UNIVERSITY OF CAPE COAST

TOTAL QUALITY MANAGEMENT AND ENVIRONMENTAL PERFORMANCE: THE MEDIATING ROLE OF INNOVATION

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BY

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DECLARATION

Candidate's Declaration

I therefore declare that this thesis is the result of my own independent work and that no portion of it was submitted for another degree to this university or elsewhere.

Candidate's Signature …… Date …….

Name: Bernard Nyarko

Supervisors' Declaration

We therefore declare that, in accordance with the guidelines set out by the University of Cape Coast for the supervision of thesis. The preparation and presentation of the thesis have been supervised.

Principal supervisor's Signature ……

Date …….

Name: Dr. Nicodemus Osei Owusu

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ABSTRACT

The study overall looked at the effect of total quality management on environmental performance with the mediating role of innovation. The specific objectives of the study were to examine the effect of total quality management on environmental performance. To examine the effect of innovation on environmental performance and the effect of the mediating role of innovation in the relationship between total quality management and environmental performance. Being a quantitative study, the positivism philosophy was adopted together with an explanatory research design. A self-administered survey questionnaire was used as the research instrument for data collection. In all, 400 respondents in food and beverage manufacturing firms were included in the study. The study employed the partial least square structural equation modelling (PLS- SEM) as the statistical tool for data analysis. The findings of the study indicated that total quality management has a positive and significant effect on environmental performance. Innovation has a positive and significant effect on environmental performance. Also, innovation has a positive and significant mediating role in the relationship between total quality management and environmental performance. The study recommended that total quality management does not work in a vacuum. Therefore, managers need to incorporate innovation into their strategic decisions when considering how to improve upon their environmental performance through total quality management.

KEYWORDS

Environmental Performance

Food and Beverage Manufacturing Firms

Ghana

Innovation

Total Quality Management

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DEDICATION

To my family

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AGI	Association of Ghana Industries
AVE	Average Variance Extracted
CR	Composite Reliability
HTMT	Heterotrait Monotrait ratio
ILO	International Labour Organisation
TQM	Total Quality Management
UNEP	United Nations Environment Programme

CHAPTER ONE

INTRODUCTION

This study sought to examine the effect of total quality management on environmental performance with the mediating role of innovation. Food and beverages manufacturing firms in Ghana was selected for this study. The contribution of food and beverages manufacturing firms on the economy and the private/public sector cannot be taken lightly because they provide employment to citizens and contribute immensely to the GDP. However, food and beverages manufacturing firms over the years underperform in terms of sustaining the environment in Ghana. One of the reasons accounting to this drawback is the weakness in the total quality management and the omission of innovation in the dealings of food and beverages manufacturing firms in Ghana. It is from this assertion this study draws motivation to identify the moderating role of innovation on the relationship between total quality management and the environmental performance of food and beverages manufacturing firms in Ghana.

Background to the Study

The consequences of economic development (e.g., climate change, deforestation, loss of biodiversity, depletion of water resources) create pollution and environmental problems that threaten sustainable development (Asumadu, *et al.*, 2020; Givens *et al.*, 2019). According to the World Health Organization, one quarter of the world's deaths and diseases are caused by known and avoidable environmental risk factors (World Health, 2019). The need to face these large-scale and urgent environmental problems has reached a global consensus. Governments

of all countries are taking responsibility for international environmental problems and must adopt measures to tackle them. At present, governments around the world are starting to include what they deem marginal and secondary environmental issues into their political agendas.

The inclusion of environmental performance indicators has become one of the most popular metrics to measure progress towards the achievement of sustainable development goals (SDGS) (Guijarro, 2019; Mokhayeri, 2017). According to the Environmental Performance Index report conducted by Wolf *et al.*, (2022), Ghana is ranked 170th among 180 countries globally and 45th among 46 African countries as country with focus on environmental performance. In the Environmental Performance Index report conducted by Wolf et al. (2020), Ghana was ranked 168th among the 180 countries considered globally and 36th among the 46 African countries with focus on environmental performance. The annual report is based on 24 performance indicators in 10 categories spanning from environmental health to ecosystem vitality.

A report from the International Labour Organisation (ILO) highlighted that Ghana's food and beverages manufacturing industry is the largest subsector of the manufacturing sector (ILO, 2020). The food and beverages manufacturing industry contributes about 52% to the manufacturing sector's GDP and more than 50% to the environmental costs of the manufacturing sector (ILO, 2020). Reports from Ghana Food and Drugs Authority, also indicate that over the past 10 years, several food and beverages manufactured products have been recalled off the market due to the challenges of quality. Even though, most food and beverages manufacturing

firms if not all have either a quality control unit, a quality assurance unit or both units in their production lines (FDA, 2022–2019). These challenges contribute to poor environmental performance.

Total quality management is a business management philosophy that emphasizes customer satisfaction and the organization's overall performance by ensuring that customers' expectations are met (Amin *et al.*, 2017). Consequently, firms have used total quality management practices to boost corporate performance by distinguishing their goods and obtaining a competitive market position (Agyabeng-Mensah, 2020; Singh *et al.*, 2018). These total quality management practices include continuous improvement, top management commitment, employee involvement and customer focus (García-Fernández *et al.*, 2022; Shafiq *et al.*, 2019).

Akanmu *et al.*, (2020), acknowledged total quality management as a globally advanced strategy for attaining quality goods and services that result in performance excellence. The theoretical stance for the influence of total quality management on environmental performance is the resource-based view theory. The Resource Based View theory (RBT) suggests that firms are able to create and sustain competitive advantages through the collection and integration of rare, valuable, inimitable, and non-substitutable resources (Barney, 2018; D'Oria *et al.*, 2021). In the context of TQM application, an organization builds unique resources and capabilities that ensures better environmental performance than organizations that do not possess such resources and capabilities.

Innovation in an organizational context is an idea, a product, a process, a system or even a device, that successfully brings new insights. Which impacts an individual, groups of people, organizations, an industrial sector and the whole society (Valmohammadi, 2017). Organizations that are able to innovate are more capable of delivering new products and services, improving processes faster to fit the market needs and capitalizing on opportunities better than non-innovative organizations (Montreuil *et al.*, 2020). According to literature, the main dimensions of innovation are; product innovation and process innovation (Yusr *et al.*, 2017). Given that TQM is a philosophy that promotes a new way of thinking among employees, organizations that have adopted this philosophy may create the necessary prerequisites to increase innovation in the company (Ershadi *et al.*, 2019).

A system is defined as a set of objects together with relationships between the objects, their attributes related to each other and to the environment so as to create or form a whole (Peprah *et al.*, 2019). According to systems theory, components of each system are structured in a hierarchical ordering, and components are interdependent with one another in the system to the extent that one component cannot function without the support of other component (Lai & Huili, 2017). Therefore, organisations need to implement innovation as part of their strategic decisions to aid total quality management in influencing environmental performance; i.e., total quality management, environmental performance and innovation are all interdependent components in the system.

Total quality management, environmental performance and innovation are all social realities that may be observed. The fact that such social realities are observable, in theory, means that they may be measured, quantified, and employed in research. According to post positivists, scientific study entails examining an observable social reality and formulating law-like generalizations in the same way that physical and natural scientists do (Saunders *et al.*, 2019). In light of this, the current study investigates the relationship between total quality management and environmental performance of food and beverage manufacturing firms in Ghana, with the mediating role of innovation.

Statement of the Problem

Over the last ten years, the food and beverage industry has faced numerous challenges such as insufficient raw material supply, low-quality raw materials, lack of appropriate processing and packaging technology, lack of modern equipment for production and poor environmental performance (Reardon *et al.*, 2021; Omari *et al.*, 2020; the Ghana Ministry of Trade and Industry, 2018). However, according to recent report from the Environmental Protection Agency (2021), the most pressing of all these challenges is the poor environmental performance of food and beverages manufacturing firms. According to World Bank Report on Ghana's Environmental Analysis (2021), food and beverages manufacturing firms contribute more than 14% of municipal waste and produces about 3,000 metric tonnes of plastic waste per day.

The same report states that, the Food and Beverage manufacturing firms consume the most variety of fuels (diesel, RFO, LPG, wood and charcoal) because

of the diverse nature of the operations and contribute more than 23% (CO2, CH4 and N2O) to total greenhouse gas emissions nationally. From relevant literature, it has been argued that the existence of food and beverages manufacturing firms' poor environmental performance can be attributed to the lack of total quality management (Akanmu *et al.* 2021; Akanmu *et al.*, 2020). Other scholars are also of the view that total quality management does not work in a vacuum but leads to innovation (Antunes *et al.*, 2021; Sotirelis & Grigoroudis, 2021).

Per the researcher's knowledge, most studies on total quality management embed environmental performance as a dimension of sustainable performance. Therefore, the importance of environmental performance is often overlooked (Yusoff *et al*., 2020). The study by Shafiq *et al.,* (2019), looked at total quality management and organisational performance in the textile sector. Using a sample size of 210 respondents, the study revealed a positive effect of total quality management on organisational performance through covariance based structural equation modelling (CB-SEM). Furthermore, Androwis *et al.*, (2017), also looked at the relationship between total quality management and organisational performance among construction chemical companies.

The study used a lesser sample size of 160 respondents. Although the sample size from this study was smaller as compared to that of Shafiq *et al.*, (2019), both results yielded similar results. These studies revealed that, there is a positive relationship between total quality management and organisational performance. Data analysis was conducted using Statistical Package for Social Science (SPSS). However, the latest studies conducted on total quality management have looked at

TQM and operational performance among manufacturing firms and how TQM improve business performance by Zaidi and Ahmad, (2020). Zaidi and Ahmad (2020), with the help of SPSS revealed that TQM is important to ensure operational performance increases, with a sample size of 364 respondents. In spite of the literature discussed above; it could be seen that Shafiq *et al.*, (2019), only looked at co-variance based structural equation modelling. Both Androwis *et al.*, (2018) and Zaidi and Ahmed (2020), looked at only SPSS and descriptive statistics.

Per the researcher's knowledge, little or no research has been done to assess the relationship between TQM and other variables of performance like environmental performance, nor the mediating role of innovation in the relationship between TQM and environmental performance in Ghana. This is due to the fact that, all the studies reviewed looked at TQM and organizational performance or operational performance. Due to this, there is little knowledge on total quality management and environmental performance. Hence, this study will fill the contextual and knowledge gap by looking at the mediating role of innovation in the relationship between TQM and environmental performance in Ghana.

Purpose of the Study

The aim of this study is to examine the impact of total quality management on the environmental performance of the food and beverages manufacturing firms in Ghana, with the influence of innovation as a mediating variable.

Research Objectives

1. To examine the effect of total quality management on environmental performance.

2. To evaluate the effect of innovation on environmental performance.
3. To determine the mediating role of innovation in the relationship between total quality management and environmental performance.

Research Hypotheses

Based on the objectives above, the following are the hypotheses;

H^1 Total quality management has a positive and significant effect on environmental performance.

H^{1a} Continuous improvement has a positive and significant effect on environmental performance.

H^{1b} Top management commitment has a positive and significant effect on environmental performance.

H^{1c} Customer focus has a positive and significant effect on environmental performance.

H^{1d} Employee involvement has a positive and significant effect on environmental performance

H^2 Innovation has a positive and significant effect on environmental performance.

H^{2a} Product innovation has a positive and significant effect on environmental performance.

H^{2b} Process innovation has a positive and significant effect on environmental performance.

H^3 Innovation plays a positive and significant role in the relationship between total quality management and environmental performance.

Significance of the Study

By investigating the total quality management component, this research would contribute to the current understanding of total quality management and innovation to help determine environmental performance. The outcome of this study would add to existing literature and theory in the area of TQM to help address some existing gaps. The study's findings would also help potential researchers identify appropriate theories to adopt when conducting studies in areas of TQM, environmental performance and innovation. Specifically, the study would provide potential researchers with the necessary information to help them choose the appropriate research philosophy, approach and design that best fit their research needs.

In an operations management environment, this study provided new insights on total quality management and innovation as predictive components of environmental performance. Thereby assisting managers in shifting their focus to maintaining and improving quality alongside innovation to achieve competitive advantages. The relevancy of innovation may be observed in the necessity to constantly monitor a product's or process' innovativeness and to maintain the quality standards necessary for its operation, from customer orientation through management orientation to organizational elements. Moreover, the results provide information on how food and beverages manufacturing firms can be responsive to the challenging environments through successfully adopting total quality management and innovation.

Delimitation of the Study

This study is delimited in the following ways;

Firstly, the study utilized a quantitative approach to research. This is due to the ability to quantify responses and use statistical tools in analyzing collected data from respondents. Secondly, this focused only on the perception of employees of food and beverages manufacturing firms in Greater Accra. The reason being that, the Greater Accra region is occupied by about 90% of food and beverages manufacturing firms and houses the highest numbers of employees in the manufacturing industry of Ghana. Thirdly, the self-administered questionnaires were distributed to employees in managerial roles.

The reason being that, accurate information on total quality management, environmental performance and innovation can be obtained from employees in managerial roles of their organizations. This is due to the fact that. Last but not least, there are other theories that can explain the relationship between total quality management, environmental performance and innovation. These are dynamic capability theory, stakeholder theory and the contingency theory.

Limitation of the Study

Research limits were often those elements of methodology or design that have an impact on or influence how the research's findings should be interpreted. These limitations on generalizability, applicability to practise, and/or effectiveness of findings are the outcome of the researcher's initial decision to design the study in this manner. The technique used to verify internal and external validity is also included. The limitations of the study design that were encountered is listed in the next paragraph.

The methodology limitation to this study was the convenience sampling technique. The only issue with convenience sampling is that it heavily relies on the investigator's judgement rather than objective standards (Bless, Higson-Smith & Sithole, 2013). Participants who were only closer and willing to fill the questionnaires were carefully chosen from a variety of backgrounds who could provide data for the study as part of the sample selection process. For instance, barbers, hairdressers and fashion designers were used to choose the owners, personnel, and managers of small businesses in the metropolis.

Definition of Terms

***Total Quality Management* (TQM)**

This is an organizational structure that implements quality management activities throughout the entire organization to satisfy customer needs.

Innovation

This is defined as a process that extends from the emergence of the idea to its commercialization in the form of production, exchange and consumption.

Environmental performance

This can be defined as how successful a firm is in reducing and minimizing its impact on the environment, often relative to some industry average or peer group.

Organisation of the Study

This study was divided into five chapters with a goal of fulfilling the suggested objectives. Chapter One consisted of the background of the study and the problem statement. The purpose of this study, objectives and the research

hypotheses. The significance of the study, the definitions of important terms, and the study's organization. Chapter Two provided an in-depth evaluations of the study's relevant literature, including both theoretical and empirical viewpoints. In Chapter Three, the study's research approach was demonstrated. The sample size and data analysis were also discussed. Chapter Four presented analyses and explained the survey questionnaire's analytical results. The conclusion, recommendations and suggestion for further studies was discussed in Chapter Five.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The primary goal of examining the literature was to understand the current study's subject area better and to identify research gaps that would be addressed by the current study (Kraus *et al.*, 2020). This chapter examined related material on "total quality management and environmental performance in Ghana: the mediating role of innovation." It provides an in-depth assessment of the associated literature that drive this study, as well as the concepts and empirical work in the field. Chapter two ends with the chapter summary.

