

Research on Six Sigma in the Service Industry

Yan Xie*, Yuanfan Dong

School of Economics and Management, Southwest Petroleum University, Chengdu 610000, China

* Corresponding author: 1171562580@qq.com

Abstract: The competition for services in the 21st century is becoming increasingly important, and Six Sigma management (6 σ)'s focus on customers sets it apart from previous manufacturing management methods. This article takes service management as the research object, analyzes customer needs based on the Six Sigma DMAIC model, and provides ideas and methods for the study of service management.

Keywords: Six Sigma; Service management; Application research.

1. Introduction

The competition in the 21st century has gradually shifted from product competition to service competition. Service management

the importance of it is becoming increasingly prominent. How to manage services requires advanced theories to guide and provide practical and feasible methods for the practical process. Six Sigma is well-known for reducing errors and improving efficiency, and many manufacturing companies also use Six Sigma as a magic weapon. This article focuses on exploring its application in the service industry. Learn from the DMAIC theory of Six Sigma to implement improvements. DMAIC mainly includes five stages: Define, Measure, Analyze, Improve, and Control.

2. The Origin and Development of Six Sigma Management Theory

2.1. Origin of Six Sigma Management Theory

The Six Sigma management theory originated from Motorola in the 1980s. At that time, Motorola introduced the Total Quality Management concept to cope with the competitive pressure of Japanese companies and developed the Six Sigma management theory based on it. The core of Six Sigma management theory is to reduce product and service defects and improve customer satisfaction by setting extremely high goals, collecting data, and analyzing results.

2.2. Development of Six Sigma Management Theory

2.2.1. Current Research Status Abroad

Since the mid-20th century, Japanese people have invested a large amount of resources in quality management such as product quality improvement, and have continuously innovated in practice under the guidance of Western quality management theory. After a period of accumulation, "Made in Japan" has made a qualitative leap, with its products performing well in global competition and gaining huge advantages. Especially in the US market, it has had a huge impact on its domestic products, greatly affecting and compressing the survival space of American enterprises. Motorola, the former global communication leader, is one of them. In order to get rid of the sluggish market situation and return the company to the right track, Motorola refocused on

the products themselves and began to attach importance to improving product quality. After several years of exploration and practice, Motorola summarized and formed a new method for quality improvement, named Six Sigma Management, which was fully implemented in the company. Thus, Six Sigma Management opened the curtain as a new method for quality improvement. At the beginning of its implementation, Six Sigma management was only a set of methods and tools provided to reduce product quality defects. However, it achieved tangible results at Motorola, which quickly caught the attention of other companies in the United States and was introduced for promotion. In particular, General Electric achieved more significant results through the implementation of Six Sigma management, greatly expanding its influence. Large multinational corporations such as Ford, DuPont, Siemens, Ericsson, Citibank, Microsoft, American Express, Intel, and Microsoft also vigorously promoted Six Sigma management. Today, Six Sigma management has become a global standard

The impact of the Six Sigma management has been significant, and it has moved from large multinational corporations to ordinary enterprises, from manufacturing to service industries. After decades of development, the Six Sigma management craze has not diminished. In this process, research and practice related to Six Sigma management have become increasingly in-depth, and more and more scholars, enterprises, and institutions have invested in it. Its theoretical and methodological system continues to develop and improve. Six Sigma management is no longer limited to solving specific product quality problems, but has expanded to various aspects such as process optimization and system improvement. From the initial scale of statistics (i.e. the level of 3.4 defects out of 1 million in data statistics), it gradually developed into a scientific management method aimed at reducing process fluctuations and minimizing or eliminating defects. Later, with the continuous enrichment and extension of content, it rose to become a company business strategy that pursues superior products and services, and ultimately sublimated into a new way of thinking and an organizational culture that values quality. At present, Six Sigma management has made great progress and enrichment in both theoretical research and practical application, and has penetrated deeply into various industries. The theoretical and practical research of Six Sigma management is no longer limited to its own field, but is integrated with other theoretical and practical research, providing a richer and more efficient theoretical basis and

thinking methods for solving practical problems.

Brian J. Galli analyzed the relationship between continuous improvement, risk management, and Six Sigma management, and believed that Six Sigma management, as a method of improving processes in many environments, is an excellent tool for the continuous improvement phase. It can discover and improve defects, thereby reducing the occurrence of risks in the process. He also introduced systems analysis and systems thinking methods into Six Sigma management, believing that systems thinking and analysis can help to comprehensively consider problems in the Six Sigma management definition phase, and can make problem definition clearer and more accurate [3-4].

Dahlgaard Jens Ji believes that lean production and Six Sigma management are extensions and developments of Total Quality Management. However, in the research and practice of lean production and Six Sigma management, the focus is more on tools and technology, and too little attention is paid to human factors, which is not conducive to establishing a suitable corporate culture.

