Asia Pacific Science Press

Asia Pacific Economic and Management Review
ISSN(O):3005-9275
ISSN(P):3005-9267
Vol. 2 No.2 (2025)

Supplier Quality Management and Green Technology Innovation

Sishuo Liu*

Xi'an Polytechnic University, School Of Management , shaan'xi, xi'an , 710048

Corresponding author: Sishuo Liu, 572430493@qq.com

Abstract: Supplier quality management is an effective way to promote the green transformation of enterprises, which is limited by the degree of supplier quality improvement, and there are big obstacles for traditional manufacturing enterprises to improve production efficiency. From the perspective of quality management, we explore the realization path of green technological innovation of suppliers through quality management for green technological innovation.

Keywords: Green Technology Innovation; Supplier Quality Management; Supply Chain Collaborative Innovation

Published: Mar 20, 2025

DOI: https://doi.org/10.62177/apemr.v2i2.207

1.Introduction to Supplier Quality Management

Supplier quality management is an important part of enterprise management, which is not only related to the stability and improvement of product quality, but also directly affects the enterprise's production cost, delivery time and customer satisfaction[1]. An excellent supplier quality management system can ensure that the products and services provided by suppliers meet the quality requirements of the enterprise, while optimizing the cost structure and enhancing the competitiveness of the overall supply chain. In the modern enterprise competition, excellent supplier quality management capability has become an important guarantee for the sustainable development of enterprises, it can help enterprises in the fierce market competition to stand out, win the trust and loyalty of customers.

2.Four core elements of supplier management

The four core elements of supplier management include quality (Quality), technology (Technology), cost (Cost) and delivery (Delivery), referred to as QTCD.Quality (Q): Product quality is the cornerstone of supplier management, which is directly related to the market competitiveness of the enterprise's products. High-quality products can improve customer satisfaction, enhance brand reputation, thus bringing more market share and profits for the enterprise[2]. Therefore, the quality management of suppliers is an important part of the enterprise can not be ignored.Technology (T): the supplier's technical capabilities determine whether it can provide products and services to meet market demand. Technological innovation and R & D capability is an important indicator to assess the potential of suppliers. A supplier with strong technical strength can bring more competitive products and services for the enterprise, to help the enterprise to maintain a leading position in the market.Cost (C): Cost control is a key aspect of supply chain management. Reasonable cost structure can not only improve enterprise profit, but also enhance market competitiveness.Therefore, cost management of suppliers is an important means for enterprises to realize profitability and sustainable development.Delivery (D): On-time delivery is the basis of

smooth operation of supply chain. Delivery management directly affects the enterprise's production planning and inventory control, which in turn affects the market response speed. A supplier who can deliver on time can ensure that the enterprise's production program is carried out smoothly, to avoid production interruptions and customer complaints caused by delivery delays.

3.Seven Supplier Assessment Criteria

In addition to the four core elements of QTCD, supplier appraisal should also include service, financial/management, responsiveness/flexibility and regulatory/environmental aspects to ensure a comprehensive assessment of suppliers[3]. Service: The service level of a supplier directly affects the cooperation experience and problem solving efficiency. A supplier that provides excellent service can bring better cooperation experience and improve the efficiency of problem solving for the enterprise, thus enhancing the operational efficiency and customer satisfaction.Financial/Management: The financial status and management level of the supplier determines its long-term stability and reliability. A supplier with good financial condition and high management level can provide more stable and reliable products and services for the enterprise, and reduce the supply chain risk of the enterprise.Response/flexibility: The market changes rapidly, the supplier's response speed and flexibility is an important ability to cope with market fluctuations. A supplier with the ability to respond quickly and adjust flexibly can help enterprises quickly adapt to market changes and seize market opportunities.Regulatory/environmental protection: Compliance and environmental standards are the basic requirements for enterprises in modern society, and suppliers must have the corresponding awareness and ability. A supplier that complies with regulations and pays attention to environmental protection can bring compliant products and services to enterprises and reduce their legal and environmental risks.