Theoretical Review

Resource based view theory

Resource Based-View theory was suggested by Wernerfelt in the year 1984 (Wernerfelt, 1984). The theory contends that the possession of strategic resources provides an organization with a golden opportunity to develop competitive advantages over its rivals (Sutton, 2021). Resource Based View (RBV) theory analyses and interprets resources of the organizations to understand how organizations achieve sustainable competitive advantage. According to (Pournader *et al.*, 2021; Zaid *et al.*, 2018), the RBV theory focuses on the concept of difficult-to-imitate attributes of the firm as sources of superior performance and competitive advantage. Resources that cannot be easily transferred or purchased. That require an extended learning curve or a major change in the organization climate and culture, are more likely to be unique to the organization. Therefore, more difficult to imitate by competitors.

According to Gachanja and Kinyua (2021), performance variance between firms depends on its possession of unique inputs and capabilities. The two critical assumptions of RBV are that resources must also be heterogeneous and immobile (Gachanja & Kinyua, 2021). The first assumption is that skills, capabilities and other resources that organizations possess differ from one company to another. If organizations would have the same amount and mix of resources, they could not employ different strategies to outcompete each other. The second assumption of RBV is that resources are not mobile and do not move from company to company, at least in short-run. Due to this immobility, companies cannot replicate rivals' resources and implement the same strategies. Intangible resources, such as brand equity, processes, knowledge or intellectual property are usually immobile (Fitria *et al.*, 2017).

Past management researchers have also used resource-based view as a theoretical basis for research construct in their studies (Gabow & Kinyua, 2018; Kimiti & Muathe, 2021; Kitur & Kinyua, 2020; Kimaru & Kinyua, 2018). In total quality management, resource-based theory is relevant in that resources that are valuable, rare, difficult to imitate, and non-substitutable best position an institution for long-term success. These strategic resources can provide the foundation to develop firm capabilities that can lead to superior performance over time. Capabilities are needed to bundle, manage, and otherwise exploit resources in a manner that provides value added to customers and creates advantages over competitors.

In the study done by Kadhim and Ahmad (2021), it was also found that TQM is an important organizational resource. Both theoretical and empirical evidences support the idea that TQM oriented organizations create successfully barriers for competitors to copy or follow TQM practices while they obtain a sustainable competitive advantage through positive environmental performance. With the above description, the RBV theory is selected as the underpinning theory for the effect of total quality management on environmental performance.

The study was underpinned by the RBV theory, which endeavours managers who are agents on behalf of a company to use appropriate practices and principles like effective TQM when managing food and beverage manufacturing firms. Thus, the RBV theory helps highlight the interrelationship between a company, its agent and the practices they adopt on behalf of their stakeholders to manage the firm. These practices go a long way to impact environmental performance.

System theory of management

Originating in biology, systems theory was developed in the 1950s against the backdrop of a need to have a set of systematically theoretical constructs to discuss the empirical world (Boulding, 1956; Von Bertalanffy, 1951). Siwasilchai *et al.*, (2021), defined a system as a complex and highly interlinked network of parts exhibiting synergistic properties, the whole is greater than the sum of its parts. It is a collection of interrelated parts acting together to achieve some goal which exists in the environment. Also, system is defined as a set of objects together with relationships between the objects, their attributes related to each other and to the

environment, so as to create or form a whole (Peprah et al., 2019). Further, Petrić et al., (2020) defined a system as a model of a whole entity, which may be applied to human activity.

According to systems theory, components of each system are structured in a hierarchical ordering, and components are interdependent with one another in the system. To the extent that one component cannot function without the support of another component (Lai & Huili, 2017). After its introduction into the organizational context in the 1960s, systems theory of management has been applied to the study of organizations. Being used as a theoretical framework to understand how organizations function in relation to the various environments and factors surrounding them. Systems theory aims to explicate dynamic relationships and interdependence between components of the system, the organization and environmental relationships (Şenik & Uzun, 2022; Lai *et al.*, 2017).

Moreover, the adoption of systems theory of management was fuelled by the increasing realization about the complex and rapidly changing nature of organizational environments (Rahman et *al.*, 2021). The introduction of systems theory of management to the organizational context then led to a new string of empirical studies, focusing on how the systems theory can be applied to understand organizational behaviour and communication, and how organizations evolve due to interaction with surrounding environments. According to Şenik and Uzun (2022), researchers have recognized and advocated that organizations progressively have to function as open systems and that potential for growth and increased efficiency depended on how well they knew their environments.

As the open systems model was developed to illustrate how organizations should develop communication processes that allow exchange of information and adaptation to feedback from external environments. The system theory is applied to study situations, to diagnose problems, and to prescribe solutions. Thus, the key in using the systems approach to solving organizational problems rests in the complete consideration of the structure, functions, processes, and the environment where the problem is. Practically, this meant that systems theory was used to analyse organizational conflict and problems (Roulet & Bothello, 2021).

By getting a fuller picture of the problem, senior management could view the problem in a new light. Previous studies in literature have made use of the system theory of management to depict its relevance in the organisation (Foote, 2022; Lai *et al.*, 2017; Panigrahi *et al.*, 2021; Roulet & Bothello, 2021; Şenik & Uzun, 2022). The link between total quality management, environmental performance and innovation is seen as a system. There is an interdependence between these social phenomena. Therefore, total quality management, environmental performance and innovation all have to be present in the system.

The study was underpinned by the system theory of management, which endeavours managers of a company to use appropriate management systems like constant introduction of innovation when managing an organisation. Thus, the system theory of management helps highlight the interrelationship between a company and the practices they adopt to make complex systems in the company less cumbersome. These practices go a long way to impact environmental performance.

Conceptual Review

When the theories that underpin the study does not contain or bring out the variables directly to measure the study's aims, a conceptual review is required in quantitative research (Saunders *et al.*, 2019). A conceptual review is a process of bringing together several linked concepts. To explain or predict a specific event, gain a better knowledge of a phenomenon of interest or a research problem. This section focuses on the concepts of total quality management, environmental performance and innovation, and the applications and difficulties that go along with them.

Total quality management

Every organization relies on the notion of quality to drive actions in practically every facet of their activities and daily operational design of work. With their internal environment and supply chain partners in today's ever-changing and competitive business landscape. However, that quality would not just be a theoretical norm to create a better business climate. Still, it would enable each stakeholder to make decisions that consistently advance their interests (Jong *et al.*, 2019). This is the concept of total quality management in action. Total refers to everyone's involvement; quality refers to precisely achieving customer expectations, and management refers to the conditions that allow total quality (Amin *et al.*, 2017).

Total quality management (TQM) as defined by Garza-Reyes *et al.*, (2018), is an interconnected technique that strives to integrate all organizational activities across the organization. To generate a synergistic result with the primary aims of improving product and service quality and increasing customer satisfaction.

According to Amin *et al.*, (2017), TQM is a concept and a set of guiding principles that blends management strategies, technological tools, and improvement initiatives in a reliable technical system. With the goal of managing a company via continuous improvement. From the aforementioned definitions, total quality management is characterized as a process that prioritizes the customer's needs and works to enhance operational procedures continuously.

It makes sure that every joint effort, especially employee work, is focused on enhancing both the production and service delivery processes and the quality of the final goods. According to Pham (2020), achieving total quality management (TQM) requires the joint collaborative efforts of all departments and all employees. Thus, total quality management is not only the responsibility of the quality department or board of directors but also all employees in the organization. Due to the inconsistent results of previous studies, it is challenging to determine the precise TQM dimensions (Abbas, 2020). Shafiq *et al.*, (2019) claim no study has ever attempted to explain the fundamental elements of TQM. However, the majority of academics concur that the most crucial elements of TQM are top management commitment, employee involvement, continuous improvement, and customer focus (Hilman *et al.*, 2019; Shafiq *et al.*, 2019).

Top management commitment

Since top management has the ability to influence and guide a group or team to achieve both long-term and short-term defined goal. It plays a significant role in determining a company's success or failure (Bouranta *et al.*, 2019). The importance of top management has been emphasized in the majority of TQM literature as one

of the most important components. This is due to the fact that, top management establishes quality goals and guides employees toward these goals. Adopting TQM necessitates senior management involvement in creating and upholding a customer-focused culture with obvious quality principles. Deming, a pioneer in quality management, advises businesses to commit to their chosen strategy for the long term (Arunachalam & Palanichamy, 2017). As a result, the success of TQM is heavily dependent on top management commitment (Paraschi *et al.*, 2019; Arunachalam & Palanichamy, 2017).

Top management commitment, in the opinion of Kumar and Sharma (2017), is the capacity to engage and inspire staff to make a willing and voluntary commitment to meet or surpass organizational goals. Top management commitment according to Ali and Johl (2021), is the process of articulating a distinct and compelling vision and offering ready leadership for the future. From the perspective of Barua (2021), top management commitment is an activity that focuses on developing and putting into practice an innovative vision. In light of the aforementioned definitions, it can be deduced that top management must specify and display a unity of purpose and direction to achieve the organization's stated goals and objectives.

The idea here is that, for staff members to reach their maximum potential, the top management must establish and maintain the internal environment (Khan & Naeem, 2018). According to Singh *et al.*, (2018), managers should act as leaders by supporting employee development, involving them in decision-making, and enhancing their knowledge of TQM. Therefore, top managers should constantly

prioritize training staff members by enlisting them in courses that are especially created to increase output and raise the standard of goods and services. One presumption about top management commitment in a TQM firm is that it is required to foster a continuous improvement process (Asad *et al.*, 2020). Continuous improvement will be discussed in the following section.

Continuous improvement

A company-wide strategy called continuous quality improvement involves a variety of interrelated tasks in order to meet objectives. Since TQM is a long-term strategy, gains in performance are anticipated to continue and compound over time. Resulting in a cycle of continuous improvement (Abu-Rumman *et al.*, 2021). From the study by Elias and Davis (2018), continuous improvement is a planned, structured, and systematic method of incrementally improving current business processes across the entire organization. According to Sila (2018), continuous improvement is a strategy focused on frequent small adjustments, reducing waste. Continuously improving productivity and safety, and significantly reducing production costs.

This suggests that the Deming cycle, which is composed of a plan, do, check, and act, stands for continuous improvement (Ghatorha *et al.*, 2022; Isniah *et al.*, 2020; Alauddin & Yamada, 2019). As a result, continuous improvement is based on the measurement of key characteristics and other processes, as well as the taking of necessary measurements to improve them. Since management, service, and production procedures affect the quality of the finished product. The aim of continuous improvement is to find and eradicate defects and causes of

inconsistency in these processes. The goal of continuous improvement is to enhance the procedure in order to accomplish two objectives: increased customer satisfaction and decreased costs (Zimon, 2017).

It is advised that businesses devote more time and energy to achieving objectives like maintaining and raising quality, enhancing performance, cutting down on lead times, and enhancing delivery reliability. If they want to implement continuous improvement as a continuous process to maintain a competitive position (Abu-Rumman *et al.*, 2021). Therefore, increasing customer value through better products and services, boosting productivity and operational performance through enhanced work processes. The elimination of errors, defects, and waste, enhancing flexibility, responsiveness, and cycle time performance. Enhancing organizational management procedures through learning are just a few of the enhancements that can be implemented within businesses as activities of continuous improvements.

Adem and Virdi (2020) stated that a customer-focused approach results in a greater understanding of customers' wishes and expectations. This can then be translated into detailed operating instructions for future improvement, producing superior quality performance. According to Khan *et al.*, (2020), the major goal of TQM is to accomplish continuous improvement in operational processes in order to increase production and sales. While, increasing customer and stakeholder satisfaction. The following session discusses customer focus.

Customer focus

According to Aletaiby *et al.*, (2017), quality is determined by the client, not by the company or the person who produces the good or service. Quality is what

the customer wants. Customer focus is generally believed to be an essential aspect of TQM as the idea of quality management emphasizes the importance of development generated by and for consumers themselves (Croom *et al.*, 2017). A good organization takes into account the adaptability and dynamism of the customers' changing expectations. Aziz *et al.*, (2019), defined customer focus as the degree to which a company continuously satisfies the needs and expectations of its customers.

According to Buer, *et al.*, (2018), customer focus is a strategy that includes how businesses understand their customers' wants and wish to provide things that delight them and comprehend customer complaints to make appropriate changes. Focusing on customers requires businesses to pay special attention to every step of the supply chain, including selecting reliable suppliers, designing products that fulfil consumer needs. Delivering goods on time, pricing goods fairly, and providing efficient after-sales support. Han (2019), contend that more attention has to be paid to customers and their interactions as competition in the business environment is quickly growing across all production and manufacturing industries.

Ershadi, Najafi and Soleimani (2019), also agreed that for a company to be deemed as customer-focused, it should cultivate deep ties with its clients and customers Engage in direct communication with them, routinely assess their levels of satisfaction, and consistently work to meet their evolving needs. Being customer focus as company can help in a variety of ways, including improved communication between parties, identification of the need of customers and clients for process

development. Thorough understanding of the issues, progress assessment toward the goal, and tracking and reporting fulfilled results and changes.

The idea here is that, the organization must continuously enhance all relevant processes if it is to become a customer-focused business. Customer-focused businesses must go above and beyond the objective of providing goods and services that meet customer expectations and requests. As a result, a company needs to follow standards that are focused on its customers and clients. Wang *et al.*, (2017), assert that the idea of customer focus encompasses both internal and external customers and those who use the firm's goods and services. Internal customers include those who work for the company and are responsible for a common goal. Employee involvement will be discussed in the next session.

Employee involvement

The most important factors that determine whether an organization succeeds or fails are the supremacy of its people and the successful process of that supremacy's focus on achieving the business goals. A strategy for empowering employees to actively participate in executive decision-making and improvement projects suitable to their position within the organization is employee involvement (Valverde-Moreno et al., 2020). Islam *et al.*, (2018), defined employee involvement as the process by which individuals inside an organization are motivated and given the opportunity to contribute to the accomplishment of organizational objectives and the ongoing improvement of the organization.

According to Delmas and Pekovic (2018), employee involvement is a process of empowering individuals within an organization to take the initiative and

make choices regarding issues that are pertinent to their roles within the company. Jiménez-Jiménez *et al.*, (2019), asserted that employee involvement is a method for empowering individuals to take part in problem-solving and decision-making inside a business. Employee involvement generally refers to giving staff members the power to influence significant organizational decisions and participate in problem-solving activities to increase organizational viability (Tortorella *et al.*, 2021).

For a number of managerial activities, employee involvement is very necessary (Stanojeska *et al.*, 2020). This is because all organizations depend on the limitations and strengths of their personnel. Organizations that see people as little more than two hands or inert cogs in a machine can never realize their full potential. Eniola *et al.*, (2019), asserted that management encourages employee involvement to enhance workplace communication and boost employee commitment to the company. Assist staff in realizing the value of ongoing creativity and the need to be dedicated to their work in new and improved ways. The review of relevant literature on employee involvement shows numerous advantages to involving workers in management problem-solving and decision-making processes.

Employee involvement enhances decision-making across the organization. Boosts commitment and motivation, creativity, self-worth, and empowerment. Lowers attrition, and boosts productivity (Hall-Jones *et al.*, 2018; Kurtulus & Kruse, 2017). Additionally, it enhances organizational performance, decision-making quality, and the willingness to accept authority (Oparanma & Obiekwe, 2017). According to (Wallis *et al.*, 2021; Wafa' *et al.*, 2020), the overall purpose of

employee involvement is to promote positive and original thinking among employees.

