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Green Quality Management and Green Target Costing and Their Role in Achieving Competitive Advantage

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Abstract. This study mainly aims at the extent of the possibility of achieving integration between green cost management techniques, including green quality management and green target costing, and the extent of the possibility of achieving many benefits from this integration, including environmental benefits as well as economic benefits for the company and achieving competitive advantage. We have concluded that companies can achieve competitive advantage by adopting the proposed model of integration between green quality management and green target costing, with the use of green value engineering in excluding non-value-adding activities and enhancing value-adding activities, which contributes to enhancing customer value and reducing costs, as well as providing environmentally friendly and differentiated green products.

Keywords. Green Quality Management, Green Target Costing

Introduction

In an era of escalating environmental concerns and fierce market competition, companies face a critical dual challenge: minimizing their environmental footprint while maximizing their competitive advantage. The traditional model of prioritizing profit over environmental responsibility is undergoing a transformative shift. Customers are increasingly demanding environmentally friendly products, while regulatory bodies are tightening environmental regulations.

This paper delves into two powerful tools, Green Quality Management (GQM) and Green Target Costing (GTC), and their synergistic potential in this complex landscape. By integrating environmental considerations into quality management and cost control at its core, companies can open a path not only to sustainable practices but also to a distinct competitive advantage. By enabling companies to achieve operational excellence, cost optimization, and ultimately, a superior market position.

This paper delves into the dynamic interplay between domestic regulations, international market pressures, and the rise of environmentally conscious consumers, highlighting the critical role of green quality management and green target costing in navigating this complex landscape and revealing their combined potential for competitive advantage.

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First Section: Study Methods and Review of Literature

Methodology of research

First: Research Problem

In the current circumstances and challenges that countries face, including a decrease in natural resources, an increase in environmental pollution rates, and a lack of energy sources, the possibility of using renewable energy to generate energy while preserving the environment and reducing damage compared to the traditional product, the environmental awareness among customers has increased significantly, and the intensity of competition between companies has increased. Hence, there is a growing necessity to implement modern cost-effective strategies to produce eco-friendly products that can compete based on quality and price, ultimately leading to customer satisfaction and gaining a competitive edge. Traditional cost systems are no longer sufficient to address current challenges.

The research problem was identified through the following questions:

1) Can implement green quality management and green target costing help in cost reduction??
2) Can green quality management and green target costing contribute to the production of eco-friendly products?
3) Can implementing green quality management and green target costing help in gaining a competitive advantage?

Second: The research objectives

The study aims to achieve the following objectives:

1) Clarifying the cognitive foundations of green quality management.
2) Explaining the cognitive foundations of the green target costing technique.
3) Explaining how to reach an environmentally friendly (green) product using green quality management.
4) Explaining the role of green quality management and green target costing in achieving competitive advantage.

Third: Research hypothesis

The research depends on a fundamental hypothesis.:

"Using green quality management and green target costing techniques helps companies achieve competitive advantage."

Literature review: The following studies relating to the topic of study will be presented:

1) **A Study of (Lihui, 2007) entitled: "Research on Construction and Process Control of Green Quality Management System in Enterprises"**
   The study aims to clarify the impact of green quality management information on efficient control and management. The study also seeks to provide an effective evaluation system through the use of (ANP) and based on the innovation of the Green Quality Index. The study found that green quality management covers aspects of environmental protection, efficient use of resources that total quality management lacks, as well as meeting the requirements of sustainable development. The study also indicated that applying green quality management effectively with the application of ISO 9000 contributes to maximizing benefits. On the economic and environmental levels.
2) **A Study of (Ning, 2015) entitled: "The Application of Green Quality Management System in Ship Industry Research"**

The objective of the study is to implement green quality management practices in shipbuilding in order to enhance competitive advantage, protect the ecosystem, and attain sustainable growth within the industry.

The study found that green quality management addresses the limitations of total quality management by focusing on environmental preservation, efficient resource utilization, and achieving the criteria for sustainable development. A green quality management system aims to achieve zero defects while contributing to a pollution-free environment by monitoring every phase of the product cycle.

3) **A Study of (Tao, 2015) entitled: "Research on Construction and Evaluation of Green Quality Management System in Enterprise"**

This study aims to investigate the green quality management system, total quality management, and the environmental management system. The objective of the study is to integrate the green quality function into every stage of the product life cycle, analyze the processes involved, and employ the Analytical Hierarchy Process (AHP) to establish a green quality management system. The objective is to establish a green quality management system and assess its efficiency and effectiveness.

