economy.

3. Traditional Theory of Scientific Management

In the context of digital economy, the innovation of scientific management is not only necessary, but also imminent. First, data-driven decision making will become the core of enterprise management. Advances in modern technology allow companies to access vast amounts of real-time data, including market information, consumer behavior, and competitor dynamics. By using big data technology, enterprises can make scientific decisions based on data, thereby improving the accuracy and efficiency of decisions. For example, companies can use data analytics tools to monitor market trends and changes in consumer demand in real time in order to quickly adjust product strategies and marketing programs. This data-driven approach to decision-making not only reduces the risk of relying on personal experience, but also enables companies to respond to market changes in a timely manner and maintain a competitive edge.

Secondly, intelligent management will bring new management methods for enterprises. With the rapid development of artificial intelligence and machine learning technologies, enterprises can automatically process large amounts of data, identify potential problems and provide solutions with these technologies. Intelligent management can not only improve the real-time monitoring and optimization of the production process, but also play an important role in predicting market trends and consumer demand. For example, using machine learning algorithms, companies can analyze historical data and predict future sales trends, thereby better managing inventory and allocating resources. This not only improves operational efficiency, but also reduces costs and helps companies stay competitive in a highly competitive market.

In addition, flexible organizational structure is also an important innovation path for scientific management in the digital economy. Facing the rapidly changing market, enterprises need to establish a flat organizational structure, reduce hierarchical management, and improve decision-making efficiency. The flat structure can reduce the time for information transfer and make decision making faster and more flexible. At the same time, encouraging employee participation in management decision-making and innovation is also key. By establishing diversified incentive mechanisms, enterprises can stimulate the initiative and creativity of employees, making it an important driving force for enterprise innovation. For example, companies can set up innovation funds to encourage employees to come up with new ideas and projects, and reward them accordingly.

In short, in the wave of digital economy, the innovation of scientific management can not only improve the management efficiency and competitiveness of enterprises, but also provide guarantee for the sustainable development of enterprises. Enterprises need to keep up with the pace of The Times, flexibly respond to market changes, and actively explore new paths of scientific management in order to achieve higher value and stronger competitive advantages.

4. The Innovative Path of Scientific Management under the Digital Economy

4.1 Data-Driven Decision

In the context of the digital economy, the innovation of scientific management is not only necessary, but also imminent. First, data-driven decision making will become the core of enterprise management. With the continuous development of big data technology, enterprises are able to obtain real-time market information, consumer

behavior, and the dynamics of competitors. This comprehensive data collection and analysis capability enables enterprises to make more scientific decisions based on data. Through data analysis, companies can not only improve the accuracy of decision making, but also significantly reduce the response time to market changes. With a real-time grasp of market dynamics, enterprises can adjust their strategies more flexibly, seize opportunities and avoid potential risks. Data-driven decision making is not only the analysis of past data, but also the prediction of future trends, which can help enterprises make forward-looking decisions in complex market environments. In this era of information explosion, data has become the most valuable asset of enterprises, which can help enterprises gain an advantage in the competition, but also promote the continuous innovation and development of enterprises.

4.2 Intelligent Management

The introduction of artificial intelligence technology enables enterprises to achieve intelligent monitoring and management in the production process, thereby improving overall efficiency. In the context of digital economy, innovation in scientific management is not only necessary, but also imperative. With the help of advanced data analysis and artificial intelligence algorithms, companies are able to monitor various indicators in the production process in real time, and identify and solve potential problems in a timely manner. This intelligent management method not only improves the production efficiency, but also optimizes the allocation of resources, enabling enterprises to maintain a leading position in the fierce market competition. Through intelligent management means, enterprises can better adapt to changes in the market and enhance their competitiveness. In addition, intelligent management facilitates team collaboration, allowing departments to work more closely together through data sharing and real-time feedback to maximize overall benefits. In summary, intelligent management is not only the upgrading of technology, but also the profound change of enterprise management concept, which is an important driving force to promote the future sustainable development of enterprises.