Environmental performance

Environmental performance relates to organizational initiatives to meet and exceed societal expectations vis-à-vis the natural environment to go beyond mere compliances with rules and regulations (Dar *et al.*, 2021; Singh *et al.*, 2020). Environmental performance is the measurable result of managing the environmental aspects of organizations. It encompasses the environmental effects of organizational processes, products, and resource consumption in a manner that best fits legal and environmental requirements (Singh *et al.*, 2020). According to Johnstone (2020), environmental performance is not merely an organizational-level phenomenon but rather something that is the product of a given context with consequent various financial, social and operational effects.

This concurs with Latan *et al.*, (2018), positioning environmental performance effects as existing beyond organizational boundaries. Environmental performance refers to a corporate operation in response to environmental challenges, covering all impacts from production, products and services (Allur *et al.*, 2018). Environmental performance can positively impact corporate performance and competitiveness, employee health, and an increase in the quality of environmental inputs, etc. It is concerned with reducing harmful materials, hazardous consumption, usage of resources, and efficient energy (Akanmu, Hassan & Bahaudin, 2020).

According to Kumar and Shetty (2018), environmental performance is achieved by reducing the emission of pollution, resource usage, and waste generation as a result of undertaken efforts. From the study of Roscoe *et al.*, (2019), environmental performance indicators used in the manufacturing industry include waste management and reduction of greenhouse gas emissions. However, environmental performance will be treated as a composite variable in this study.

Waste management

Literature based on waste management has been reviewed and reveals that waste has a great significance on the economic losses bared by industrial organizations. The concept of waste is perceived divergently among organizations and scholars. Zahiri *et al.*, (2017), for instance, defined waste as those materials, with the exception of radioactive materials, which are intended for disposal. Yakubu (2017), on the contrary defined waste as substances which are due for disposal based on national laws. Waste has also been viewed as non-prime materials which have become obsolete to the generators' interests and are due for disposal (Musau, 2020).

Therefore, waste can be attributed as a material lacking its main economic value while, exhibiting intrinsic secondary value. Waste management is therefore perceived as collecting, treating and disposing of materials that are no longer useful in production processes (Nathanson, 2020). It is related to ecological production, environmental products and services. Reducing environmental impacts, protecting natural resources and developing an overall environmental policy. The rational use

of energy, waste reduction, separation and recycling at the forefront to minimize costs (Nathanson, 2020).

Reduction of greenhouse gas (GHG) emissions

When firms reduce GHG emissions, they, in essence, follow a pollution prevention strategy instead of pollution capture and remediation (Peng *et al.*, 2021; Velte *et al.*, 2020). In contrast with capture and remediation, prevention results in significant savings from efficiency and productivity gains, as well as avoided compliance and liability costs (Szabo & Webster, 2021; Kraus *et al.*, 2020). Unsurprisingly, pollution prevention has been identified as a strategy that can lead to sustainable cost advantages (Peng *et al.*, 2021; Szabo & Webster, 2021; Bansal & Song, 2017). Firms capable of reducing their GHG emissions demonstrate to investors that they possess, or at least are developing, internal capabilities that will allow them to be more competitive in a business environment. Facing increased institutional pressure to comply with regulations, standards, and norms directed at mitigating climate change.

Innovation

Innovation is everywhere today. Organizations include the term in their vision, mission, and objective statements. Though such pervasiveness has garnered attention, it has resulted in innovation being called the most important and overused word in America (Dahlin *et al.*, 2022; Kahn, 2018). Innovation in an organizational context is an idea, a product, a process, a system or even a device that successfully brings new insights. Impacts an individual, groups of people, organizations, an industrial sector and the whole society (Valmohammadi, 2017). Innovation is

considered important for achieving sustainable competitive advantages and, by extension, for the success of businesses in the market. The main reason is that innovative firms are more flexible and have a greater capacity to adapt to changes (Valmohammadi, 2017).

This means that they can protect themselves when the climate is unstable, they can respond faster to changes, create new opportunities and exploit existing ones to a greater extent than the competition (Tian *et al.*, 2018). According to Abdilahi *et al.*, (2017), the term innovation is defined in one of two ways: the introduction of something new, or a new idea, method, or device. Although similar, the two definitions for innovation represent important distinctions. The first definition presents innovation as an outcome. The second definition presents innovation as a process. Herein lies an important consideration for understanding innovation. Innovation should be thought of as both an outcome and a process.

Organizations defining innovation as only one of these will fall short in their pursuit (Dahlin *et al.*, 2022). Those organizations focusing strictly on the outcome will minimize process, leading to inefficiencies such as duplication of effort and resource overconsumption. Those organizations preoccupied with the process often create organization bureaucracies that make it too difficult to manifest outcomes. Schumpeter, which may be called the founder of the theory of innovation in the economics in 1982. Generally regarded innovation as the economic impact of technological change, as the use of new combinations of existing productive forces to solve the problems of business (Kogabayev & Maziliauskas, 2017).

Schmookler in 1954 argues that, understanding the distinction between the related terms product technology (product innovation) and production technology (process innovation) is crucial for understanding innovations (Vlados & Chatzinikolaou, 2019). Consistent with the existing literature (Distanont & Khongmalai, 2020; Li *et al.*, 2018; Valmohammadi, 2017). This study will examine two aspects of innovation, i.e., product and process innovation.

Product innovation

Product innovation is defined as a form of introduction of improvements in new products or services (Alshourah, 2021). It pertains to market offerings such as new products, services, or programs. Launching a new product can be done through customer pull and technology-push to understand the customer demand and find a creative idea (Antunes *et al.*, 2021). Product innovation is more about effectiveness in developing new offerings than efficiency as new products often require additional resources and force new procedures (Alshourah, 2021). An organization's product innovation can be resultants of internal factors (such as the types of strategies, leadership, performance system, company, structure, human resource management and communication) or external factors (such as regional environment and industry).

Customers' expectations can easily be fulfilled when an organization produce a high-quality and innovative product (Bocken & Geradts, 2020; Escrig-Tena *et al.*, 2018).

Process innovation

Process innovation can be defined as the implementation and changes in the method of producing products or services (Maier, 2018). Process innovation attempts to redesign or improve the business process to boost efficiency and customer satisfaction (Dani & Gandhi, 2021). It includes new and improved work methods (Kafetzopoulos *et al.*, 2019). Process innovation emphasizes efficiency, with cost savings being of particular interest. This could lead the firm to maximize its benefits by improving the delivery method or production through the changes in device, software or technique (Altamony, 2017). Besides that, it also seeks to modify the current or creation of a new process (Abdallah *et al.*, 2018). According to Jin *et al.*, (2019), process innovation could be focused on improving the effectiveness and efficiencies of production.

Empirical Review

An empirical literature review focuses on previous research results or findings that the researcher wants to investigate, compare, and quote. It summarises the findings of earlier empirical investigations (not theoretical analyses) conducted on the subject or subjects under investigation by other researchers. The important concerns, in this case, are the difficulties addressed, the methodology used, and the key results and conclusions. This section examined empirical studies on total quality management, environmental performance and innovation in detail.

Total quality management and environmental performance

According to resource-based view theory, total quality management is seen as a resource that will lead to the positive environmental performance for the firm.

This theoretical perspective prompts the following empirical studies in order to reaffirm the theoretical position.

Fitriyani *et al.*, (2021), conducted a study to investigate the role of TQM practices in improving business performance's pharmaceutical industry in Indonesia. The data were obtained through an online questionnaire sent to pharmaceutical companies that manufactured generic products in Indonesia. The study was conducted based on responses received from 168 valid questionnaires. Partial least squares structural equation modelling (PLS-SEM) was used to test the hypotheses. Statistical analysis show that total quality management positively impact the company's business performance improvement in all dimensions.

Zaidi and Ahmad (2020), examined the relationship between TQM practices and operational performance in the manufacturing industry in Malaysia. This research employed a quantitative research method. Survey questionnaires were randomly distributed to 364 manufacturers in Johor. The Statistical Package Social Science (SPSS) version 25 was used for data analysis. The findings showed that implementing TQM practices is important in ensuring that operational performance increases in manufacturing companies.

Androwis *et al.*, (2018), conducted a study on total quality management practices and organizational performance in the construction chemicals companies in Jordan. The aim of the study was to investigate the relationship between total quality management practices and organizational performance. One hundred and thirty-one (131) questionnaires were completed and used for the analysis. The data obtained from the questionnaire were analysed using the Statistical Package for

Social Sciences (SPSS) version 20.0. Analysis has shown that total quality management positively affects organizational performance.

The role of total quality management has been highlighted in the past by several researchers for the purpose of providing help to organizations in fulfilling their green objectives through recycling wastes and reducing carbon dioxide emissions and wastage (Sriyakul *et al.*, 2019; Fernandes *et al.*, 2017). The significance of quality management activities on the firms' environmental performance has been observed in a study (Dubey *et al.*, 2017). TQM assesses the ability of an organization to enhance the quality of a product, reduce variability and improve coordination levels across the supply chain.

Many researchers refer to TQM as a source of sustainable competitive advantage for business organizations (Fernandes *et al.*, 2017). Some suggest TQM as a way to achieve excellence, creating an attitude of "do it right" at the first time that allows acquiring efficient solutions for business (Al Shraah *et al.*, 2021). Furthermore, it also facilitates the development of a mind-set among the supply chain partners for minimizing cost by reducing the amount of waste and emissions generated due to overproduction, defects, and transport (Sriyakul *et al.*, 2019). Moreover, discussing the relationship of total quality management and environmental performance is clearly explained theoretically by the resource-based view theory.

Innovation and environmental performance

According to resource-based view theory, innovation is seen as a resource that will lead to the increased environmental performance of the firm. This

theoretical perspective prompts the following empirical studies in order to reaffirm the theoretical position.

Anwar *et al.*, (2020), conducted a study on the relationship between innovation and performance among NPOS in Pakistan. This study examined the influence of the sub-dimensions of innovation on the performance of NPOs. Data were collected through structured questionnaires using a sample size of 309 NPOs operating in the emerging market Pakistan. The hypotheses were tested through structural equation modelling (SEM) in AMOS.21. Overall, the results showed there is a positive and significant relationship between organisational innovation and non-profit performance.

Ntiamoah *et al.*, (2019), examined the effect of innovation practices on agribusiness performance in Ghana. This study investigated how organizational innovation affect agribusiness performance in Ghanaian agribusiness companies. Data were collected through survey questionnaires from 1526 respondents. The researchers employed the structural equation modelling (SEM) in determining the relationships between the variables. The results reveal that innovation has a positive and significant effect of on agribusiness performance.

Maldonado-Guzmán *et al.*, (2018), also conducted a study on innovation capabilities and performance in Mexico. The purpose of this paper was to investigate the effects that innovation capabilities have on the business performance of small- and medium-sized enterprises (SMEs). The approach of this study is quantitative. Data were collected through a questionnaire survey responded by 308 SMEs. Data were analysed using structural equation modelling (SEM). The results

obtained show that innovation has a positive and significant effect on the business performance of Mexican SMEs.

Research has found that innovation plays a significant role in organization performance (Jamai *et al.*, 2021; Rajapathirana & Hui, 2018). Organizations able to innovate are more capable to deliver new products and services, improve processes in a faster way to fit the market's needs and capitalize on opportunities better than non-innovative organizations (Montreuil *et al.*, 2020). Moreover, innovation has been associated with higher levels of growth and profitability (Amankwah-Amoah, 2021). In the literature, several studies have been conducted to confirm the positive relationship between innovation and performance (Hermundsdottir & Aspelund, 2021; Jamai *et al.*, 2021; Rajapathirana & Hui, 2018).

Adopting innovations generally contributes to improving the performance or efficiency of a company (Hermundsdottir & Aspelund, 2021). Tajeddini, Altinay and Ratten (2017), list three valuable features of innovative companies that can lead to business improvement. First, innovative companies are open to new ideas, changing values, encouraging the acceptance of business risks and new ways of addressing market needs. Second, highly innovative companies are more able to develop creative solutions that are superior to competitors' solutions. Thirdly, innovative firms are more likely to continuously improve business, production methods, and product development processes.

Wang *et al.*, (2020), suggest that the innovativeness of the company enhances the innovative capacity of the company, which ultimately leads to better

performance. Innovation is a means to change the organization, either in response to changes taking place in the internal or external environment or as preventive measures taken to affect the environment (Rajapathirana & Hui, 2018). As environments evolve, companies must adopt innovations over time, and the most important innovations are those that enable the company to achieve some kind of competitive advantage, contributing to the company's performance (Hermundsdottir & Aspelund, 2021; Dziallas & Blind, 2019).

Total quality management, environmental performance and innovation

Total quality management, environmental performance and innovation of the firm is seen as a system, according to system theory. This theoretical perspective prompts the following empirical studies to reaffirm the theoretical position.

Anifowose *et al.*, (2022), investigated the role of innovation speed in mediating the relationship between total quality management and small and medium-sized enterprise performance. Cross-sectional data from 484 Nigerian small and medium-sized manufacturing enterprises were collected. The data were evaluated using the partial least squares structural equation modelling (PLS-SEM). Findings show that innovation speed substantially mediates the relationship total quality management (TQM) and small and medium-sized enterprises (SME) performance.

Kulenović *et al.*, (2022), sought to explore the influence of total quality management (TQM) practices on a company's financial performance, considering innovation performance as a mediator variable. For this study, a quantitative methodology was adopted. Data collection was based on the sample size of 593

companies from various sectors in Bosnia and Herzegovina, and structural equation modelling was used to analyse the relationships between the variables in the model. The results show that the impact of TQM practices on financial performance is manifested through full mediation of innovation performance.

Sahoo (2019), conducted a study on quality management, innovation capability and firm performance with empirical insights from Indian manufacturing SMEs. This paper aimed to examine the relationship between quality management, innovation capability and firm performance. For this study, a quantitative methodology was adopted. Data was collected from 134 Indian manufacturing firms. Analysis was done using SPSS and AMOS statistical software. Overall, the findings show that quality management through the firm's innovation capability is indirectly associated with a firm's business performance.

Throughout the world today, innovation has become the dominant factor in maintaining competitiveness (Syapsan, 2019). Innovation refers to applying new knowledge, ideas, methods and competencies that can generate unique skills and enhance the organization's competitiveness (Antunes *et al.*, 2017). With regard to the relationship between TQM and innovation, the existing research works in the literature bring up evidence that states that TQM supports innovation. Suggesting that organizations that implement TQM will be successful in innovation strategies (Dihardjo & Ellitan, 2021; Ulyah *et al.*, 2020).

Also, innovation is contented to significantly impact superior firm performance due to short product life cycles in the market, high rates of new product introductions and innovative improvement in processes (Sahoo, 2019). To

compete in global markets, the organization must have the ability to identify new opportunities and configure and protect technologies, skills, and knowledge assets, to achieve a sustainable competitive advantage (Antunes *et al.*, 2017). Applying TQM practices within the organization provides and enhances the organization's skills and capabilities, which would reflect positively on the performance (Sahoo, 2019).

Several studies have explored the relationship between quality management, performance and innovation (Niyi *et al.*, 2022; Kulenović *et al.*, 2022; Sahoo, 2019). In general, these studies have shown positive correlations. For instance, the support role for quality in innovation management, which indicates that TQM can be the basis for innovation. Moreover, discussing the relationship between total quality management, environmental performance and innovation based on the system theory of management strongly justifies this relationship.