The study found that traditional quality management focuses primarily on the production process and ignored environmental protection, as well as disregarding energy and resource wastage. Green quality management focuses on efficiently utilizing resources, optimizing environmental advantages, and meeting customers' desire for eco-friendly products.

4) **A Study of (Qiang, 2017) entitled: "Green Quality Enhancement of Manufacturing Enterprises in Vision of Standardization System"**

The study aims to achieve integration between the ideas of green development and comprehensive quality management from the perspective of the standardization system and the establishment of an integrated green quality system for manufacturing institutions. To achieve this, ISO 9001 standards and environmental management standards (ISO 14001) were used to establish a green quality system for manufacturing institutions.

The study concluded that focusing on developing and improving green quality is the primary way to reduce the impact on the environment and natural resources. The study also concluded that ISO 9001 and ISO 14001 contribute to building an environmentally friendly quality system.

5) **A Study of (Tsai, 2018) entitled: "A Green Quality Management Decision Model with Carbon Tax and Capacity Expansion under Activity-Based Costing (ABC)-A Case Study in the Tire Manufacturing Industry"**

The aim of this study seeks to reorganize carbon emissions throughout various production stages to to reduce the overall carbon emissions generated by products. The implementation of activity-based costing was carried out to evaluate the expenses related to green quality management and production. Attempt to enhance production, minimize environmental impact, and maximize profitability.

The study found that companies are increasing energy consumption for financial gain, while governments are implementing carbon emission regulations and tax policies for protecting the environment. Therefore, it is essential to consider consider these two aspects when planning new projects. Companies are currently emphasizing both environmental protection and profitability due to the increasing importance of global awareness of environmental issues. The study found that energy allocation is a crucial aspect for the sustainable operations of corporates and their capacity to maintain competitiveness. Enhancing

competitiveness through the useful utilization of energy is an essential goal for all companies.

6) **A Study of (Frehe, 2015) entitled: "Can target costing be applied in green logistics-evidence from a conjoint analysis"**
This article seeks to determine customer sustainability preferences, evaluate them in terms of monetary value, and apply them in green logistics target costing through Expert Survey and Choice-Based Conjoint Analysis approach. The study found that the most essential factors are actual work, price, and delivery time, with environmental challenges (gas emissions) and social issues following closely after. The last two elements are regarded similarly in terms of appropriate delivery timing. Typically, pricing is the primary consideration, but this may change in the future. The essential conclusion is The study showed that target costing can be effectively utilized to offer the suitable product or service at a suitable price.
7) **A Study of (Horváth & Berlin, 2012) entitled: "Green Target Costing: Ready for the Green Challenge"**
The study emphasized the importance of integrating business models to preserve the environment and tackle the green challenge and the role of management accounting tools in enhancing environmental information to modify these models. The study found that the green product business model outperforms traditional products in terms of quality, functionality, and cost.
8) **A Study of (De Melo et al., 2016)entitled: "ZEMCH and Green Target Costing Approaches Inferences from a Design Workshop"**
The study investigates the use of green target costing as a strategic cost management approach in the construction sector to reach a specific profit margin and improve product value. The study suggests that the green target costing technique is currently being tested in the construction sector. Its ability to lower costs, maintain profit margins, and enhance supply chain collaboration is essential for assessing the value delivery process.

Section Two: Fundamentals of Green Quality Management

First: Green Quality Management Concept

The 1987 report "Our Common Future" (WCED) introduced the concept of sustainable development, ensuring present needs are met without compromising future generations' ability to meet their own needs. In 1992, the World Conference on Environment and Development proposed a sustainable development strategy and formulated Agenda 21, focusing on understanding resources, environment, and development, integrating them with social and economic development, and promoting mutual coordination between these areas (Lihui et al., 2006).

There are many viewpoints of researchers and academics on The term of green quality management, including:

- Green quality management systems are a formal management system that assists firms in identifying goals and making decisions. They are regarded as the most comprehensive and methodical tool for protection the environment and business. (Wang et al., 2023)
- Green quality management combines conventional Total Quality Management principles with environmentally friendly practices focused on conservation and sustainability. It aims to fulfill customer demands by taking consideration of social, resource, and environmental factors, ensuring satisfaction through societal development, protecting the environment, and energy consumption reduction. (Jie, 2010a)