Kevin Linderman, Roger G. Schroeder, Adrian S. Cho explained Six Sigma management from the perspective of goal theory, using the principles of goal theory to analyze the role of Six Sigma management tools and methods in achieving goals. They believed that effective use of Six Sigma management can effectively combine goal theory with quality management [6].

Alessandro Laureani and Jiju Antony analyzed and studied 179 relevant papers on leadership, lean management, and Six Sigma management over the past 20 years. They believed that leadership is a necessary condition for the successful implementation of Lean Six Sigma management and a key to continuous improvement. They developed a new leadership style that includes the leadership characteristics required for Lean Six Sigma management Force model [7].

Allen D. K., Laure P. conducted a study on the application of two theoretical methods and techniques, Lean Management and Six Sigma Management, in the testing process, and analyzed the positive effects of the Lean Six Sigma management improvement process model on the industry. They believed that the use of Lean Six Sigma management theory and methods can improve and enhance testing and other process issues [8].

2.2.2. Current Research Status in China

For China, the concept of Six Sigma management is an imported concept, and related research and practice started relatively late. After the application of Six Sigma management achieved great results in some foreign enterprises, it was not until the late 1990s that Chinese enterprises began to pay attention to and try to introduce Six Sigma management in their business management. The China Association for Quality, as an organization dedicated to promoting advanced quality concepts and quality technology methods in China, established the Six Sigma Management Promotion Working Committee in 2002 with the aim of timely following up on the cutting-edge developments and practical applications of Six Sigma management, promoting the research and application of Six Sigma management concepts and methods in various industries in China, and establishing a hierarchical system to cultivate relevant talents. By promoting and exchanging successful experiences, more enterprises are guided to participate in the research and implementation of Six Sigma management, in order to promote the development of Six Sigma management in China.

Currently, Six Sigma management is widely promoted in many industries in China. However, in reality, due to the lack of talent, insufficient understanding, inadequate attention, and improper methods when introducing Six Sigma management, there is a phenomenon of "two skins" between Six Sigma management and production practice, with a low degree of integration. In addition, the influence of Chinese corporate culture has led to unsatisfactory practical results and low success rates of Six Sigma management. Compared with developed Western countries, the proportion of enterprises promoting Six Sigma management is relatively low, mainly concentrated in some large foreign-funded, joint venture, state-owned or private enterprises, with a significant gap compared to developed countries. In recent years, many scholars, institutions, and enterprises in China have actively engaged in the research and application of Six Sigma management theory, addressing the deficiencies and shortcomings that still exist in the implementation of Six Sigma management. They have published many valuable discussions that are worth learning and referencing.

Xu Longze and Zeng Fengzhang discussed the relationship between Six Sigma management and quality management system, believing that the two complement each other and play different roles in organizational quality management work. Chinese enterprises should actively promote the certification of quality management system and the implementation of Six Sigma management in a two pronged and simultaneous manner.

He Zhen, Wei Ming, and Zhou Shanzhong analyzed several problems that exist when Chinese enterprises introduce Six Sigma management, and summarized several conditions that enterprises should have to implement Six Sigma management, including strong support and participation from management, clear strategic direction and objectives, a good management foundation, establishment of a promotion organization for implementing Six Sigma management, and high-level technical training and project consulting.

Chen Yongqing, Chen Chunhua, and Huang Jiatao believe that Six Sigma management is not only a management method and technique, but also a corporate culture dominated by the Six Sigma concept. They analyze and explore several cultural conflicts that exist when domestic enterprises introduce Six Sigma management and the ideas for building a Six Sigma management culture. Yan Xiaojian analyzed the reasons for the failure of Chinese enterprises in implementing Six Sigma management and believed that in implementing Six Sigma management in local enterprises, it is necessary to not only refer to the experience of successful enterprises, but also fully consider the national and social conditions to introduce, integrate and adapt, in order to successfully implement Six Sigma management and play its role.

Wu Hongtao summarized the differentiated implementation strategies of Six Sigma management based on the characteristics of three different levels of enterprises: pioneer enterprises with high management level, small and medium-sized enterprises in the industrial chain, and locally born Chinese private enterprises. He clarified the key points of implementing Six Sigma management in various types of enterprises, providing reference for domestic enterprises.

Zhao Deyong, Niu Yanming, Peng Lunquan, and others combined matrix flowcharts, value stream diagrams, and Six Sigma management based on customer value quality value stream analysis to form a comprehensive analysis method for Six Sigma management project process value stream, which

provides a good analytical foundation for later process optimization and improvement.