Conceptual Framework

The requirement for a conceptual framework arises because the variables used to measure the specific objectives do not flow immediately from the study ideas. The conceptual framework of the study is built on ideas derived from the arguments of the system theory of management, resource-based view (RBV) theory, and the findings of numerous empirical studies pertinent to this study. As a result, the study looked at concepts and utilized them as proxies to measure the variables in the objectives. As illustrated in Figure 1, the conceptual framework incorporates three major variables: total quality management, environmental

performance and innovation. Figure 1 depicts the conceptual framework of the study based on the objectives of the study.

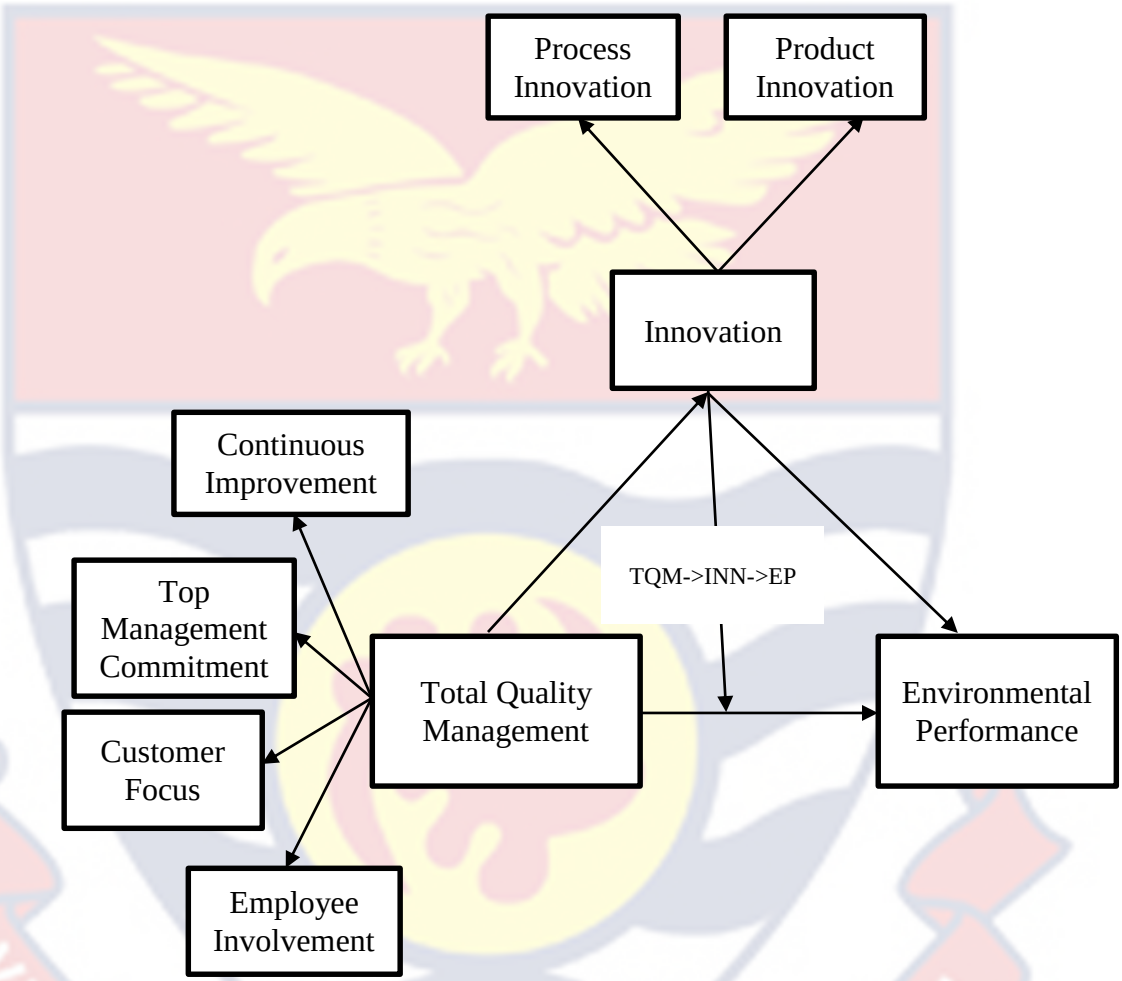

Figure 1: Conceptual Framework

Source: Author's construct (2023)

Figure 1 shows the constructs used in the study. Both the dependent and the independent variable with the mediating variable. The dependent variable is the environmental performance and the independent variable is the total quality management. From Figure 1, it can be seen that, the variables of that make up the independent variable are top management commitment, continuous improvement,

customer focus and employee involvement. Furthermore, it could be seen that total quality management directly affects environmental performance. However, there is a mediating role of innovation in the relationship between total quality management and environmental performance. Moreover, innovation was conceptualised using product innovation and process innovation. Hence, they make up the mediating variable.

Chapter Summary

This chapter started by introducing the theories adapted and employed in the study. It next described the effect of the independent factors on the dependent variable and gave conceptual views on relevant concepts used in this study. Finally, the chapter constructed a conceptual framework based on the concepts discussed and proxies to measure the variables in the objectives of this study, as well as provide empirical evidence for the study.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter looked at the methodological approaches used to accomplish the study's goals. The research paradigm, research design and research approach. Variable sources and measurement with instrument validity and reliability. Also, data processing and analysis. It goes over the many scientific techniques used to accomplish the study's goals.

Research Paradigm

The research philosophy of this work is based on positivist philosophy. Authenticity, according to positivists, is constant and can be discovered, characterized, and measured objectively without the aid of prepared glasses (Saunders, Lewis & Thornhill, 2016). As a result, the positivist school dismisses the notion of constructing knowledge and theories from a range of sources, including personal experiences and opinions (Rubin & Rubin, 2012). Rather than focusing on these views, pragmatism concentrated on the research problem and employed all available methods to solve it (Creswell & Creswell, 2018). Instead of sticking to one style of thinking, pragmatists argue for using quantitative approaches to examine a phenomenon (Creswell, 2009; Moon & Blackman, 2014).

Research Approach

The research approach is one of the most crucial factors to consider when performing scientific research. Although there are many other categories of research approaches, quantitative and qualitative research approaches still predominate (Rahi, 2017). This study adopted the quantitative research approach. This is because, the quantitative research approach entails gathering data that can

be quantified Such as numerical data, to assess the data's objectivity and feasibility. Also, quantitative research eliminates the investigator's bias, allowing the testing of assumptions about the study's findings (Gray 2019).

Research Design

The research design method determines the outcome of any study. Hence, it is crucial to choose the kind of data, data collection technique, and sample technique to be utilized in a study. This study made use of the explanatory research design. According to McNabb (2017), it is largely utilized to assist the researcher in explaining and establishing a distinct causal relationship between the exogenous and endogenous latent variables. According to Saunders *et al.*, (2019), the aim of explanatory research design is investigating a situation or an issue to explain the relationships between variables. Several researchers have used the explanatory research design to explain the causal and effect relationship (Bentouhami *et al.*, 2021; Asad *et al.*, 2018; Bowen *et al.*, 2017). The researcher will utilize an explanatory design to examine the connection between total quality management and environmental performance, with innovation as the mediating variable achieve the objectives of the study.

Study Area

The study focused on the Greater Accra region of Ghana as the study area. In terms of the food and beverages industry, the Greater Accra region has about 90% of food and beverages manufacturing firms. The reason why Greater Accra region was chosen as the study area is that, it houses more than 27% of the total population of employees in the manufacturing sector of Ghana. According to GSS

report (2021), it is the region with most population of employees in the manufacturing sector.

Population

In terms of some combination of geography and demography, a research population is sometimes specified (Saunders *et al.*, 2019; Lai, 2018). Employees in Ghana's manufacturing sector from all 16 regions will make up the study's population. This is because real data on the people working in the food and beverage industry is limited and difficult to get by. Furthermore, quantitative studies necessitate the participation of a sufficient number of individuals (Apuke, 2017; Queirós *et al.*, 2017). The study focused on procurement officers, quality officers, marketing managers and production/operations managers because they are directly or indirectly involved in decision-making and controls. This group was chosen because it was revealed by Khan (2019) that other stakeholders, aside from employees, are not involved in decision-making, governance, or control. The manufacturing industry employs 668,486 employees in Ghana (GSS report, 2021). Therefore, the sample for this study will be derived from this population.

Sample and Sampling Procedure

According to Sharma (2017), the method used in selecting a sample for a study is known as the sampling procedure. Purposive sampling is used for this study. According to Pandey and Pandey (2021), purposive sampling is known to produce well-matched groups as respondents for the study. Purposive sampling because, it involves a particular purpose. The idea is to pick out the sample concerning a criterion considered important for the particular study (Sharma, 2017).

The researcher purposively selected respondents at the managerial level such as the procurement officer, quality officer, marketing manager and production/operations manager.

As outlined in previous studies examining strategy and the environment (Cankaya & Sezen, 2018; Epstein *et al.*, 2018). Due to the fact that, the information made available on a company's strategy and environment is expected to be comprehensively useful at that level. Managers need such information to carry out their responsibilities and duties in their area of responsibility (Solovida & Latan, 2017). The Taro Yamane's sample size formula was used to determine the exact sample size.

$$n = \frac{N}{1 + N\,(e)^2}$$

$$n = \frac{668{,}486}{1 + 668{,}486\,(0.05)^2}$$

$$n = \frac{668{,}486}{1{,}672.215}$$

$$n = 400 \text{ respondents}$$

Where:
n = sample size
N = Population size
e = Allowable errors (0.05)

Based on above calculation, the sample size is 400. This implies that the study was based on four hundred (400) respondents derived as the research sample size.

Data Collection Instrument

To collect primary data, a questionnaire survey approach was used. This is easier to distribute, produces more accurate data, and presents fewer difficulties during data collection (Hair et al., 2019). Questionnaire statements were measured on a 7-point Likert scale, ranging from 1- strongly disagree to 7 – strongly agree. The questionnaire was divided into four (4) sections, numbered A through D. Section A comprises the question items and the respondents' socio-demographic information. Section B contains questions on total quality management practices. Section C contain questions on environmental performance and Section D comprises of innovation indicators.

Data Collection Procedure

Before the data collection exercise, the researcher gained an institutional ethical clearance letter from the UCC IRB. An authority note was also obtained from the Head of Department of Marketing and Supply Chain Management. The formal letter and consent form were sent to food and beverages manufacturing firms. The food and beverages firms engaged are those registered with Association of Ghana Industries (AGI) and are situated within the Greater Accra region of Ghana. Phone calls and emails were sent to the firms to schedule appointments for the survey, after the objective of the study was explained to them.

The researcher used printed questionnaires and google forms to solicit for responses from procurement officers, marketing managers, quality officers. Also, the researcher engaged production or operations managers of food and beverages manufacturing firms. Every respondent was given a survey questionnaire and a

brief explanation on how to provide their responses. Data collection took a duration from 20th of October, 2022 to 25th of November, 2022.

Variables and Measurements

The variables in this study were measured using constructs based wholly on the concepts and theories discussed. These measures were adopted and modified from previous research studies in the field to meet the study's needs. Table 1 contains a list of the study's variables, measurements, the data collection tool, and the empirical interpretation.

Table 1: Variables and Measurements

Variables	Measurements	Data collection tool	Empirical interpretation
Total Quality Management	• Continuous Improvement • Customer Focus • Top Management Commitment • Employee Involvement	Questionnaire	Pambreni et al., (2019)
Environmental Performance	• Waste Management • Reduction of Greenhouse Gas Emissions	Questionnaire	Sarbassov et al., (2020)
Innovation	• Process Innovation • Product Innovation	Questionnaire	Xie et al., (2019)

Source: Field survey (2023)

Pre-test of Questionnaire

The researcher selected 3 managers and two scholars with practical experience to review the survey questionnaire. This was after it was approved by

his supervisors. In this step, the researcher was aided to remove unsuitable questions and improved the recognition and clarity of the instrument. Then, 50 managers in the food and beverages manufacturing industry were purposively selected to conduct a pre-test survey to assess the applicability of the measurement tool (Nyamwaya *et al.*, 2020; Choe & Kim, 2019; Mishra *et al.*, 2018). A total of 50 questionnaires were self-administered for this pre-test. The pre-test results were analysed to understand the reliability and validity of the questionnaire.

The results showed from Table 2 and Table 3, that the pre-test questionnaire AVE ranged from 0.523 to 0.850. All AVE values are greater than the threshold of 0.05. From Table 8 and Table 9, Cronbach's alpha ranged from 0.830 to 0.957. All Cronbach's alpha values are greater than the threshold of 0.07. Indicating that there were no problems concerning the questionnaire instrument in term its accuracy and consistency. Finally, the questions that were not clear or easily understood by the managers were revised and adjusted.

Content validity

Fahmina *et al.*, (2019), defined content validity as the extent to which the instrument's questions and ratings adequately reflect all possible inquiries about the study. Before using statistical techniques to ensure construct validity, the researcher first consulted procurement and supply chain management authorities, including his supervisors and other experts in the area, to evaluate each expression in the developed measuring instrument in terms of the scale's content or appropriateness. The expert opinions were then considered as the researcher evaluated each expression.

Construct validity

Construct validity refers to how well an instrument measures the idea, behaviour, quality, or theoretical construct that it claims to measure (Sürücü & Maslakçi, 2020). Convergent and discriminant validity were used establish construct validity.

Convergent validity

Convergent validity (CV) is frequently measured using Average Variance Extracted (AVE) in PLS-SEM models (Hair Jr *et al.*, 2020; Hair *et al.*, 2019). Hair et al. (2019) further suggested that, due to measurement error, the AVE is used describe how the indicator is captured by the construct. To guarantee convergent validity, average explained variance (AVE) values must be smaller than composite reliability (CR), and each AVE value must be greater than 0.5. From Table 2 and Table 3 below, all AVE values are > 0.5, which means all the indicators converge accurately to explain their underlying constructs.

Table 2: Average Variance Extracted for First Order Constructs

	Average variance extracted (AVE)
CF	0.600
CI	0.523
EI	0.795
EP	0.653
PCS INN	0.724
PDT INN	0.608
TMC	0.573

Source: Field survey (2023)

Table 3: Average Variance Extracted for Second Order Constructs

	Average variance extracted (AVE)
INN	0.850
TQM	0.708

Source: Field survey (2023)

Discriminant validity

To assess the discriminant validity, the Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT) were utilized (Sürücü and Maslakçi, 2020). A model satisfies the Fornell-Larcker criterion for discriminant validity if the square roots of the AVE are larger than the correlations of the model's variables (Hair *et al.*, 2019). But, according to Hair *et al.*, (2020), the Fornell-Lacker criterion cannot accurately detect issues of discriminant validity. Due to the backdrops of the Fornell-Lacker criterion, the researcher also used the Heterotrait Monotrait ratio to assess discriminant validity.

According to Sarstedt *et al.*, (2021), in order to achieve discriminant validity, the values of the HTMT ratio should be < 0.90. Table 4 and Table 5 present the results of Heterotrait Monotrait ratio. Table 6 and Table 7 present the results of Fornell-Larcker criterion. From the Table 4 and Table 5, it can be derived that all the HTMT values obtained are <0.90. From Table 6 and Table 7, it can be derived that all the squared AVE values of each latent construct are greater than when compared to other latent constructs. Therefore, the presence of discriminant validity is evident.