4.3 Flexible Organizational Structure

Facing the rapidly changing market environment, enterprises need to establish a more flexible organizational structure to adapt to the ever-changing external environment. A flexible organizational structure not only effectively responds to market changes, but also facilitates internal communication and collaboration. Enterprises should consider establishing a flat organizational structure, reducing layers of management, and improving decision-making efficiency. By reducing layers of management, companies can speed up the flow of information, allowing decisions to be fed back to the executive level more quickly. Such flexible organizational structure can stimulate the creativity and initiative of employees, thus promoting the innovation and development of enterprises. In the age of digital economy, flexibility and adaptability have become key factors for the survival and development of enterprises. At the same time, flexible organizational structure can also improve employee satisfaction and loyalty, and employees are more likely to feel their value and influence, so that they are willing to work hard for the goals of the enterprise. In addition, enterprises can also adjust their organizational structure and resource allocation in a timely manner according to changes in market demand to achieve higher operational efficiency and market response speed.

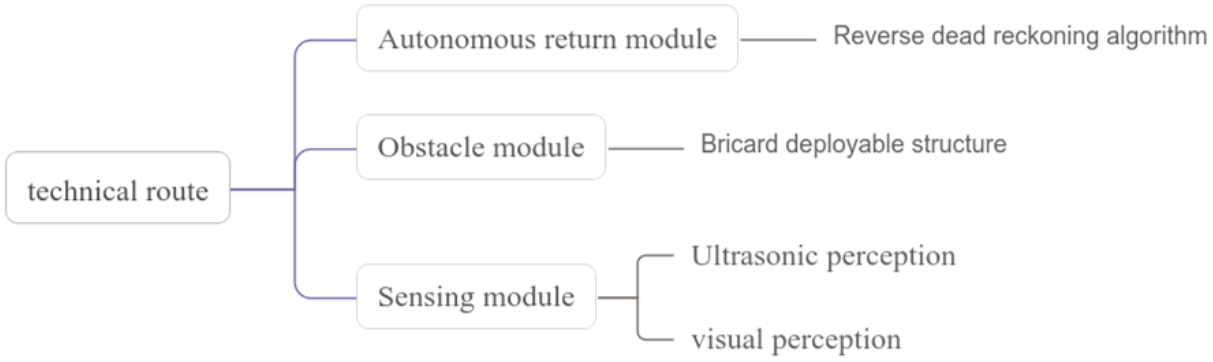

Figure 1. Flow chart of the technical route

4.4 Employee Engagement and Motivation

In modern enterprise management, employees' sense of participation and enthusiasm is an important factor to improve work efficiency and innovation ability. By installing infrared sensors and transmitters in the robot and its surroundings, when the sensor detects an infrared signal from the transmitter, the robot is able to accurately determine its current position based on the received signal. This not only achieves accurate positioning, but also

has strong environmental adaptability and can work effectively in different types of environments, ensuring that the robot can still operate stably in complex scenarios. Through such technology applications, companies are able to enhance their employees' work experience and enhance their sense of engagement, thereby stimulating their work enthusiasm and creativity. The enthusiasm of employees and the innovation ability of enterprises complement each other, which is an important driving force to promote the sustainable development of enterprises. Incentives such as training opportunities, recognition and rewards can be used to further increase employee engagement and satisfaction and create a more positive work environment. In such an atmosphere, employees can better develop their potential and contribute to the innovation and development of the enterprise.

5. Case Study - Amazon Platform

In the context of digital economy, many enterprises have realized scientific management innovation through data analysis and intelligent technology, especially in supply chain management, and achieved remarkable results. Taking Amazon, a world-renowned technology company, as an example, the company has successfully optimized its supply chain management and improved its overall operational efficiency through advanced data analysis technology and intelligent management systems.

First, Amazon uses big data and machine learning to monitor its vast inventory and logistics network in real time. By analyzing consumer purchase data, market demand trends, and historical sales records, Amazon can accurately predict demand for various products. This prediction not only helps the company to carry out the right amount of inventory management at the right time, reducing the possibility of excess inventory and stock shortages, but also improves the turnover rate of warehousing.