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- Mei et al. (2004) define green quality management as a technology that addresses green demand by considering economic, social, and environmental benefits, aiming to provide customers with satisfactory product characteristics for environmental protection and energy conservation (Mei et al., 2004)
- Green quality management is a technology that combines traditional total quality management with green demand, considering social functions and economic unit profitability. It aims to balance profitability, energy conservation, environmental protection, and customer needs. This involves managing the entire product design, procurement, production, logistics, recycling, and feedback cycles to meet green quality standards (Tao, 2015)
- The green quality management philosophy focuses on integrating green environmental protection into economic unit production management, addressing customer needs, and enhancing customer satisfaction. This approach is applied throughout the product life cycle, from design to recycling, ensuring economic and environmental benefits. This holistic approach improves the sustainable environmental competitiveness of economic units, enhancing customer satisfaction and societal harmony. The philosophy is applied throughout the product life cycle (Xiangshu & Ming, 2018)

Second: Green Quality Management Objectives

Adopting green quality management technology can achieve many objectives, including:

1) The management model within the green quality management system focuses on resource efficiency, pollution control throughout the product lifecycle, and minimizing environmental effects. (Wang et al., 2023)
2) Achieving environmental efficiency in the entire product life cycle, including design, raw material selection, process optimization, pollution prevention and treatment, after-sales services, and waste recycling and treatment.
3) Determine and measure direct and indirect costs associated with environmental factors in production to enhance enterprises' environmental performance, control costs, evaluate equipment investments and clean production technology, avoid and treat pollution, and enhance green processes and products within environmental protection and clean production.
4) Green quality cost data is crucial for decision-makers in product structure, retention, and pricing strategies. It evaluates environmental quality and determines the effectiveness of cost management systems. Objective criteria are used to determine if the cost of green quality management aligns with environmental protection purposes. Costs include prevention, evaluation, internal, and external failure costs (Tsai, 2018)
5) Encouraging technological innovation and management innovation Technological innovation refers to improving the product or level of service automation, intelligence, and greening. While management innovation refers to making the production process cleaner, flexible, and waste-free, eliminating waste, and improving efficiency.
6) Help economic units seize green opportunities, open unlimited business opportunities resulting from the global green industrialization trend, reduce environmental pollution losses, improve social image, and enable economic units to obtain greater benefits (Qiang, 2017)

Third: Characteristics of green quality management

The green quality management system has some features and characteristics, including:

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1) Quality requirement-oriented extension: The implementation of green quality management will lead to the expansion of quality requirements, which will have a significant influence on the larger industrial ecosystem, that is, to meet the expanding market demand, including the environmental market, and the expansion of the market for products—services—consumers—markets (Jie, 2010b)
2) Harmonization of strategic ideas and methodologies for green quality management. Traditional enterprise environmental quality management using clean production technology, implementing ISO14000 certification, product life cycle evaluation methods as well as green design, green manufacturing, and other methods, most are methods and means, there is no risk to the enterprise strategy height, lack of corresponding quality culture. The company promotes green quality management, first by establishing a green quality strategy, guide ideas first, technical methods follow, establish green quality control system, model, the combination of various green technologies, methods and more effective, so that ideas and methods come together (Jie, 2010b).
3) Beyond the typical total quality, High-quality green standards are met. Traditional Total quality includes product performance, quality, delivery time, efficiency, life cycle, maintainability, and quality expenses to meet consumer expectations. Quality is restricted to industrial habitats due to resource scarcity and environmental issues. Generalized quality should reflect enterprise green quality, integrating conservation, harmony, and ecologically beneficial green concepts within the framework of Total quality management.
4) Expanding the range of quality management. The scope of quality management has evolved from traditionally focusing just on the product to encompassing the entire process of formation and network development within an organization. However, its reach remains limited when considering the goal of sustainable development. It disregards the environmental impact of the production process, the efficient utilization of resources, and the environmental consequences that occur from the moment the product enters the consumer market until its final disposal. Green Quality Management includes the product, process, and organizational aspects of a business beyond its immediate area.
5) The Integration of Internal Quality with External Quality.
   Traditional Total quality management focuses on both the internal and external quality of a business company. The act of consuming and disposing of consumer products can still have a negative influence on the environment. The extent of this impact is determined by the quality of the design and composition of these products. Consequently, the green quality management criteria need a lifelong commitment. Enterprises will integrate external quality requirements, aligning them with their internal practices, and thereby contribute to an overall ecological environment that is environmentally friendly (Sui et al., 2019)
6) Quality management theory is a dynamic process that evolves over time, shifting from ensuring product service life to focusing on product functionality, standardization, and total quality control. Green quality management is also in dynamic development, ranging from green function development to full cycle functional integration, demonstrating the dynamic nature of product quality control (Tao, 2015)
7) Sustainability: The sustainability reflected in the green quality management system mainly refers to the sustainability of the company's production activities, the sustainability of customer needs and satisfaction, as well as the sustainability of environmental resources and the environment. For production activities to be sustainable, the source of resources must be sustainable, and for customer needs to be sustainable, the company's production