Table 4: Heterotrait-Monotrait for First Order Constructs

	CF	CI	EI	EP	PCS INN	PDT INN	TMC
CF							
CI	0.874						
EI	0.729	0.477					
EP	0.854	0.742	0.860				
PCS INN	0.582	0.529	0.508	0.749			
PDT INN	0.673	0.723	0.627	0.870	0.825		
TMC	0.621	0.592	0.578	0.651	0.487	0.531	

Source: Field survey (2023)

Table 5: Heterotrait- Monotrait ratio for Second Order Constructs

	INN	TQM
INN		
TQM	0.853	

Source: Field survey (2023)

Table 6: Fornell-Larcker criterion for First Order Constructs

	CF	CI	EI	EP	PCS INN	PDT INN	TMC
CF	**0.775**						
CI	0.773	**0.723**					
EI	0.687	0.466	**0.892**				
EP	0.791	0.698	0.820	**0.808**			
PCS INN	0.549	0.552	0.501	0.722	**0.851**		
PDT INN	0.595	0.653	0.594	0.779	0.700	**0.780**	
TMC	0.605	0.577	0.544	0.630	0.506	0.501	**0.757**

Source: Field survey (2023)

Table 7: Fornell and Larcker criterion for Second Order Constructs

	INN	TQM
INN	**0.922**	
TQM	0.721	**0.841**

Source: Field survey (2023)

Reliability

A measurement is said to be reliable, if it yields consistent and equal results (Hair *et al.*, 2019). It evaluates a study's consistency, reproducibility, and dependability (Sarstedt *et al.*, 2019). The researcher guaranteed that the data collection instrument is reliable. This is evident by the Cronbach's alpha value and composite reliability (Rho_a and Rho_c). From the Table 8 and Table 9 below, the Cronbach's Alpha of all the latent constructs is greater than 0.70. This depicts that all latent constructs are reliable to be used in explaining the underlining model of this study.

Table 8: Internal Consistency of Reliability for First Order Constructs

LV	Cronbach's alpha	(Rho_a)	(Rho_c)
CF	0.925	0.927	0.937
CI	0.881	0.911	0.905
EI	0.957	0.964	0.964
EP	0.930	0.938	0.943
PCS INN	0.877	0.954	0.912
PDT INN	0.830	0.874	0.882
TMC	0.907	0.919	0.923

Source: Field survey (2023)

Table 9: Internal Consistency of Reliability for Second Order Constructs

LV	Cronbach's alpha	(Rho_a)	(Rho_c)
INN	0.823	0.828	0.919
TQM	0.862	0.867	0.906

Source: Field survey (2023)

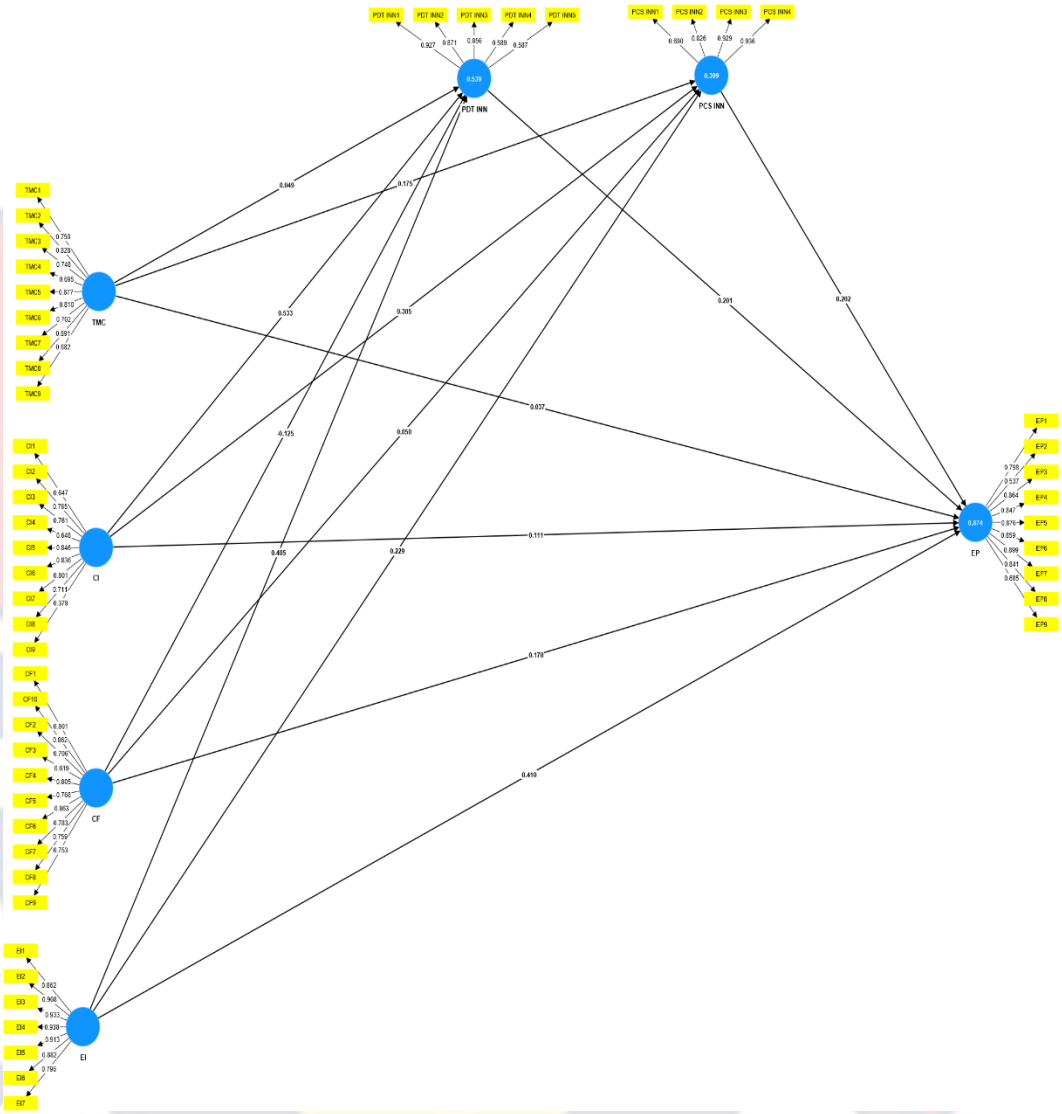

Figure 2: Structural equation modelling (Measurement Model) for First Order Constructs

Source: PLS- SEM output (2023)

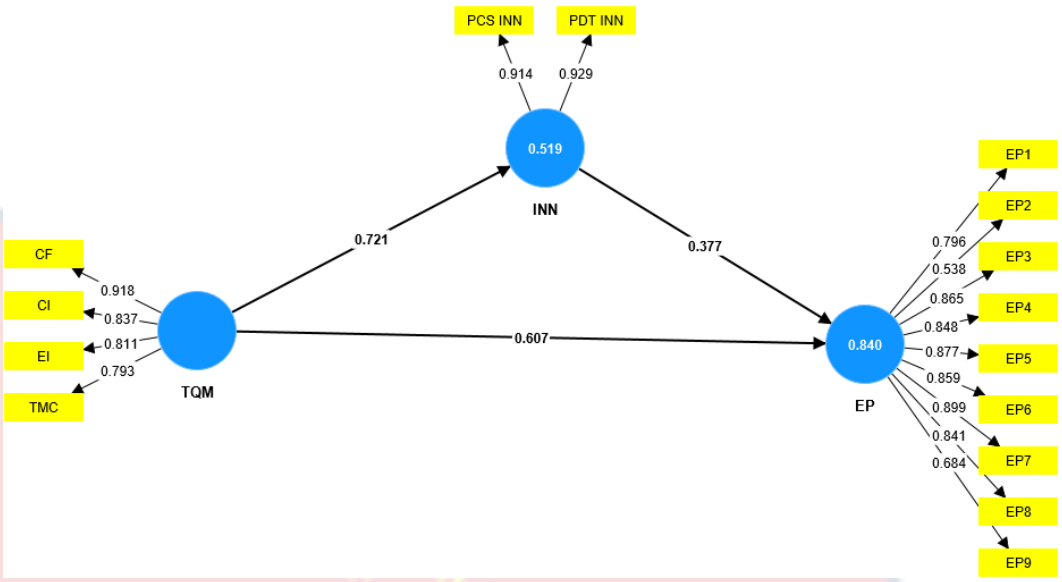

Figure 3: Structural equation modelling (Measurement Model) for Second Order Constructs

Source: PLS- SEM output (2023)

Data Processing and Analysis

Data collected from the field was processed prior to analysis. The data was reviewed and incorrect data were corrected in order to ensure successful processing and analysis of data. The Microsoft Excel v. 16.0 was utilized in data coding, entry, and cleaning which lasted for 14 days. After which, the researcher continued with the other data management activities in other to ensure that the variables to be used both dependent and independent are well captured and entered correctly. Data analysis ensures that data elicited over the study period was interpreted sequentially to achieve the study objectives.

The study ensured high retrieval rate and data cleaning before proceeding to actual analysis. The study made time to check for precision of responses to the questionnaire items. It was used as a means of screening data to elicit results from

the field to identify missing values and outliers. The statistical analysis for the study was carried out using the partial least square structural equation modelling (PLS-SEM) version 4. The real benefit of PLS-SEM is that it frees researchers from having to impose distributional assumptions on the data. To estimate complex models with a high number of constructs, indicator variables, and structural paths. Also, the PLS-SEM approach emphasizes prediction when constructing statistical models and is designed to provide causal explanations (Hair *et al.*, 2020; Sarstedt *et al.*, 2019).

Ethical Considerations

The primary ethical issue that needs to be taken into account in any research was identified in a study by (Patten, 2017). The main ethical concerns are voluntary involvement, the right to privacy, anonymity, and information security. To handle all of these ethical issues, every effort was made to ensure the effectiveness of these ethical considerations. The researcher did the following. Regarding voluntary participation, each respondent was able to choose whether or not to take part in the data collection operation. Participating respondents were given the needed privacy to complete the survey independently and a suitable method for resolving unanswered queries were provided.

The concern of anonymity was addressed by prohibiting respondents from submitting details about themselves in the survey, such as names, phone numbers, and home addresses. Additionally, respondents were guaranteed that their identities were not disclosed or utilized for anything other than this open analysis. Finally,

the researcher guaranteed respondents that all information submitted were kept safe without interference from any third party.

Chapter Summary

The goal of this chapter was to explain the techniques used to achieve the objective of the analysis. The investigator used the standardized questionnaire as a quantitative data collection tool. Using the Smart PLS (4.0) for the assessment of the reliability and validity of the measurements and structural models, data analysis was also considered. Ethical consideration of the study showed that prior to the commencement of data collection the researcher sent a written document to the Heads of Department and the Office of Deans of Graduate Studies for approval.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The study was conducted to examine total quality management and environmental performance with the mediating role of innovation. The findings were presented and fully discussed in this chapter. The presentation of the findings is done to chronologically reflect the specific objectives considered in this study. The discussion is done in details that gives cognizance to previously empirically tested claims concerning the relationship among the constructs of interest in this study.

Response Rate

Four hundred structured questionnaires were distributed to all selected respondents for the study. Following that, a total of 320 completed questionnaires were gathered. This amounted to a response rate of 84.4 percent, which the researcher judged appropriate. According to Blumenberg *et al.*, (2019), a response rate of at least 80% is recommended.

Table 10: Response Rate

Response Rate	Frequency	Percentage
Filled	320	80.0
Not filled	80	20.0
Total	**400**	**100.00**

Source: Field survey (2023)

Demographic Information

This section provides information about the demographic of respondents that participated in the study. The characteristics of these respondents are descriptively measured with frequency and percentage. Specifically, the section

presented the results on the respondents' gender, managerial role and years of experience. The findings were presented on Table 11. It is discovered that majority of the respondents (28.70%) were quality officers followed by procurement officers (27.50%), marketing managers (22.50%) and production or operations managers (21.30). Furthermore, regarding the years of experience of respondents, it was found that most of the respondents had 1 – 2 years of experience (30.00%) and 28.10% were within the less than a years' category.

Also, the remaining 27.80% and 14.10% had 3 – 4 years of experience and above 5 years of experience. On the issue of gender of the respondents, most of the respondents were males (52.50%), followed by females with (47.50%).

Table 11: Demographic Characteristics of Respondents

Variables	Options	Frequency	Percentage (%)
Managerial Role	Procurement officer	88	27.50
	Marketing manager	72	22.50
	Quality officer	92	28.70
	Production/operations manager	68	21.30
Total		320	100.00
Years of experience	Less than a year	90	28.10
	1 – 2 years	96	30.00
	3 – 4 years	89	27.80
	5 years and above	45	14.10
Total		320	100.00
Gender	Male	168	52.50
	Female	152	47.50
Total		320	100.00

Source: Field survey (2023)

Measurement Model Assessment

The measurement model quality test includes the reflective model's internal reliability [Cronbach alpha, composite reliability, rho_a], convergent validity

[average variance extracted], multicollinearity using the VIF and discriminant validity [HTMT ratio] (Sarstedt *et al.*, 2021; Hair *et al.*, 2020). This section tests the quality for both the first order constructs and second order constructs. Measurement model for the second order constructs was achieved by the disjoint two stage method proposed by (Sarstedt *et al.*, 2021).

Internal Consistency Reliability

Internal consistency of reliability can be measured using the internal reliability (Cronbach's Alpha), reliability of indicator (Rho_a) and composite reliability (Rho_c). Internal reliability is achieved by the outcomes of Cronbach alpha (α). The rule of thumb is that the threshold should be > 0.7 for any given predictor (Sarstedt *et al.*, 2021; Hair *et al.*, 2019). Hajjar (2018), also suggested that internal reliability is achieved when the Alpha value of the Cronbach is 0.6 or more. From Table 12, Cronbach's alpha (α) for first order constructs showed the following: CF= 0.931, CI= 0.895, EI= 0.942, EP= 0.943, PCS INN= 0.894, PDT INN= 0.878 and TMC= 0.905 respectively. From Table 13, Cronbach's alpha (α) for second order constructs showed the following: INN= 0.842 and TQM= 0.868 respectively. The results indicate that all latent variables have met the thresholds of the latent variables (> 0.70), suggesting that all of them are reliable for the model.

According to Henseler (2017), the reliability of the indicator (Rho_a) is an important method for the uni-dimensionality assessment of a collection of measurement variables. Benitez et al. (2020), posit that the use of rho_a for testing indicator reliability has been suggested by other studies. The reason being that, Rho-a is a much more reliable test of the reliability of the predictor. Ringle *et al.*,

(2020), proposed that the rho_a rating should be > 0.70. From Table 12, CF= 0.934, CI= 0.901, EI= 0.944, EP= 0.949, PCS INN= 0.911, PDT INN= 0.887 and TMC= 0.907 for first order constructs. From Table 13, INN= 0.852 and TQM= 0.873 for second order constructs.

Ringle et al. (2020), demonstrated that composite reliability (Rho_c) measures the degree to which, when placed together, a particular variable is properly assessed by its indicators. This implies that, to have a good reciprocal correlation, CR requires all the indicators assigned to a given construct to be reliable. Çankır (2017), stress that using the composite reliability, the construct reliability result was obtained, since it is ideal for evaluating the extent to which a given indicator is consistent in measuring its underlining latent variable. The thumb rule is that, 0.70 or higher should be the CR value (Ringle *et al.*, 2020; Çankır, 2017). From Table 12, the results revealed that the minimum CR value for first order is 0.913. From Table 13, the minimum CR value for second order constructs is 0.910. This implies that with their respective constructs, all the assigned metrics are reliable.