4.Supplier Total Quality Management Discussion

Total Quality Management (TQM) is an all-inclusive, all-process-control, holistic approach to quality management. Reasons for promoting TQM include improving product quality, enhancing customer satisfaction, and optimizing cost structure[4]. Implementing TQM can bring many benefits to an organization, such as improving product quality, reducing production costs, and enhancing customer satisfaction.To determine whether a supplier has promoted TQM: You can evaluate whether its quality management system is perfect, whether its employees have quality awareness, and whether it has a mechanism for continuous improvement. A supplier that promotes TQM usually has a perfect quality management system, a quality culture with full participation of all employees and a mechanism for continuous improvement.Evaluating the supplier's quality management level: This can be done through quality audits, customer feedback, and industry comparisons. Quality audit can assess the supplier's quality management system and actual operation; customer feedback can understand the quality performance of the supplier's products and services; industry comparison can assess the supplier's quality management level in the industry.Company's own TQM implementation: When evaluating the quality management level of suppliers, companies also need to reflect on their own TQM implementation status. Companies need to ensure that their own quality management system matches the supplier's requirements in order to better cooperate with the supplier and achieve common quality goals.

5.Quality Philosophy and TQM

Quality philosophy is the basic concept and value orientation of quality, which determines the quality management behavior and decision-making of the enterprise. qc (quality control), qa (quality assurance) and qm (quality management) are the three pillars of quality management, which together constitute the cornerstone of enterprise quality management[5].Total Quality Management's All Employees, All Processes and Comprehensiveness: TQM emphasizes the participation of all employees in quality management, the control of the whole process, and the pursuit of overall quality improvement. This means that enterprises need to focus on quality training and education of employees to ensure that every employee has quality awareness and skills; at the same time, enterprises need to control the whole process of the product, from raw material purchasing to manufacturing, and then after-sales service and other links need to focus on quality control; finally, enterprises need to pursue comprehensive quality improvement, not only focusing on the functional quality of the product, but also need to focus on the

smooth operation of supply chain. Delivery management directly affects the enterprise's production planning and inventory control, which in turn affects the market response speed. A supplier who can deliver on time can ensure that the enterprise's production program is carried out smoothly, to avoid production interruptions and customer complaints caused by delivery delays.

3.Seven Supplier Assessment Criteria

In addition to the four core elements of QTCD, supplier appraisal should also include service, financial/management, responsiveness/flexibility and regulatory/environmental aspects to ensure a comprehensive assessment of suppliers[3]. Service: The service level of a supplier directly affects the cooperation experience and problem solving efficiency. A supplier that provides excellent service can bring better cooperation experience and improve the efficiency of problem solving for the enterprise, thus enhancing the operational efficiency and customer satisfaction.Financial/Management: The financial status and management level of the supplier determines its long-term stability and reliability. A supplier with good financial condition and high management level can provide more stable and reliable products and services for the enterprise, and reduce the supply chain risk of the enterprise.Response/flexibility: The market changes rapidly, the supplier's response speed and flexibility is an important ability to cope with market fluctuations. A supplier with the ability to respond quickly and adjust flexibly can help enterprises quickly adapt to market changes and seize market opportunities.Regulatory/environmental protection: Compliance and environmental standards are the basic requirements for enterprises in modern society, and suppliers must have the corresponding awareness and ability. A supplier that complies with regulations and pays attention to environmental protection can bring compliant products and services to enterprises and reduce their legal and environmental risks.