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activities must continue. Achieving these goals depends on environmental resources and environmental sustainability (Lihui et al., 2006)

Fourth: Factors Affecting Green Quality Management

Many factors are closely related to green quality management technology and that contribute to influencing the process of its adoption and application: (Wu et al., 2022)

1) Green manufacturing technology: Green technology innovation provides the environmental friendliness of products by focusing on both the manufacturing process and methods to achieve environmentally friendly production.
   Utilizing new energy sources and materials helps remove technological barriers between businesses and nations, promoting sustainable and cost-effective development. The green cost control ability may assess an enterprise's capacity for green quality management, as well as its competitiveness in quality performance. (Wu et al., 2022b)
2) Green supply chain: Green quality management in enterprises is impacted by the green supply chain, which involves suppliers, vendors, partners, customers, and government oversight throughout the production process. Manufacturing companies should set up cooperative limitations and proactively engage in waste recycling to encourage environmentally friendly consumption, production, quality competition, and ecological responsibility. (Wu et al., 2022b)
3) Green Operation Management: To implement green quality management, enterprises must integrate green concepts into their corporate culture, adopting a green approach that prioritizes quality innovation over profit. This involves setting objectives, implementing green quality control systems, introducing green human resources and technology, and meeting consumer and society's environmental protection needs. (Wu et al., 2022b)

Fifth: Principles of Green Quality Management

The concept of green quality management depends on several fundamental principles, and the most importance placed on the following:

1) Meeting the green demands of customers and pursuing the satisfaction of all parties concerned
   Companies must fulfill the environmental requirements and expectations of customers and other significant users, including present, potential, and future needs, to provide benefits for all parties involved. This includes all customers, owners, workers, partners, suppliers, the community, and the environment.
2) Take responsibility for quality of life
   Green quality management aims to achieve Total satisfaction by coordinating the growth of economic units, society, resources, and the environment, with a focus on quality of the product life cycle. Design, production, packaging, and other processes are related to external quality, and the economic unit bears the responsibility for quality of life.
3) Benefits the supplier and the environment
   As the environmental crisis becomes more serious, humanity's interests are closely intertwined with those of other species and even the Earth. People should consider the harmony between the interests of man, nature, and the entire ecosystem. Humanity should realize that everything is interconnected and the choice of human interests is limited by the limits of the overall dynamic structure of the natural world, establish a mutually beneficial relationship with suppliers and the environment, and maintain a win-win situation (economic unit and supplier) within the limits of the values of the natural system (Jie, 2010a)

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4) Attention to environmental satisfaction
Total quality management works to focus on the customer and that customers are the basis for the survival and continuity of the economic unit, and all economic units should meet the customer's requirements. However, the reality indicates that if the economic unit destroys the environment to obtain benefits and meet customer requirements, then it can be said that it is a step backward, as It does not improve the quality of life of customers, but rather reduces the quality of life. According to the requirements of environmental protection, if economic units blindly meet the needs of customers and seek to maximize their interests, they obviously cannot meet the requirements of environmental development. Satisfying customers based on environmental considerations improves the green benefits of the economic unit, and at the same time, customers obtain green satisfaction so that the public benefits including the environment are greatly improved.
5) Achieving excellence
Traditional management benefits economic units by fostering interdependence and collaboration to achieve maximum benefits. Currently, the environmental issue is increasing. Hence, the relationship between supply and demand should not viewed only as mutually beneficial, but balanced interaction between humanity and the environment must be regarded. By properly protecting the environment, select high-quality suppliers, and integrating them, the total superiority of the company can be realized (Ning, 2015)
6) Zero defects and zero pollution
Traditional quality emphasizes achieving "zero defects," whereas green quality emphasizes achieving "zero pollution" and "zero defects." Green Quality Management aims for the best by focusing on the goal of achieving "zero defects," which in turn results in zero contamination. Producers should strive to ensure their products and businesses are impeccable. Companies should encourage environmentally friendly practices and support emission standards. Zero defect measures include promoting energy efficiency, reducing pollution, emissions, and waste. These measures not only reduce costs but also improve environmental protection, enhance environmental responsibility, and prevent the potential negative consequences of violating environmental regulations. Encouraging sustainable development over the long term. Defect and pollution prevention are integrated into green quality management.
7) The principle of focusing on prevention
This means shifting the focus of quality management from the "result" of management to the "process" of management. Economic units should not wait for non-conforming products to take measures, nor wait for pollution to occur. Therefore, economic units should take effective measures to prevent possible pollution. Ideas should be put in place to preserve and protect the environment and health. The establishment, operation, and improvement of all processes should be based on prevention.
8) The principle of unifying quality and benefit
To achieve the unification of quality and benefit, the relationship between benefits, costs, and risks from different aspects of customers, economic units, and the environment should be balanced. An effective quality management system should not only meet customers' needs and expectations but also protect the interests of the economic unit and the environment, to achieve a win-win situation.
9) The principle of continuous improvement
The economic unit should prevent the occurrence of non-conformities and pollution, take necessary measures for continuous green improvement of the economic unit's operations,