Table 12: Internal Consistency Reliability for First Order Constructs

Latent Variables	Cronbach's alpha	(Rho_a)	(Rho_c)
CF	0.931	0.934	0.942
CI	0.895	0.901	0.916
EI	0.942	0.944	0.953
EP	0.943	0.949	0.952
PCS INN	0.894	0.911	0.927
PDT INN	0.878	0.887	0.913
TMC	0.905	0.907	0.922

Source: Field survey (2023)

Table 13: Internal Consistency of Reliability for Second Order Constructs

Latent Variables	Cronbach's alpha	(Rho_a)	(Rho_c)
INN	0.842	0.852	0.926
TQM	0.868	0.873	0.910

Source: Field survey (2023)

Convergent Validity (Average Variance)

Convergent validity (CV) is frequently measured using Average Variance Extracted (AVE) in PLS-SEM models (Hair *et al.*, 2019, 2020). Hair *et al.*, (2019) further suggests that, due to measurement error, the AVE is used to describe how the indicator is captured by the construct. By analysing the average variance extracted of all variables in the model, the analysis observes the convergent validity. For a construct to show convergent validity, an AVE with a minimum threshold of 0.5 was suggested (Sarstedt *et al.*, 2021; Hair *et al.*, 2019). The findings from Table 14, show that the AVEs ranges from 0.571 to 0.760 for all the latent variables for first order constructs. From Table 15, the AVE values for second order constructs the ranges from 0.718 to 0.863. Therefore, the measurement model is convergent.

Table 14: Convergent Validity for First Order Constructs

Latent Variables	Average variance extracted (AVE)
CF	0.620
CI	0.578
EI	0.745
EP	0.691
PCS INN	0.760
PDT INN	0.678
TMC	0.571

Source: Field survey (2023)

Table 15: Convergent Validity for Second Order Constructs

Latent Variables	Average variance extracted (AVE)
INN	0.863
TQM	0.718

Source: Field survey (2023)

Multi collinearity (Variance Inflation Factor)

Hair *et al.*, (2020) noted that to ensure that the indicator coefficients are free of bias while minimizing substantial levels of collinearity among the predictor constructs, multi collinearity diagnostics are checked. Hair *et al.*, (2019), suggested cut point off point for multi collinearity (VIF) is 5.00. From Table 16 and Table 17, the VIF value of all latent variables are less than the threshold of 5.00. It can be concluded that the measurement model is free from common method bias.

Table 16: Inner VIF for First Order Constructs

Latent Variables	EP
CF	4.298
CI	3.830
EI	2.052
PCS INN	2.352
PDT INN	2.897
TMC	1.979

Source: Field survey (2023)

Table 17: Inner VIF for Second Order Constructs

Latent Variables	EP
INN	2.288
TQM	2.288

Source: Field survey (2023)

Discriminant Validity

To evaluate the consistency of the model, the discriminant validity (DV) is tested. (Hair *et al.*, 2020). Discriminant validity is examined using the Fornell and Larcker (1981) criterion and the Heterotrait-Monotrait (HTMT) ratio. Fornell and Larcker (1981), explained that DV ensures the latent variables of the sample are truly different from each other. Discriminant validity can be used to check the

structural model for problem with collinearity (Hair *et al.*, 2019). According to Hair *et al.*, (2017), there are usually no substantial levels of collinearity for discriminatingly true constructs. According to the Fornell and Lacker criterion, the factorial loadings should be greater in their individual constructs than between the latent variables (Benitez *et al.*, 2020; Fornell & Larcker, 1981).

The results for Fornell and Larcker criterion for discriminant validity in Table 18 and Table 19, revealed that there is the presence of discriminant validity. The rule of thumb proposed by Fornell *et al.*, (1981) is therefore, fulfilled. This means that the dimensions of the constructs have individuality. Finally, using the Heterotrait-Monotrait (HTMT) ratio, discriminant validity was assessed. This is a relatively new measure in structural equation modelling to test discriminant validity (Sarstedt *et al.*, 2017). Ringle *et al.*, (2020), indicated that the HTMT ratio is gaining more recognition, and now a generally recognised measure for assessing latent variables individuality.

According to Hair *et al.*, (2019), the HTMT ratio has been proposed for determining discriminant validity instead of the previously used Fornell-Larcker criterion and also cross-loadings. The reason being that, the HTMT ratio demonstrates greater results because of its ability to detect a lack of discriminant validity in typical research work (Hair *et al.*, 2019). According to Sarstedt et al. (2019), in order to achieve discriminant validity, the values of the HTMT ratio should be < 0.90. From the Table 20 and Table 21, all the HTMT values are below the acceptable range of < 0.9. This shows that the constructs are different from each other.

Table 18: Fornell-larker Criterion for Checking Discriminant Validity for First Order Constructs

LV	CF	CI	EI	EP	PCS INN	PDT INN	TMC
CF	**0.788**						
CI	0.799	**0.760**					
EI	0.653	0.487	**0.863**				
EP	0.778	0.744	0.775	**0.831**			
PCS INN	0.620	0.585	0.495	0.688	**0.872**		
PDT INN	0.679	0.708	0.527	0.803	0.727	**0.824**	
TMC	0.618	0.585	0.59	0.665	0.549	0.534	**0.756**

Note Diagonal element in bold = square root of AVE; Off – diagonal elements = correlation between constructs

Source: Fornell and Lacker (1981)

Table 19: Fornell-larker Criterion for Checking Discriminant Validity for Second Order Constructs

Latent Variables	**INN**	**TQM**
INN	**0.929**	
TQM	0.750	**0.847**

Note Diagonal element in bold = square root of AVE; Off – diagonal elements = correlation between constructs

Source: Fornell and Lacker (1981)

Table 20: Heterotrait-Monotrait (HTMT) Ratio for First Order Constructs

LV	CF	CI	EI	EP	PCS INN	PDT INN	TMC
CF							
CI	0.877						
EI	0.698	0.517					
EP	0.831	0.795	0.819				
PCS INN	0.669	0.625	0.53	0.741			
PDT INN	0.750	0.778	0.572	0.877	0.824		
TMC	0.653	0.627	0.636	0.702	0.585	0.577	

Source: Field survey (2023)

Table 21: Heterotrait-Monotrait (HTMT) Ratio for Second Order Constructs

Latent Variables	INN	TQM
INN		
TQM	0.873	

Source: Field survey (2023)

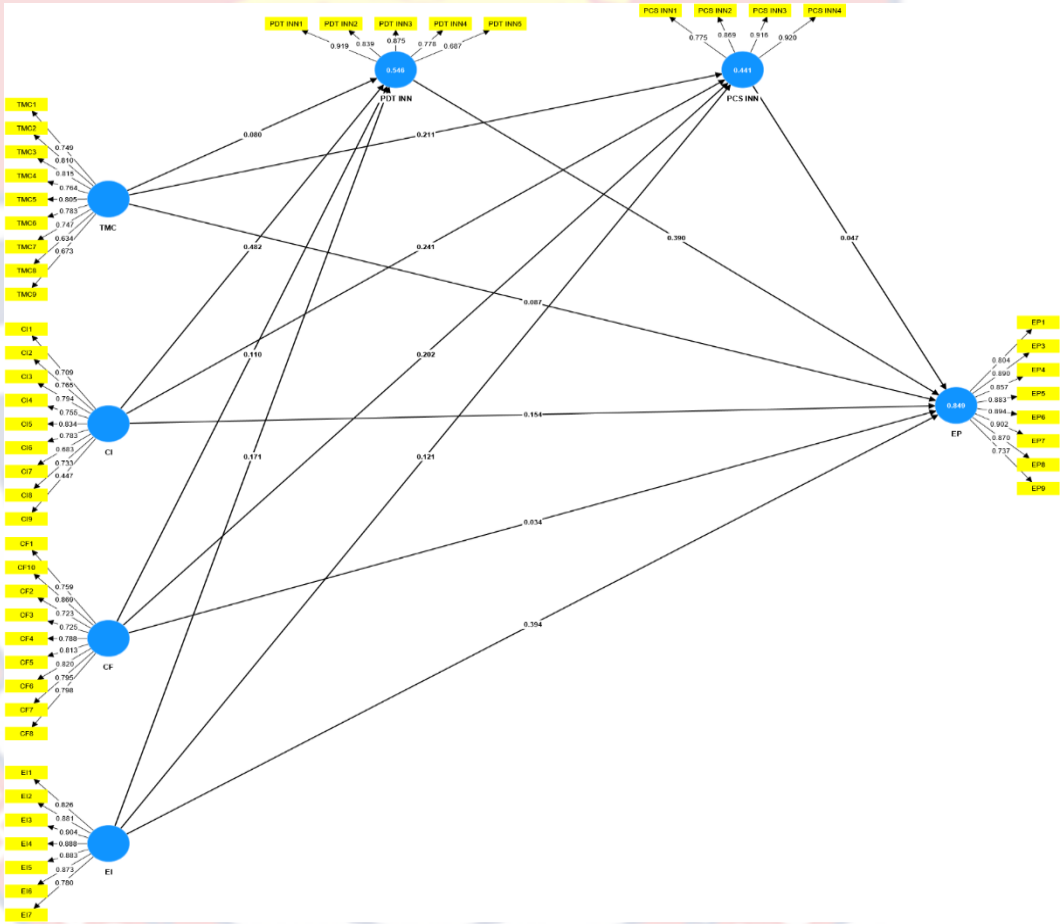

Figure 4: Structural equation modelling (Measurement Model) for First Order Constructs

Source: PLS-SEM output (2023)

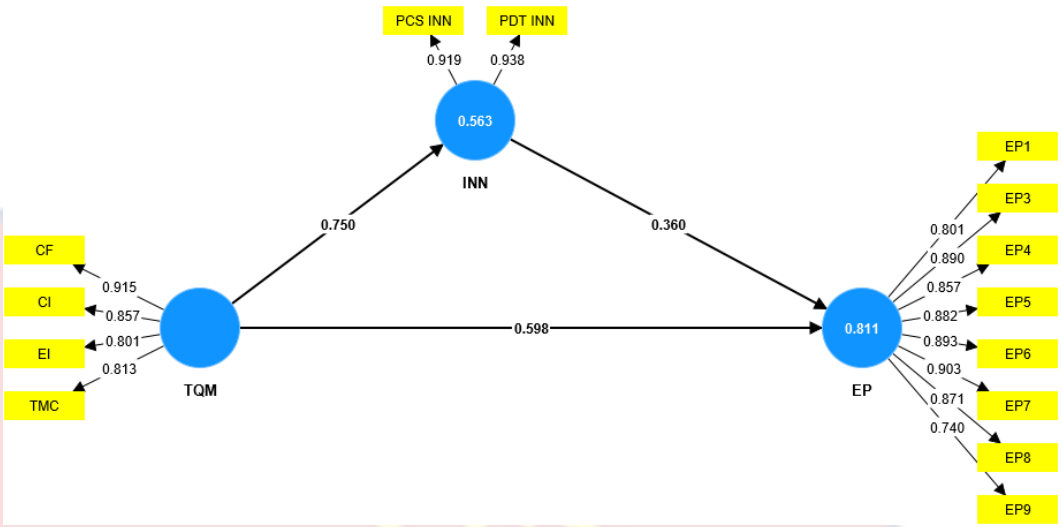

Figure 5: Structural equation modelling (Measurement Model) for Second Order Constructs

Source: PLS-SEM output (2023)

Coefficients of Determination (in-sample predictive power)

The coefficient of determination R^2 measures the variance, which is explained in the endogenous construct and is therefore a measure of the model's explanatory power (Hair *et al.*, 2019). The R^2 is also referred to as in-sample predictive power (Sarstedt *et al.*, 2021). According to Ringle *et al.*, (2020) and Hair *et al.*, (2019), the R^2 ranges from 0 to 1, with higher values indicating a greater explanatory power. As a guideline, R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak (Sarstedt *et al.*, 2021).

Hair *et al.*, (2019) clarified that R^2 indicates the combined impact on the endogenous variable (EP) of the exogenous variables (TQM and INN). From Table 22, the coefficient of determination (R^2) is 0.811 for the endogenous latent variable (EP). This means that TQM and INN substantially explains 81.1% of the variance in EP. Simply put, total quality management and innovation results in 81.1%

change in environmental performance. Hence, much attention should be given to total quality management and innovation. Through these, improvement in environmental performance will be achieved.

Table 22: Coefficients of Determination (in-sample predictive power)

Endogenous Variable	R-square	R-square adjusted
EP	0.811	0.810

Source: Field survey (2023)

PLS predict (out-sample predictive power)

Shmueli *et al.*, (2019), developed PLSpredict as a holdout-sample-based procedure that generates case-level predictions on an item or a construct level to reap the benefits of predictive model assessment in PLS-SEM. Contrary to the standard structural model evaluation metrics such as the R^2 and Q^2. PLSpredict offers a means to assess a model's out-of-sample predictive power i.e., a model's accuracy when predicting the outcome value of new cases (Hair *et al.*, 2019). To test for the out-sample predictive power, PLSpredict uses the partial least square root square mean error (PLS-SEM_RSME) against the linear model root square mean error (LM_ RSME) which is the benchmark (Shmueli *et al.*, 2019).

When comparing the RMSE values with the LM values, the following guidelines apply (Shmueli *et al.*, 2019); if the PLS-SEM analysis, compared to the naïve LM benchmark, yields higher prediction errors in terms of RMSE for all indicators, this indicates that the model lacks predictive power. If the majority of the dependent construct indicators in the PLS-SEM analysis produce higher prediction errors compared to the naïve LM benchmark, this indicates that the model has a low predictive power. If the minority (or the same number) of

indicators in the PLS-SEM analysis yields higher prediction errors compared to the naïve LM benchmark, this indicates a medium predictive power.

If none of the indicators in the PLS-SEM analysis has higher RMSE values compared to the naïve LM benchmark, the model has high predictive power. From Table 23, only the PLS_RMSE of EP4 is less than its LM_RMSE. Majority of the dependent variable indicators have higher PLS-SEM_RMSE compared to their LM_RMSE. Therefore, it can be said that the model has low predictive power. This means that the accuracy with which this model can predict the outcome of new cases for is low.

Table 23: PLS predict (out-sample predictive power)

	Q^2predict	PLS-SEM_RMSE	LM_RMSE
EP1	0.499	0.889	0.801
EP3	0.554	0.850	0.837
EP4	0.527	**0.826**	**0.831**
EP5	0.477	0.910	0.900
EP6	0.626	0.755	0.746
EP7	0.648	0.755	0.705
EP8	0.611	0.809	0.803
EP9	0.435	0.874	0.864

Source: Field survey (2023)

Structural Model

When measurement model assessment is satisfactory, the next step in evaluating PLS-SEM results is assessing the structural model.

Discussion of Hypotheses

This section discussed the hypotheses. Firstly, the effect that the dimensions of total quality management and innovation have on environmental performance. Also, the effect that the dimensions of innovation have on environmental performance.