4.Supplier Total Quality Management Discussion

Total Quality Management (TQM) is an all-inclusive, all-process-control, holistic approach to quality management. Reasons for promoting TQM include improving product quality, enhancing customer satisfaction, and optimizing cost structure[4]. Implementing TQM can bring many benefits to an organization, such as improving product quality, reducing production costs, and enhancing customer satisfaction.To determine whether a supplier has promoted TQM: You can evaluate whether its quality management system is perfect, whether its employees have quality awareness, and whether it has a mechanism for continuous improvement. A supplier that promotes TQM usually has a perfect quality management system, a quality culture with full participation of all employees and a mechanism for continuous improvement.Evaluating the supplier's quality management level: This can be done through quality audits, customer feedback, and industry comparisons. Quality audit can assess the supplier's quality management system and actual operation; customer feedback can understand the quality performance of the supplier's products and services; industry comparison can assess the supplier's quality management level in the industry.Company's own TQM implementation: When evaluating the quality management level of suppliers, companies also need to reflect on their own TQM implementation status. Companies need to ensure that their own quality management system matches the supplier's requirements in order to better cooperate with the supplier and achieve common quality goals.

5.Quality Philosophy and TQM

Quality philosophy is the basic concept and value orientation of quality, which determines the quality management behavior and decision-making of the enterprise. qc (quality control), qa (quality assurance) and qm (quality management) are the three pillars of quality management, which together constitute the cornerstone of enterprise quality management[5].Total Quality Management's All Employees, All Processes and Comprehensiveness: TQM emphasizes the participation of all employees in quality management, the control of the whole process, and the pursuit of overall quality improvement. This means that enterprises need to focus on quality training and education of employees to ensure that every employee has quality awareness and skills; at the same time, enterprises need to control the whole process of the product, from raw material purchasing to manufacturing, and then after-sales service and other links need to focus on quality control; finally, enterprises need to pursue comprehensive quality improvement, not only focusing on the functional quality of the product, but also need to focus on the

product's reliability, durability, safety and other aspects of quality.

Application of management methods, mathematical statistics, modern electronic technology and communication technology: modern quality management realizes more accurate and efficient quality control with the help of advanced management methods and technical tools. For example, enterprises can use mathematical and statistical methods to analyze and control data in the production process; use modern electronic technology and communication technology to realize functions such as remote monitoring and real-time data collection; and use advanced management methods such as Six Sigma and Lean Manufacturing to improve the level and efficiency of quality management.

6.Methodological Tools for Total Quality Management

The implementation of TQM requires the support of a series of methodological tools to ensure effective and efficient quality management[6]. These methodological tools include:

Customer Determines Quality: Satisfying customer needs is the starting point for quality standards. Companies need to focus on customer needs and expectations and translate them into specific quality requirements and quality standards to ensure that products and services meet customer expectations and needs.

Group cooperation: Emphasize teamwork to solve quality problems together. Companies need to focus on teamwork and communication to encourage employees to actively participate in quality management activities and work together to solve quality problems and improve product quality.

Management Input: Management's attention and support is the key to the success of TQM. Enterprises need to ensure that management pays attention to and supports quality management, sets clear quality strategies and goals, and provides the necessary resources and support for quality management.

Continuous Improvement: Continuously seek opportunities for quality improvement and implement improvement measures. Enterprises need to focus on continuous improvement and innovation, encourage employees to put forward ideas and suggestions for improvement, and implement and follow up on improvement measures in order to continuously improve product quality and management level.

Process-oriented: focus on process control to ensure the quality of each link. Enterprises need to focus on process control and management, control and supervise the whole process of products to ensure that each link meets the quality requirements and quality standards.