plan and implement the necessary measures to ensure the improvement process and evaluate the impact of the improvement. Companies must enhance possibilities, and analyze resources, technology, methods, and other environmental factors. They should focus on continual innovation and aim for performance excellence. These procedures should be implemented for a certain period of time to prove their effectiveness (Lihui, 2007)

Third Section: Green Quality Management and Green Target Costing To Competitive Advantage

First: Green Target Costing Concept

Climate conservation is a growing concern, prompting companies to focus on green products that conserve natural resources, avoid toxic materials, reduce pollution, and use renewable energy. These products must maintain product quality while satisfying customer needs. Companies must develop their businesses and use green cost management techniques, including green target costing, to meet these goals.

Nishimura (2014) Proposes the implementation of green target costing, which combines environmental costs with traditional target costing by including a green price premium and utilizing the green Kaizen approach. This approach focuses on six principles: customer, design focus, business teams, product life cycle orientation, and value chain involvement (Nishimura, 2014)

Green target costing is the integration of target costing mechanisms into an environmental sustainability strategy, enhancing practices and providing a comprehensive approach. It helps determine permissible product costs, as customers often resist additional costs, despite environmental programs emphasizing the importance of green products (Hendricks, 2015).

Green target costing integrates environmental considerations into traditional target costing in response to legislation, legislative issues, the desire for eco-friendly consumer products, and stakeholder expectations. These problems typically pertain to the goods of the economic unit, like in the automobile industry, where vehicles need to comply with environmental regulations established by legislative authorities. (Malone, 2015)

We believe that Green target costing is the modification of traditional target costing technique to create environmentally friendly products that meet customers' expectations and comply with environmental regulations, while maintaining competitive pricing to maintain market position. Cost-effective and environmentally friendly for consumers

Second: The Effect of Green Quality Management on Competitive Advantage

A researcher argues that a company can get a competitive advantage over competitors by acquiring high-quality, eco-friendly raw materials at a fair price, having skilled employees, and utilizing advanced technologies.

Utilizing contemporary eco-friendly technologies in production enhances operations, helping the economic unit avoid penalties and fines for environmental offenses. Costs can be minimized by efficiently utilizing manufacturing capacity and continually improving product quality and innovation in green product design. Energy-efficient manufacturing procedures aligned with environmental policies can lower processing and waste disposal costs, as well as prevent environmental fines for the company. This results in favorable financial consequences that can save costs and enhance efficiency. Therefore, the company can benefit of the pricing variation to surpass competitors. (ElKhouly et al., 2020)

Third: The Impact of Target Costing on Competitive Advantage

The cost strategy focuses on operational excellence, reducing costs through good financing and new production systems, while the low-cost strategy offers cheap products compared to competitors (Arseculeratne & Yazdanifard, 2013)

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Cost advantage can be achieved through various sources, such as economies of scale, preferential selection of raw materials, and special technology. However, companies must consider the foundations of differentiation in environmental product production, as they cannot ignore these factors in most cases of competition, We believe that using the green target costing technique is effective in reducing environmental costs because the process of reducing costs must be worked on from the initial stages of product design.