Dimensions of total quality management on environmental performance

H^{1a} states that continuous improvement has a positive and significant effect on environmental performance. From Table 24 below, the findings show that continuous improvement has a positive and significant effect on environmental performance with (β= 0.356; t stat= 8.909; p-value= 0.000). The reason being that the t-stat (8.909) for H^{1a} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in continuous improvement initiatives would results in 35.6% improvements in environmental performance.

H^{1b} states that top management commitment has a positive and significant effect on environmental performance. From Table 24 below, the findings show that top management commitment has a positive and significant effect on environmental performance with (β= 0.118; t stat= 3.288; p-value= 0.001). The reason being that the t-stat (3.288) for H^{1b} is greater than 1.96 and its p value (0.001) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in top management commitment to quality initiatives would results in 11.8% improvements in environmental performance.

H^{1c} states that customer focus has a positive and significant effect on environmental performance. From Table 24 below, the findings show that customer

focus has a positive and significant effect on environmental performance with (β= 0.114; t stat= 2.328; p-value= 0.020). The reason being that the t-stat (2.328) for H^{1c} is greater than 1.96 and its p value (0.020) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in customer focus initiatives would results in 11.4% improvements in environmental performance.

H^{1d} states that employee involvement has a positive and significant effect on environmental performance. From Table 24 below, the findings show that employee involvement has a positive and significant effect on environmental performance with (β= 0.453; t stat= 10.150; p-value= 0.000). The reason being that the t-stat (10.150) for H^{1d} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in total quality management initiatives would results in 45.3% improvements in environmental performance.

Table 24: Dimensions of total quality management on environmental performance

	B	Sample mean (M)	(STDEV)	T stats	P values
CF -> EP	0.114	0.114	0.049	2.328	0.020
CI -> EP	0.356	0.357	0.040	8.909	0.000
EI -> EP	0.453	0.447	0.045	10.150	0.000
TMC -> EP	0.118	0.123	0.036	3.288	0.001

Source: Field survey (2023)

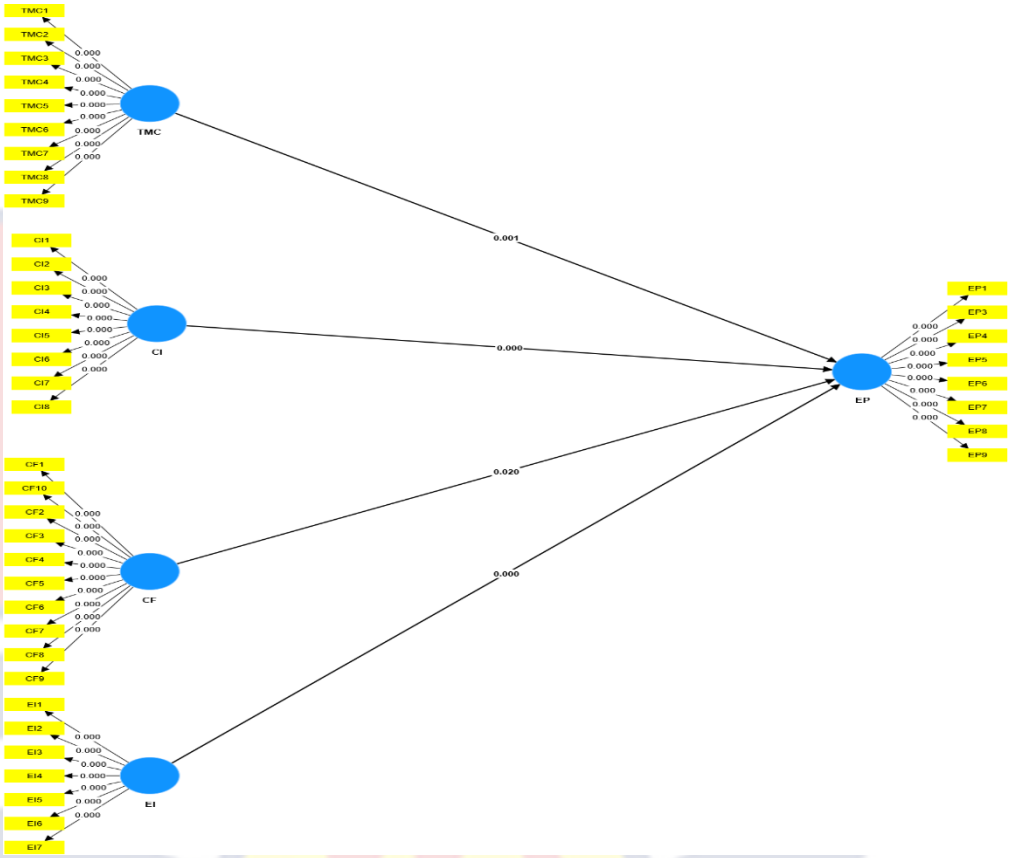

Figure 6: Structural equation modelling (Direct effect)

Source: PLS-SEM output (2023)

Dimensions of innovation on environmental performance

H^{2a} states that product innovation has a positive and significant effect on environmental performance. From Table 25 below, the findings show that product innovation has a positive and significant effect on environmental performance with (β= 0.661; t stat= 15.393; p-value= 0.000). The reason being that the t-stat (15.393) for H^{2a} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in product innovation initiatives would results in 66.1% improvements in environmental performance.

H^{2b} states that process innovation has a positive and significant effect on environmental performance. From Table 25 below, the findings show that process innovation has a positive and significant effect on environmental performance with (β= 0.207; t stat= 4.920; p-value= 0.000). The reason being that the t-stat (4.920) for H^{2b} is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in process innovation initiatives would results in 20.7% improvements in environmental performance.

Table 25: Dimensions of innovation on environmental performance

	β	Sample mean (M)	(STDEV)	T stat	P values
PCS INN -> EP	0.207	0.209	0.042	4.920	0.000
PDT INN -> EP	0.661	0.658	0.043	15.393	0.000

Source: Field survey (2023)

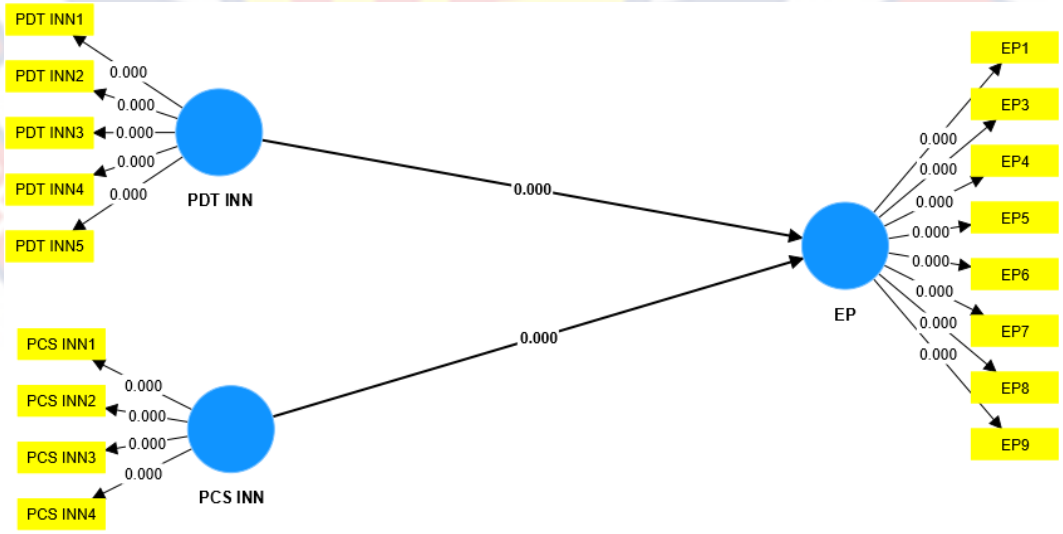

Figure 7: Structural equation modelling (Direct effect)

Source: PLS-SEM output (2023)

The Main Study Findings

Objective one: Effect of Total Quality Management on Environmental Performance

The first objective of this study was to examine the effects of total quality management on environmental performance. The study hypothesized that (H^1): total quality management has a positive and significant effect on the environmental performance. The outcome of Table 26 below, shows that total quality management has a positive and significant effect on environmental performance (H1: β=0.870; t= 40.430; p-value= 0.000). The reason being that the t-stat (40.430) for H^1 is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis. From β, it can be derived that a rise in total quality management initiatives would results in 87% improvements in environmental performance. This means that total quality management plays a significant role in ensuring excellent environmental performance. Theoretically, this study's result has been supported by the resource-based view theory.

The theory posits that in order to improve their environmental performance and achieve a competitive advantage over their competitors in the market. Managers can use a bundle of total quality management practices such as top management commitment, customer focus, continuous improvement and employee involvement as resources to reduce the adverse effect of their operations on the environment. Practically, the examination's discovery is supported by empirical literature. Fitriyani *et al.*, (2021), who conducted a study to investigate the role of TQM practices in improving business performance's pharmaceutical industry in

Indonesia. The results showed that the TQM positively impact the company's business performance improvement in all dimensions.

Zaidi and Ahmad (2020), examined the relationship between TQM practices and operational performance in the manufacturing industry in Malaysia. The findings showed that implementing TQM practices is important in ensuring that operational performance increases in manufacturing companies. Androwis *et al.*, (2018), conducted a study on total quality management practices and organizational performance in the construction chemicals companies in Jordan. The aim of the study was to investigate the relationship between total quality management practices and organizational performance. Analysis showed that TQM practices positively affect organizational performance.

Table 26: Effect of Total quality management on environmental performance

	β	Sample mean (M)	(STDEV)	T stat	P values
TQM -> EP	0.870	0.867	0.022	40.430	0.000

Source: Field survey (2023)

Objective two: Effect on Innovation on Environmental Performance

The second objective of this study was to examine the effects of innovation on environmental performance. The study hypothesized that (H^2): innovation has a positive and significant effect on the environmental performance. The outcome of Table 27 below, showed that innovation has a positive and significant effect on environmental performance (H^2: β= 0.813; t= 34.621; p-value= 0.000). The reason being that the t-stat (34.621) for H^2 is greater than 1.96 and its p value (0.000) < 0.05. Hence, the researcher failed to accept the null hypothesis (H0). From β, it can

be derived that a rise in innovation initiatives would results in 81.3% improvements in environmental performance.

This means that innovation (thus; combination of both product and process innovation) results in a significant improvement in environmental performance. Theoretically, this result is supported by the resource-based view theory. The resource-based view theory sees innovation as a resource, which can impact environmental performance. Innovation can be used to improve environmental performance through the impact it has of the products and processes of the firms. Practically, this result is supported by empirical literature. Anwar et al. (2020), conducted a study on the relationship between innovation and performance among NPOS in Pakistan. This study examined the influence of the sub-dimensions of innovation on the performance of NPOs.

Overall, the results showed there is a positive and significant relationship between organisational innovation and non-profit performance. Ntiamoah *et al.*, (2019), examined the effect of innovation practices on agribusiness performance in Ghana. This study investigated how organizational innovation affect agribusiness performance in Ghanaian agribusiness companies. The results revealed that innovation has a positive effect of on agribusiness performance. Maldonado-Guzmán *et al.*, (2018), also conducted a study on innovation capabilities and performance in Mexico. The purpose of this paper was to investigate the effects that innovation capabilities have on the business performance of small- and medium-sized enterprises (SMEs). The results obtained show that innovation has positive and significant effect on the business performance of Mexican SMEs.

Table 27: Effect of innovation on environmental performance

	β	Sample mean (M)	(STDEV)	T stat	P values
INN -> EP	0.813	0.812	0.023	34.621	0.000

Source: Field survey (2023)

Objective three: Effect of the mediation role of Innovation on the relationship between Total Quality Management and Environmental Performance

The third and final objective of this study was to examine the effect of the mediating role of innovation in the relationship between total quality management and environmental performance. The study hypothesized (H^3) that: the mediating role of innovation has a positive and significant effect in the relationship between total quality management and environmental performance. The outcome of Table 28 below, showed that innovation played a positive and significant mediating role in the relationship between total quality management and environmental performance (H^3: β= 0.270; t stat= 10.818; p-value 0.000 <0.05).

The reason being that the t-stat (10.818) for H^3 is greater than 1.96 and its p value 0.000 < 0.05. Hence, the outcome is consistent with the hypothesis, therefore, the researcher failed to accept the null hypothesis (H0). From β, it can be derived that the presence of innovation in the relationship between total quality management and environmental performance would results in a 27.0 % improvement in environmental performance. Theoretically, the result is supported by the system theory of management. The theory posits that every part of a system is important and total quality management is interdependent on innovation to influence environmental performance. Therefore, managers need to adopt innovation in addition to total quality management initiatives. In order to improve

their environmental performance and achieve a competitive advantage over their competitors in the market.

Practically, this result is supported by empirical literature. Kulenović *et al.*, (2022), sought to explore the influence of total quality management (TQM) practices on a company's financial performance, considering innovation performance as a mediator variable. The results suggested that the impact of TQM practices on financial performance is manifested through full mediation of innovation performance. Anifowose *et al.*, (2022), investigated the role of innovation speed in mediating the relationship between total quality management and small and medium-sized enterprise performance. Innovation speed substantially mediates the relationship between total quality management (TQM) and small and medium-sized enterprises (SME) performance.

Sahoo (2019), conducted a study on quality management, innovation capability and firm performance with empirical insights from Indian manufacturing SMEs. Overall, the findings showed that quality management through the firm's innovation capability is indirectly associated with a firm's business performance.

Table 28: The mediating role of innovation in the relationship between total quality management and environmental performance

	β	(M)	(STDEV)	T stat	P values
TQM -> INN -> EP	0.270	0.270	0.025	10.818	0.000

Source: Field survey (2023)

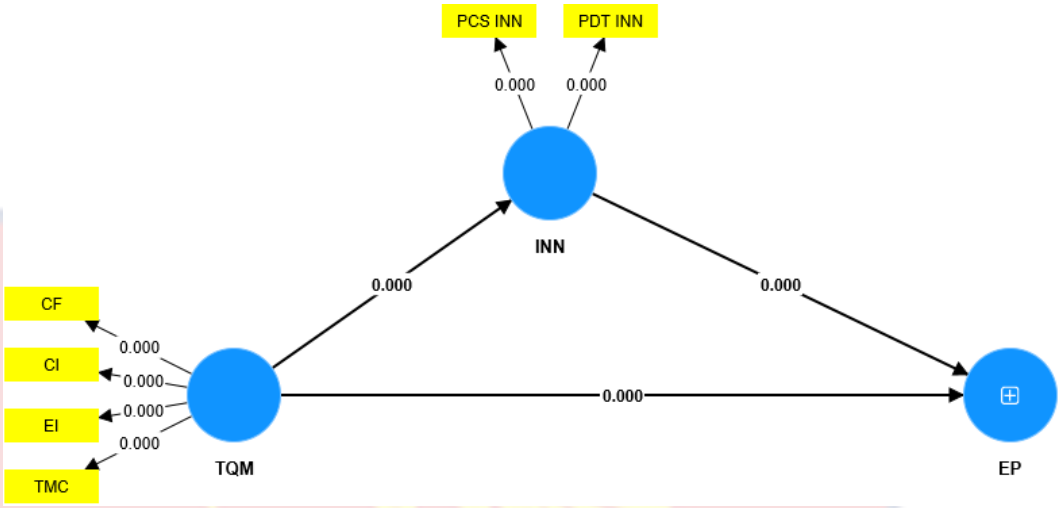

Figure 8: Structural equation modelling (Mediation effect)

Source: PLS-SEM output (2023)

Significance of Path Coefficients

After the measurement model has been reviewed to make sure that it meets the PLS-SEM standard. The researcher proceeded by testing the hypotheses. The hypotheses are primarily about investigating the effect of the mediating role of innovation on the relationship between total quality management and environmental performance. The study concentrated on the selected area of the Greater Accra region. As recommended by Hair *et al.*, (2019), the path coefficient measures the direction, intensity and degree of significance with t-statistics obtained from 5000 bootstraps. Table 29 below, describes the results of the hypotheses studied using PLS- SEM.