Zeng Fengzhang and Caifeng believe that Six Sigma management and ERP are largely consistent in terms of ultimate goals, business optimization, and continuous improvement. The implementation of Six Sigma management is beneficial for ERP implementation and can effectively promote the successful implementation of enterprise informatization. Therefore, Six Sigma management and ERP should be integrated and applied to enterprise informatization.

Lv Yongwei and Bali Wei have developed a new quality management improvement model, the PDAIC model (including preparation, definition, analysis, improvement, and control), based on the Six Sigma Management DMAIC model and the lean production theory method. The PDAIC model can reconstruct the improvement steps according to different enterprise properties or problem characteristics, providing improvement ideas and tools for the implementation stage of Six Sigma management [17].

Jiang Zhibin and Zhou Liping, based on the advantages and disadvantages of Six Sigma management, lean management, and constraint theory, combined the three management theories in different ways and proposed a management model that integrates multiple methods.

Chen Zishun, Tan Runhua, and Zhang Jianhui applied the conflict resolution charts CRD and TRIZ conflict resolution matrices, separation principles, and other tools from the constraint theory TOC to the improvement stage of Six Sigma management, enriching the methods of the improvement stage and facilitating the acquisition of innovative solutions, playing an important role in quickly, cost effectively, and thoroughly solving problems [19].

3. The connotation and industrial application status of Six Sigma

3.1. Connotation of Six Sigma

Six Sigma is a quality management method aimed at improving process stability and predictability by reducing defects and variations. It emphasizes customer-oriented approach, reducing product and service defects and improving customer satisfaction by setting high goals, collecting data, and analyzing results. Six Sigma management includes two processes: DMAIC (Define, Measure, Analyze, Improve, Control) and DMADV (Define, Measure, Analyze, Design, Validate), which are respectively applicable to optimizing existing processes and developing new products.

3.2. Industrial Application Status of Six Sigma

3.2.1. Manufacturing Industry

In the manufacturing industry, Six Sigma management is widely used to improve product quality, reduce production costs, optimize production processes, and other aspects. By implementing Six Sigma management, enterprises can accurately identify problems in the production process and take targeted measures for improvement. For example, a certain automobile manufacturing enterprise successfully reduced the product failure rate, improved production efficiency and product quality by implementing Six Sigma management. For example, 3M successfully transformed by implementing Six Sigma, saving millions of dollars and promoting innovative thinking.

3.2.2. Financial Industry

In the financial industry, Six Sigma management is used to

optimize business processes, improve service quality, and reduce risks. By implementing Six Sigma management, financial institutions can accurately identify bottlenecks and waste in business processes and take targeted measures for improvement. For example, financial institutions such as Citibank have optimized loan approval processes by introducing Six Sigma to detect non value added parts in various processes, improving approval efficiency and customer satisfaction, and using process reengineering to shorten cycles and reduce defects.

3.2.3. Service Industry

In the service industry, Six Sigma management is used to improve service quality and customer satisfaction. By implementing Six Sigma management, enterprises can accurately identify problems in the service process and take targeted measures for improvement. For example, Ctrip CEO Liang Jianzhang successfully transformed the traditional tourism industry using Six Sigma and fully implemented Six Sigma management. As one of the retailers, Costco Wholesale provides Lean Six Sigma training to its expatriate employees and uses the Lean Six Sigma methodology to reduce production costs.

3.2.4. Healthcare Industry

In the healthcare industry, Six Sigma management is used to improve medical quality, reduce medical accident rates, and increase patient satisfaction. By implementing Six Sigma management, medical institutions can accurately identify problems in the medical process and take targeted measures for improvement. For example, a hospital has optimized its surgical and patient management processes by implementing Six Sigma management, reducing the rates of medical accidents and patient complaints.

4. Application of Six Sigma in the Service Field

4.1. The Connotation of Six Sigma in the Service Field

The application of Six Sigma in the service field aims to improve customer satisfaction and loyalty by improving the efficiency and quality of service processes, reducing errors and defects in the service process. The core idea is to comprehensively analyze the service process through data-driven methods, identify and improve existing problems, in order to achieve continuous optimization and upgrading of services.

4.2. Micro application of Six Sigma in the Service Field

4.2.1. Process optimization

Many processes in the service industry, such as customer consultation, order processing, after-sales service, etc., can be optimized using Six Sigma methods. For example, through the DMAIC (Define, Measure, Analyze, Improve, Control) model, bottlenecks and waste in the process can be systematically identified, improvement measures can be proposed, and implementation effectiveness can be monitored.

4.2.2. Employee Training

Employees in the service industry are direct providers of service quality, and their skills and attitudes have a significant impact on service quality. Six Sigma emphasizes employee participation and continuous improvement, through training and education, to enhance employees' understanding and

mastery of service processes, and to strengthen their service awareness and abilities.