The Design of green products called Environmental design is defined as a green product design process that considers products, processes, materials, energy, and recycling throughout their life cycle. It aims to eliminate waste from manufacturing processes, which are direct sources of waste. By redesigning products, environmental degradation or improvement can be achieved, ensuring a more sustainable and eco-friendly future (Hansen & Mowen, 2007)

Fourth: Integration between Green Quality Management and Green Target Costing to Achieve Competitive Advantage: a Proposed Model

green management has been considered an important organizational philosophy in reducing environmental risks and a preventive approach to increase environmental performance and achieve competitive advantage (Tarvirdizadeh et al., 2021)

The following steps can be taken to clarify the integration between green quality management and green target costing:

1) Identify and evaluate required green features and functions

   Assessing a product's quality and performance from the customer's perspective is crucial for understanding environmental requirements. However, customers often lack awareness of green products due to a lack of standards. Target values for environmental product specifications can be derived from market data, internal environmental management activities, or economic unit programs. A unified approach, such as conjoint analysis, connects internal and external aspects of a product, assessing customer perceived value. (Horváth & Berlin, 2012)

   The concept of green quality should be able to reflect the real needs of environmental protection and sustainable development of consumers, enterprises, and society, and reflect the latest quality management ideas and methods. At the same time, it should also be dynamic, and developing, and can continue to innovate with the development of society's economy and technology, green quality is the strategic development objective of enterprise quality management, emphasizes enterprise environment protection and resources saving green quality responsibility, based on guaranteeing the traditional Total quality management effect, pursue to achieve the sustainability of the enterprise and the green needs of customers (Gaoqian, 2012)

   Beyond meeting the green needs of customers, pursuing the satisfaction of all stakeholders. Companies must focus on recognizing and fulfilling the green requirements and desires of customers and other parties, encompassing current, potential, and future requirements, to ensure mutual benefits. This includes a wide range of customers, enterprise owners, corporate employees, external suppliers, partners, related organizations, and the social and ecological environment. (Jie, 2010b)

2) Planning for green quality

   It should be noted that the company should define quality objectives, necessary operating processes, and related resources to achieve quality objectives, and the planned results constitute a quality plan. To improve the quality of products and services to meet green requirements and meet environmentally friendly requirements, the green quality management system needs to be carefully planned. It is noteworthy that any new job or

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activity requires planning and that the first step to success is developing a quality plan (Sui et al., 2019)

Lun (2008) believes that attention is paid to planning during the design stage because it is a key link in shaping the performance of various products, including environmental performance. Green quality management during design aims to implement green quality control and verification in the entire process from design trial to design confirmation. By formulating and implementing documented procedures for monitoring and verifying product design, design work can be carried out in a planned and phased manner. Step by step, taking into account comprehensive considerations: environmental protection, labor protection, resource and energy optimization, and other issues at each stage of the product life cycle to ensure that product performance meets customer requirements and relevant environmental requirements, thus laying the foundation for achieving comprehensive green quality requirements for the product (Lun, 2008)

3) Determine the green premium and target selling price.

The target selling price for green products is calculated by an analysis of market conditions and feedback from customers. Early findings on the pricing of green products are inconclusive, since some research indicate that consumers are ready to pay more for green products, while others propose specific criteria that can lead to a premium for green products. Customer trust in environmental advantages, namely tangible environmental concerns such as global warming, could account for varying preferences. (Horváth & Berlin, 2012)

There are many tools available to determine the green target price, which are:
(Malone, 2015)

- Direct customer survey: Potential consumers are interviewed in person for assessing their responses to pricing. This is an efficient and easy method for obtaining information about a larger number of specific customers.
- Analysis of secondary market data: This approach employs the functional parameters of the inverse demand function and econometrics. The target price is determined based on market data, such as association studies and published statistics.
- Expert opinions: This approach depends mainly on experienced and qualified staff. This procedure is efficient and cost-effective, but the outcome quality relies on the expertise of the experts.
- Price experiments: The buyer's behavior is evaluated at several prices, with the price changing periodically. This procedure is time-consuming and relatively costly.

4) Adjusting the green profit margin and calculating the allowable costs

As in traditional target costing, allowable costs are computed by subtracting the target profit margin from the target price. For green products, the profit margin must to be modified to account for additional hazards linked to this category, such as the potential for the sustainable product to be unsuccessful compared to the conventional one. Additionally, indirect costs must be taken into account. The selling price covers the costs incurred throughout the product's life cycle, while only direct costs are included in the target cost. Indirect costs, such as admin costs, are a significant component tied to proportionate cost objectives, regardless of the customer's perceived value. (De Melo et al., 2016)

5) Analyze activities and identify their nature

Green quality management and green activity-based costing techniques are used to identify and categorize activities into those unrelated to green quality and those related to green

quality. The activities can be categorized based on the different phases of the product life cycle:(Banglong, 2016)

a) Activities unrelated to green quality are categorized into:
   - Research and development phase activities: design, production of trial samples of the product, testing of trial samples of the product.
   - Manufacturing phase activities: Parts assembly, raw material transportation, logistics operations, and warehousing.
   - Distribution and sales phase activities: advertising, packaging, product transportation, product installation.
   - Recycling activities: cleaning the product, dismantling and opening the product.

b) Activities associated with green quality, including prevention, appraisal, internal failure, and external failure, are categorized among the following:
   - Research and development phase activities: This includes all activities related to the green design process.
   - Manufacturing phase activities: environmental protection operations, pollution treatment operations.
   - Distribution and sales phase activities: This includes the green packaging process.
   - Recycling phase activities: recycling empty containers, and recycling waste.