Second, Amazon's intelligent warehousing system greatly improves the efficiency of picking and shipping through the use of robots and automation equipment. In its warehouses, robots are able to complete a large number of pickings in a matter of minutes, reducing manual time and error rates. At the same time, the system can update the inventory status in real time to ensure that all inventory data is up to date, reducing the management risk caused by information lag.

In addition, Amazon has reduced logistics costs through an optimized supply chain network. The company has built close relationships with logistics partners around the world, and through the use of data analytics, Amazon is able to choose the best shipping routes and methods to ensure that products can be delivered to customers in the shortest time. Such supply chain flexibility not only improves customer satisfaction, but also saves the company a lot of transportation costs.

Finally, Amazon attaches importance to employee participation and feedback, and encourages employees to submit improvement suggestions and innovative ideas by establishing an internal data sharing platform. The first-hand experience and feedback of employees provide the company with valuable basis for improvement, making supply chain management more humane and efficient. This data-driven, employee participation-based management model has become an important factor in Amazon's leading position in the fierce market competition.

Through the case of Amazon, we can see that in the era of digital economy, the innovation of scientific management is not only the improvement of the technical level, but also the comprehensive transformation of management concepts and strategies. Enterprises must combine modern technology and flexibly respond to market changes in order to remain invincible in the competition. In the future, more enterprises can learn from Amazon's successful experience and integrate data analysis and intelligent management into supply chain and other management areas to promote sustainable development of enterprises.

6. Conclusion

The advent of the era of digital economy provides an unprecedented opportunity for the innovation of scientific management. With the rapid development of information technology, the operation mode, management concept and decision-making process of enterprises are undergoing profound changes. Enterprises must actively embrace this change and make full use of modern technological means to re-examine and innovate management models in order to effectively respond to the rapidly changing market environment.

First, the digital economy, through technologies such as big data, artificial intelligence and cloud computing, enables enterprises to be more data-driven in their decision-making processes. This transformation not only improves the scientific and accurate decision-making, but also enables enterprises to respond quickly to market changes. In the past, managers often relied on experience and intuition to make decisions, but today, data analytics can provide real-time market feedback and trend prediction to help companies seize the best market time. Therefore, enterprises should strengthen the training of data analysis ability in management practice and establish a data-centric decision-making mechanism.

Second, the digital economy gives businesses flexibility and adaptability. Traditional scientific management often relies on fixed processes and standards, and in a rapidly changing market environment, companies need to be able to flexibly adjust their strategies and operational processes to cope with uncertainty. To this end, enterprises can borrow the ideas of agile management and build a more flat organizational structure that encourages cross-functional collaboration and rapid decision-making. In this way, enterprises can quickly adjust resource allocation and strategic direction in the face of emergencies to ensure that they maintain an advantage in the competition.

In addition, the digital economy has prompted companies to place greater emphasis on employee engagement and innovation. Faced with the rapid development of technology, it is particularly important to update knowledge and skills within enterprises. By establishing an open innovation environment and encouraging employees to come up with new ideas and suggestions, companies can stimulate employees' creativity and thus achieve management innovation. This management model of employee participation can not only enhance the sense of belonging and enthusiasm of employees, but also bring new growth momentum to the enterprise.

Future research should further explore the management innovation practices of different types of enterprises in the context of digital economy. For example, how the differences between small enterprises and large enterprises in technology application, resource allocation and management mode affect their innovation ability and market competitiveness. In addition, cross-industry comparative research can also provide more perspectives for innovation in scientific management and help enterprises draw inspiration from successful experiences in other industries.

In general, the era of digital economy provides a rich soil for the innovation of scientific management, and enterprises should actively adapt to this new environment and deeply explore the possibility of management innovation. Only through continuous self-examination and technology application, enterprises can be invincible in the rapidly changing market and meet the challenges and opportunities of the future. The future of scientific management will not only be the continuation of traditional theory, but also a new practice deeply integrated with modern science and technology.

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