4.2.3. Customer Feedback Management

Customer feedback is an important source of information in the service industry. By collecting and analyzing customer feedback, we can understand their needs and expectations, and identify problems in the service. Six Sigma establishes a customer feedback system to classify, analyze, and process feedback information to guide service improvement and improve customer satisfaction.

4.3. Practical Case Analysis of Six Sigma in the Service Field

4.3.1. Banking Services

A certain bank has optimized its loan approval process by introducing Six Sigma management. Through the application of the DMAIC model, bottlenecks and waste in the process were identified, improvement measures were proposed, and the implementation effect was monitored. In the end, the bank successfully shortened the loan approval time, improved approval efficiency and customer satisfaction.

4.3.2. Tourism Services

A certain travel agency has optimized the design and execution process of travel itineraries through the implementation of Six Sigma management. They used the DMAIC model to analyze the problems and deficiencies in the itinerary, and improved service quality and customer satisfaction by improving processes, providing employee training, and strengthening supply chain management.

4.3.3. Logistics Services

A logistics company uses Six Sigma method to optimize warehousing and distribution processes. They identified bottlenecks and issues in the warehousing process and optimized it by improving processes and providing employee training, reducing inventory management time and error rates, and improving efficiency and customer satisfaction.

References

- [1] Xie Yijun The Development Status and Prospect Prediction of the Cigarette Consumption Market in the Tobacco Industry under the New Situation [J]. Technological Perspective, 2018(18):205-206.
- [2] Zhang Yongkai Research on the Management of Cigarette Brand Competitiveness under the Monopoly System [J]. Management Observation, 2018, (33):23-25.
- [3] Brian J. Galli. Continuous Improvement, Six Sigma and Risk Management: How They Relate [J]. International Journal of Strategic Engineering, 2020, 3(2):1-2.
- [4] Brian J. Galli. Effectively Applying System Analysis and System Thinking in Six Sigma Environments [J]. International Journal of Strategic Engineering, 2019, 2(2):9-21.
- [5] Dahlgard Jens Ji. Lean production, six sigma quality, TQM and company culture [J]. The TQM Magazine, 2006, 18(3):263-281.
- [6] Kevin Linderman, Roger G. Schroeder, Adrian S. Choo. Six Sigma: The role of goals in improvement teams [J]. Journal of Operations Management, 2006, 24(6):779-790.
- [7] Alessandro Laureani, Jiju Antony. Leadership and Lean Six Sigma: a systematic literature review [J]. Total Quality Management & Business Excellence, 2019, 30(1-2):53-81.
- [8] Allen D.K, Laure P. Exploiting lean six sigma quality tools to improve test and other process [J]. Systems Readiness Technology Conference, 2006(9):509-514.
- [9] Wang Jing The Enterprise Gene of Six Sigma Management and Its Implementation in China [D]. Capital University of Economics and Business, two thousand and five
- [10] Xu Longze, Zeng Fengzhang Six Sigma Management and ISO9000 Standards [J]. China Quality, 2002, 08:24-25.
- [11] He Zhen, Wei Ming, Zhou Shanzhong Key issues that Chinese enterprises should pay attention to when promoting Six Sigma [J]. Construction machinery, 2004, 12:34-37.
- [12] Chen Yongqing, Chen Chunhua, Huang Jiatao On the Construction of Six Sigma Culture in Six Sigma Management [J]. Journal of South China University of Technology (Social Sciences Edition), 2006, (01):33-37.
- [13] Yan Xiaojian Promotion and replication of successful Six Sigma management models [J]. Business Administration, 2013, 11:27-30.
- [14] Wu Hongtao Research on Measures to Promote Six Sigma Management in Chinese Enterprises [J]. Modern Business, 2016.03:131-132.
- [15] Zhao Deyong, Niu Yanming, Peng Lunquan Lean Six Sigma Project Process Analysis Method Based on Quality Value Stream [J]. Value Engineering, 2013, 14:73-75.
- [16] Zeng Fengzhang, Caifeng Research on the Integration Mode of Six Sigma Method and ERP - Exploration of New Ideas for Enterprise Informatization [J]. Management Informatization in China, 2005, 05:38-41.
- [17] Lv Yongwei, Bali Wei Empirical Study on Improvement of Intelligent Connected Management Based on Lean Six Sigma [J]. Research on Technology Management, 2014, 02:226-232.
- [18] Jiang Zhibin, Zhou Liping Systematic integration application of industrial engineering methods such as lean management, Six Sigma, and constraint theory [J]. Industrial Engineering and Management, 2017, 22(2):1-7.
- [19] Chen Zishun, Tan Runhua, Zhang Jianhui The Application of TRIZ and TOC Theory in Six Sigma [J]. Mechanical Design, 2008, 10:19-21.