6) Using green value engineering

The focus is on using green value engineering technique at an early stage of the product life cycle, namely the design stage, due to the comprehensiveness of the impact of this stage, the design stage is a critical component of the product life cycle, as it fundamentally influences all stages and serves as a connecting link between them. (Tayfour, 2012)

We advocate for implementing green value engineering by gathering product data, analyzing components and functions, assessing costs and environmental impacts, suggesting design alternatives to improve functions while reducing emissions and waste. Utilizing a Green value engineering function index to eliminate non-value-added activities, enhance functional benefits, or decrease costs of value-added activities.

7) cost breakdown on green cost drivers

Designers determine the allowable cost for each component after calculating the product's allowable cost. Customer values are reflected in product attributes, which are then allocated to the components. This method is subjective and typically carried out using quality function deployment (QFD). Understanding the environmental effects of each component is essential in green target costing evaluations. (De Melo et al., 2016)

8) Implement Green Kaizen costing

it is a method that monitors cost reduction and environmental improvements by updating a standard cost report periodically. This process involves identifying and estimating cost changes, and evaluating the achievement of cost reduction objectives. green kaizen cost includes updating standard environmental impacts and monitoring physical data for each product component to assess environmental improvement potential.

green kaizen cost involves monitoring the effectiveness of each action to reduce costs and improve the environment. This involves comparing actual impacts to expected ones and identifying ineffective measures and those with little value. The combined cost reduction, environmental improvement, and updated impact measurement report require appropriate reporting processes.(Horváth & Berlin, 2012)

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The integration between Green Quality Management and Green Target Costing can be illustrated through figure (1)