7.TQM System Establishment Procedures

Establishing a TQM system requires systematic planning and implementation to ensure the effectiveness and sustainability of the system[7]. The establishment procedures include:Quality Commitment Assurance: Clarify the quality objectives and commitment of the enterprise. The organization needs to set clear quality objectives and commitments and communicate them to all employees and suppliers to ensure that there is a common understanding of quality requirements and expectations.Establish a dedicated organization: Set up a dedicated quality management organization. Enterprises need to set up a dedicated quality management organization or department responsible for quality management planning, implementation, monitoring and improvement to ensure the professionalism and effectiveness of quality management. Promote the implementation: develop an implementation plan and promote it in stages. Enterprises need to develop a detailed implementation plan, and in accordance with the plan to promote the implementation of the TQM system in stages to ensure the smooth landing and effective implementation of the system.Review and Improvement: Regularly evaluate the implementation effect and make improvements. Enterprises need to regularly assess and review the implementation effect of the TQM system, identify problems and make timely improvements and optimization to ensure that the system is continuously improved and perfected.Design of operating procedures: Optimize operating processes to ensure quality control. Enterprises need to design reasonable operating procedures and workflows to ensure that each link meets the quality requirements and quality standards, and to control and supervise the operating process.Planning quality system: build a comprehensive quality management system. Enterprises need to plan a comprehensive quality management system, including quality planning, quality control, quality assurance and quality improvement to ensure comprehensive quality control of

products and services.Analyze quality requirements: Define the quality requirements of the market and customers. Enterprises need to analyze the quality needs of the market and customers, and translate them into specific quality requirements and quality standards to ensure that products and services can meet the expectations and needs of the market and customers. Implementation of management system: Ensure the effective implementation of the quality management system. Enterprises need to develop a detailed quality management system and operating procedures, and monitor and inspect the implementation to ensure the effective implementation and landing of the system.Shape the quality culture: cultivate the quality consciousness and values of all staff. Enterprises need to focus on shaping and spreading quality culture, cultivate quality awareness and values of all staff, so that everyone can actively participate in quality management activities and focus on product quality. Provide education and training: Improve the quality management ability and skills of employees. Enterprises need to provide employees with quality management training and education to improve the quality management capabilities and skills of employees, to provide a strong guarantee for the implementation of the TQM system.

8.Supplier Quality Requirements Analysis Steps

Supplier quality needs analysis, need to follow the steps below to ensure that the supplier's quality requirements are clear, specific and feasible:Customer demand analysis: First of all, the enterprise needs to understand the customer's specific quality requirements for the product, including the product's functionality, reliability, durability, safety and other aspects of the requirements. Through communication with customers and market research and other ways, the enterprise can obtain the customer's detailed quality requirements for the product.Product Manufacturing Requirements Analysis: Secondly, enterprises need to analyze the key points of quality in the product manufacturing process, including the quality control requirements of raw material procurement, manufacturing, inspection and testing and other aspects. By analyzing and sorting out the product manufacturing process, enterprises can determine the specific quality requirements for suppliers.Supplier quality requirements analysis: Finally, according to customer demand and product manufacturing needs, enterprises need to clarify the quality requirements for suppliers, including product quality standards, inspection and testing requirements, quality management system requirements. At the same time, companies also need to consider the supplier's quality capabilities, historical performance, industry reputation and other factors to ensure that the right supplier is selected.

9.Supplier Selection and Determination

Supplier selection and identification is a systematic process that requires comprehensive consideration of multiple factors and follows certain steps. The selection and identification process includes:Determine the key resource requirements: First of all, enterprises need to identify the key resources and capabilities they need, including raw materials, components, technical services, etc.. These resources and capabilities are necessary for the production and operation of the enterprise, and are also an important basis for selecting suppliers.Determine the evaluation and selection methods: Secondly, the enterprise needs to formulate the criteria and methods for supplier evaluation and selection, including quality, price, delivery time, service and other aspects[8]. These criteria and methods should be objective, comparable and operable in order to conduct a comprehensive and fair evaluation and selection of suppliers.Determine the resource strategy: Next, the enterprise needs to formulate strategies for the acquisition and utilization of supplier resources, including self-sufficiency, external procurement, cooperative development and other ways. These strategies should match the overall strategy of the enterprise to ensure stable access to and effective utilization of resources.