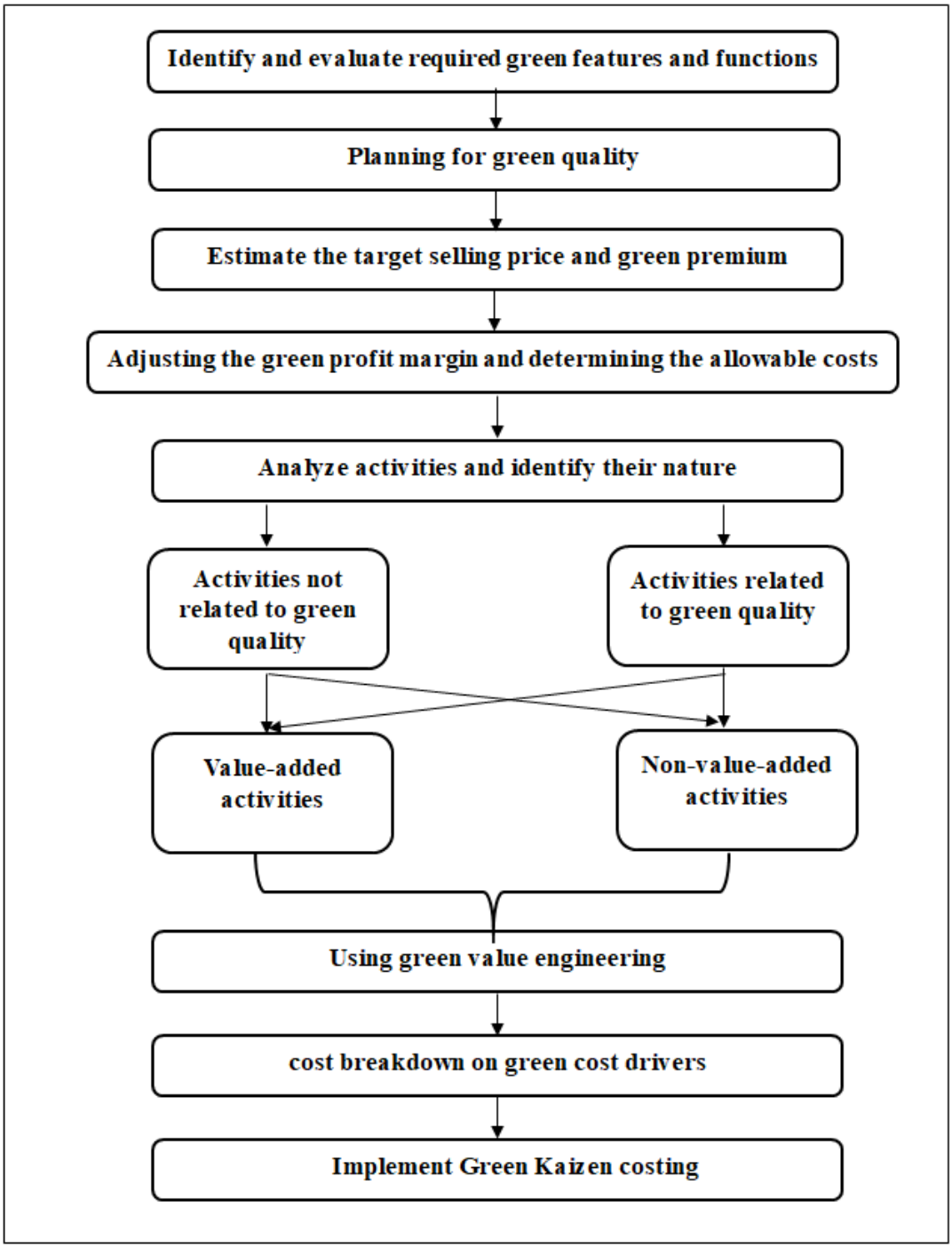

Figure (1): The integration between Green Quality Management and Green Target Costing

Fourth Section: Findings and Recommendations
First: Findings

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1) Green quality management is in harmony with the requirements of sustainable development by preserving resources and protecting the environment, as well as meeting the desires and needs of customers for green products.
2) The scope of green quality management is more comprehensive than total quality management, as it takes into account concern for the interests of the company, the environment, and society, by integrating the function of protecting the green environment into the process of manufacturing products. In terms of total quality management, its primary objective is to pursue the company's interests..
3) Green quality management addresses the limitations of total quality management by focusing on environmental protection, efficient resource utilization, and sustainable development goals.
4) Green quality management integrates the objectives of zero defects and zero pollution, as it seeks to create defect-free, green, environmentally friendly products by product monitoring throughout its life cycle.
5) Integration can be achieved between green quality management and green target costing, and this can contribute to reducing costs and improving environmental performance by dispensing with activities that are not related to green quality and do not add value, as well as creating a green design for the product that takes into account the optimal exploitation of scarce resources and works on the use of materials. Environmentally friendly primary or reducing the use of environmentally harmful raw materials, which leads to achieving a competitive advantage for the company
6) Green target costing is an essential technique used to control products in the early stages of production, allowing for the conversion of traditional products into environmentally friendly ones that give the company a competitive edge.
7) The green target costing technique requires the use of supporting tools in order to achieve the targeted reduction in the cost of products.

Second: Recommendations

1) Motivating and encouraging companies to green their products and supporting green product projects.
2) Companies adopting green management accounting techniques, as these techniques contribute to achieving the companies' financial goals as well as compliance with environmental laws and regulations. These techniques also contribute to achieving important goals, which are providing green, environmentally friendly products that save energy and work on the optimal exploitation of scarce resources. Some of these techniques help management in planning, controlling and making decisions, which contributes to evaluating the strategic performance of companies.
3) Green target costing is one of the important techniques in controlling the product in the initial stages and before starting production, which provides the opportunity to transform traditional products into green products that achieve a competitive advantage for companies.
4) Adopting green quality management technology because of its important role in eliminating non-value adding activities that are not related to green quality, which enhances the quality of products, makes them environmentally friendly, and reduces the costs of those products, which enhances the competitive advantage of companies.
5) Adopting green value engineering as a technology that contributes to improving the performance of the regular job as well as the performance of the green job. It is also considered a supporting tool for the green quality management technology in reducing

product costs by identifying components whose costs are higher than their functional value in order to be improved or their costs reduced to be their value indicator. Higher than the correct one, which is appropriate from the point of view of the customer and the company.

6) Paying attention to green design ideas during the research and development phase because green design greatly helps in applying green quality management concepts and also contributes to the production of green products that are consistent with environmental requirements and meet the needs and desires of customers in terms of quality and cost.
7) The possibility of greening the company's products is its winning card in order to achieve the strategy of differentiation, cost and focus by using the green target costing technique.

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