Identify potential suppliers: The enterprise then needs to identify potential suppliers and collect their basic information and qualification certificates and other materials through market research, industry recommendations and other means. These potential suppliers should have the ability to provide the required resources and capabilities and meet the evaluation and selection criteria of the enterprise.Limit the scope of suppliers: After identifying potential suppliers, enterprises need to conduct preliminary screening of potential suppliers based on evaluation and selection criteria and limit the scope of suppliers for more in-depth evaluation and comparison. This step helps to reduce the amount of evaluation effort and focuses on suppliers that are most likely to meet the organization's needs.Conduct supplier evaluation: In-depth evaluation of suppliers within the restricted scope. This includes site visits, quality audits, sample testing, reference to customer feedback, etc. to

gain a comprehensive understanding of the supplier's quality management capability, production process, technical strength, delivery reliability, and after-sales service. During the evaluation process, special attention should be paid to whether the supplier's quality management system meets the company's requirements and whether its historical quality performance is stable and reliable.Selecting the best supplier: Based on the evaluation results, select the supplier that best meets the enterprise's needs. In addition to price and quality, factors such as the supplier's geographic location, speed of delivery, flexibility, ability to innovate, and potential for long-term cooperation should be taken into account in the selection process. The selection process should be transparent and fair to ensure that the selected supplier can bring maximum value to the enterprise in a long-term cooperation.Sign a supply contract: Sign a formal supply contract with the selected supplier, specifying the rights and obligations of both parties, including product quality standards, delivery date, price, payment methods, and liability for breach of contract. The contract should be detailed and specific to avoid misunderstandings and disputes in future cooperation.Establish a continuous improvement mechanism: Even if the supplier has been selected, the enterprise should establish a continuous improvement mechanism with the supplier. This includes regular quality audits, performance evaluations, problem feedback and solution discussions. Through continuous improvement, it can ensure that the supplier's quality management capability is continuously improved to better meet the needs of the enterprise.Maintain a good relationship: Finally, companies should focus on establishing and maintaining a good relationship with suppliers. This includes regular communication, mutual visits, and joint participation in industry events to enhance mutual trust and willingness to cooperate. Good supplier relationships help ensure the stability and reliability of the supply chain, thus bringing long-term competitive advantages to enterprises.

Funding

no

Conflict of Interests

The author(s)declare(s) that there is no conflict of interest regarding the publication of this paper.

References

[1] Zimmer K, Fröhling M, Schultmann F. Sustainable supplier management–a review of models supporting sustainable supplier selection, monitoring and development[J]. International journal of production research, 2016, 54(5): 1412-1442.

[2] Spekman R E, Kamauff J, Spear J. Towards more effective sourcing and supplier management[J]. European journal of purchasing & supply management, 1999, 5(2): 103-116.

[3] Theodorakioglou Y, Gotzamani K, Tsiolvas G. Supplier management and its relationship to buyers' quality management[J]. Supply Chain Management: An International Journal, 2006, 11(2): 148-159.

[4] Prajogo D, Chowdhury M, Yeung A C L, et al. The relationship between supplier management and firm's operational performance: A multi-dimensional perspective[J]. International journal of production economics, 2012, 136(1): 123-130.

[5] Grimm J H, Hofstetter J S, Sarkis J. Critical factors for sub-supplier management: A sustainable food supply chains perspective[J]. International journal of production economics, 2014, 152: 159-173.

[6] Spreitzenbarth J M, Bode C, Stuckenschmidt H. Artificial intelligence and machine learning in purchasing and supply management: A mixed-methods review of the state-of-the-art in literature and practice[J]. Journal of Purchasing and Supply Management, 2024, 30(1): 100896.

[7] Adebayo V I, Paul P O, Eyo-Udo N L. The role of data analysis and reporting in modern procurement: Enhancing decision-making and supplier management[J]. GSC Advanced Research and Reviews, 2024, 20(1): 088-097.

[8] Emon M M H, Khan T, Siam S A J. Quantifying the influence of supplier relationship management and supply chain performance: an investigation of Bangladesh's manufacturing and service sectors[J]. Brazilian Journal of Operations & Production Management, 2024, 21(2): 2015-2015.