Table 29: Significance of Path Coefficients (Total Effects)

Structural paths	β	T stats	P values		Decision Rule
TQM -> EP	0.870	40.430	0.000	**P<0.05**	H^1 (supported)
CI -> EP	0.356	8.909	0.000	**P<0.05**	H^{1a} (supported)
TMC -> EP	0.118	3.288	0.001	**P<0.05**	H^{1b} (supported)
CF -> EP	0.114	2.328	0.020	**P<0.05**	H^{1c} (supported)
EI -> EP	0.453	10.150	0.000	**P<0.05**	H^{1d} (supported)
INN -> EP	0.813	34.621	0.000	**P<0.05**	H^2 (supported)
PDT INN -> EP	0.661	15.393	0.000	**P<0.05**	H^{2a} (supported)
PCS INN -> EP	0.207	4.920	0.000	**P<0.05**	H^{2b} (supported)
TQM -> INN -> EP	0.270	10.818	0.000	**P<0.05**	H^3 (supported)

Note: = P <0.05

Source: Field survey (2023)

The research hypotheses were evaluated on the basis of p values and t-stats as recommended by Hair *et al.*, (2020). They proposed that p- values should be < 0.05 and its corresponding t-stat values > 1.96. The decision rule is that, when the t-stat is < 1.96, the researcher will fail to reject the null hypothesis (H0). The result shows that the t stat for all hypotheses is > 1.96. Therefore, the researcher failed to accept the null hypothesis (H0).

Chapter Summary

This chapter presented the study findings and discussion. Firstly, the response rate to the study questionnaire, followed by demographic characteristics of the participating. The researcher then used PLS-SEM to test the quality of the data collected. Then, proceeded to analysing the hypotheses in accordance with the objectives for this study. The analyses of data found out the following. Total quality management has a positive and significant effect on environmental performance.

Innovation has a positive and significant effect on environmental performance. And innovation played a positive and significant mediating role in the relationship between total quality management and environmental performance.

The findings of the study mean that managers should take the implementation of innovation seriously in their firms because when innovation is presents, total quality management can actually improve environmental performance. The review, findings, and recommendations are discussed in the following chapter.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

In this final section, the summary and conclusions of the research were provided. In addition, the chapter offered to policy makers and managers of food and beverages manufacturing firms, some recommendations based on the findings. The chapter finally made submissions for additional researches.

Summary of the Study

The research assessed the mediating role of innovation in the relationship between total quality management and environmental performance. To achieve this overall objective, three specific objectives were formulated. The first objective was to examine the effect of total quality management on environmental performance. The second objective was to examine the effect of innovation on environmental performance. Lastly the mediating effect of innovation in the relationship between total quality management and environmental performance. In addressing the above objectives, the research reviewed relevant theoretical and empirical literature to the research. The theoretical literature revised in the study included the resource-based view theory and system theory of management.

The empirical literature also included total quality management, environmental performance and innovation. With empirical support for the objectives of the study. In addition, the study designed the appropriate conceptual framework, which pictured, for further understanding, the connection between total quality management, environmental performance and innovation. The research utilised the quantitative research method and using both the post-positivism

research philosophy and explanatory research design, the study measured the mediating role of innovation in the relationship between total quality management and environmental performance.

The study population consisted of all manufacturing firms' employees in Ghana. In all a sample of 400 employees of food and beverages manufacturing firms in Ghana were used for the study and cross-sectional data was solicited from them using a self-administered structured survey questionnaire. The data was subsequently inputted and analysed using the partial least squares structural equation model (Smart PLS-SEM) software.

Key Findings

- The outcome from Table 26 showed that, total quality management has a positive and significant effect on environmental performance (H^1: β= 0.870; t stats= 40.430; p-value= 0.000). The reason being that the t-stat (40.430) for H^1 is greater than 1.96 and its p value (0.000) < 0.05. Hence, the outcome was consistent with the hypothesis, thus the researcher failed to accept the null hypothesis.
- The study revealed from Table 27 that, innovation has a positive and significant effect on environmental performance (H^2: β= 0.813; t stat= 34.621; p-value= 0.000). The reason being that the t-stat (34.621) for H^2 is greater than 1.96 and its p value (0.000) < 0.05. Hence, the outcome was consistent with hypothesis, thus, the researcher failed to accept the null hypothesis.

- The findings from Table 28 showed that, mediating role of innovation has a positive and significant effect in the relationship between total quality management and environmental performance (H^3: β= 0.270; t stat= 10.818; p-value= 0.000). The reason being that the t-stat (10.818) for H^3 is greater than 1.96 and its p value (0.000) < 0.05. Hence, the outcome was consistent with the hypothesis, thus the researcher failed to accept the null hypothesis.

Conclusions

The study concluded that:

Based on these results, it can be observed that managers believe more efforts should be exerted on improving the above four practices of total quality management to enhance the environmental performance of their firms. Thus, the results obtained from this research can lead food and beverages manufacturing firms in Ghana to a successful implementation of TQM that will lead to improved environmental performance.

Based on these results, it can be observed that, managers believe more efforts should be exerted on improving the innovation initiatives. In order to enhance the environmental performance of their firms. Thus, the results obtained from this research can lead food and beverages manufacturing firms in Ghana to a successful implementation of innovation that will lead to improved environmental performance.

The presence of innovation increases the effect total quality management has on the environmental performance. Based on these results, it can be observed that, managers believe more efforts should be exerted on improving the innovation

initiatives. In order to enhance the effect total quality management has on environmental performance. Thus, the results obtained from this study can lead food and beverages manufacturing firms in Ghana to a successful implementation of innovation that will lead to improve the effect total quality management has on environmental performance.

Recommendations

Based on these results, the following recommendations were made;

Firstly, managers of food and beverages manufacturing firms in Ghana can benefit from total quality management to improve their environmental performance. They have to develop one integrated quality plan to meet business objectives and constantly improve their management system concerning their environments. Managers should also encourage their employees to pay attention to their customers and their needs. This can be done by preparing a list including these customers with their current and future needs. This list should be updated continuously, so as to maintain customer satisfaction and improve their environmental performance.

Furthermore, obtaining the commitment of top management and involving them in the latest development processes will significantly enhance the environmental performance. Moreover, managers should involve employees in adopting bench-marking and problem-solving techniques that are based on facts and systematic analysis. Using employee involvement techniques such questions and answers (Q&A forums) and brainstorming to control variability will also improve the environmental performance of their firms.

Secondly, managers can benefit from innovation to improve upon their firms' environmental performance. The success of product innovation and the ability of companies to improve their innovation processes are rapidly becoming an essential requirement for competitive advantage and long-term growth. Managers have to be concentrated on identifying the various innovations such as the novelty of the merchandise, the speed of launching and the use of technological innovation in new products. Whereas, the implementation of process innovation for the elimination of quality error in process and waste, reduction customer complaints and number of process activities. These initiatives create benefits such as increased in profit margin, market leadership, productivity, market share, effectiveness and efficiency.

Last but not the least, managers of Ghanaian food and beverages manufacturing firms can benefit from both total quality management and innovation. Total quality management cannot work in a vacuum. Therefore, it is prudent to implement innovation in order to increase the effect total quality management has on environmental performance. TQM and innovation will replicate an important effect towards environmental performance by empowering a superior place in the global and domestic market and also, advance a superior environmental performance and competitive advantage. Therefore, managers should implement innovation as part of their strategic management decisions in addition to total quality management when considering improvement in environmental performance.

Suggestions of Future Studies

In terms of potential directions for further studies, the results of the study offered some hints. First, further research could expand the study to include the other regions in the country. This will help to extend current awareness and help to generalize the findings of the study.

Secondly, it is possible to extend the hypotheses built for this study to include the impact of potential moderator variables such as firm size, corporate social responsibility, supply chain flexibility and market structure.

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APPENDIX A
RESEARCH QUESTIONNAIRE

University of Cape Coast
College of Humanities and Legal studies
School of Business
Department of Marketing and Supply Chain Management

Total Quality Management and Environmental Performance: the role of Innovation

Hello Respondent,

This questionnaire seeks to gather information on ***Total Quality Management and Environmental Performance: the role of Innovation.*** You are kindly requested to respond to all questions applicable to you and provide responses reflecting the ground's situation with utmost good faith. The information required here is purely for academic purposes. Hence, the ultimate privacy and confidentiality of the information provided as a respondent are highly assured and respected.

Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it, and any questions I have asked have been answered to my satisfaction. I consent voluntarily to participate as a respondent in this study and understand that I have the right to withdraw from the study at any time without in any way it is affecting me. Yes ☐ No ☐

Thank you for your participation.

Bernard Nyarko

(SB/PST/20/0008)

SECTION A: DEMOGRAPHICS

Please tick appropriately as it applies to the following issues in this section.

1. What is your role in the organization?
   - ☐ Procurement Officer
   - ☐ Marketing Manager
   - ☐ General Manager
   - ☐ Production / Operations Manager
2. What number of years have you been working in your current position?
   - ☐ Less than a year
   - ☐ 1 – 2 years
   - ☐ 3 – 4 years
   - ☐ 5 years and above
3. What is your Gender?
   - ☐ Male
   - ☐ Female

SECTION B: TOTAL QUALITY MANAGEMENT

This section seeks to gather responses on the state of total quality management of your organization. Kindly use the seven-point Likert scale to indicate your level of agreement with each statement, ranging from 1- Strongly Disagree to 7 – Strongly Agree. Tick [√] as applicable.

Part A: *Top Management Commitment*

No.	Statements	1	2	3	4	5	6	7
TMC1	The top management of my organization continually demonstrates its commitment to quality.							

TMC2	The top management of my organization is inclined to allocate adequate time and resources for quality management.							
TMC3	The top management of my organization learns quality-related concepts and skills.							
TMC4	The top management of my organization focuses on product quality rather than yields.							
TMC5	The top management of my organization actively participates in quality management activities.							
TMC6	The top management of my organisation encourages encourages performance appraisal.							
TMC7	The top management of my organisation arranges adequate resources for education and seminars on the environment							
TMC8	The top management of my organisation considers environmental concerns in quality management activities.							
TMC9	The top management of my organisation is creating and sustaining shared values, fairness and ethical role models at all levels of the organization.							

Part B: *Continuous Improvement*

No.	Statements	1	2	3	4	5	6	7
CI1	My organization has a continuous quality management manual.							

CI2	My organization emphasizes the best implementation of continuous improvement processes for all tasks at all levels.							
CI3	My organization improves quality system documents continuously.							
CI4	In my organization, we believe that quality improvement is every individual's responsibility.							
CI5	My organization implements all quality system documents in practice.							
CI6	My organization modifies quality system documents through quality audits and management review.							
CI7	My organisation emphasises improvement of all processes.							
CI8	Continuous quality improvement is an important goal of this organization.							
CI9	The organization implements all quality system documents in practice.							

Part C: *Customer Focus*

No.	Statements	1	2	3	4	5	6	7
CF1	My organization is focused on customer needs.							
CF2	My organization has systems to handle customer needs.							
CF3	My organization has invested on creating awareness for customers on its new products.							

CF4	My organization is keen on inclusion of customer needs.							
CF5	My organization understands customer needs.							
CF6	In my organisation, quality-related customer complaints are treated with top priority.							
CF7	My organization determines current and future customer requirements and expectations.							
CF8	My organisation is fully aware of market trends.							
CF9	My organisation undertakes either pull demand, push demand or both							
CF10	My organisation undertakes corporate social responsibility for its customers							

Part D: *Employee Involvement*

No.	Statements	1	2	3	4	5	6	7
EI1	Employees in my organization openly discuss problems and issues.							
EI2	Employees in my organization freely share knowledge and experience.							
EI3	Employees in my organization actively seek opportunities to enhance their competence, knowledge and experience.							
EI4	Employees in my organization evaluate their performance against their personal goals and objectives.							
EI5	Employees in my organization accept ownership of problems and their responsibility for solving them.							

EI6	Employees in my organisation understand the importance of their contribution and role in the organization.							
EI7	Formal processes are used regularly (attitude surveys, employees' briefing, etc.) to find out employees' opinions and views.							

SECTION C: ENVIRONMENTAL PERFORMANCE

This section seeks to gather responses on the state of environmental performance in your organization. Kindly use the seven-point Likert scale to indicate your level of agreement with each statement, ranging from 1- Strongly Disagree to 7 – Strongly Agree. Tick [√] as applicable.

Part 1*: Waste Management*

No.	Statements	1	2	3	4	5	6	7
EP1	The firm recommends reusable packaging.							
EP2	Employees, customers and other stakeholders are involved in the firm's waste management initiatives.							
EP3	Production materials sensitivity is a criterion for supplier selection							
EP4	The firm encourages the collection and reuse of waste.							
EP5	Mechanisms are in place to enhance reverse logistics from customer to the firm.							
EP6	Reduced emissions from directly generated general waste.							

EP7	Reduced emissions from directly produced volatile organic compounds.							
EP8	Reduced emission costs due to review of greenhouse gases usage							
EP9	Reduced emission costs due to environmental alternatives in place for direct natural resource use and extraction							

SECTION D: INNOVATION

This section seeks to gather responses on the state of innovation in your organization. Kindly use the seven-point Likert scale to indicate your level of agreement with each statement, ranging from 1- Strongly Disagree to 7 – Strongly Agree. Tick [√] as applicable.

Part 1: *Product innovation*

No.	Statements	1	2	3	4	5	6	7
PDT INN1	High-quality technical innovations are introduced during the development of this product.							
PDT INN2	Compared to similar products developed by our competitors, our product offers unique Features/attributes/benefits to the customers.							
PDT INN3	Our product introduces many completely new features to its' class of products.							
PDT INN4	Our organization try to introduce and diversify our product to suit customer needs							

PDT INN5	Our product is highly innovative, replacing an inferior alternative.							

Part 2: *Process innovation*

No.	Statements	1	2	3	4	5	6	7
PCS INN1	The organizational structure innovation is more flexible than the competitors.							
PCS INN2	The job design innovation is more diverse than our competitors.							
PCS INN3	The company has continuously used innovative technology to improve the quality and speed of delivery and services to our customers.							
PCS INN4	The company has continuously used innovative technology to improve the quality and speed of production.							

End of Survey.

Thank you.

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

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YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0011497

14TH NOVEMBER, 2022

Mr. Bernard Nyarko
Department of Marketing and Supply Chain Management
University of Cape Coast

Dear Mr. Nyarko,

ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2022/55)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your research **Total Quality Management and Employee Performance: The role of Green Supplier Development.** This approval is valid from 14th November, 2022 to 13th November, 2023. You may apply for a renewal subject to submission of all the required documents that will be prescribed by the UCCIRB.

Please note that any modification to the project must be submitted to the UCCIRB for review and approval before its implementation. You are required to submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Kofi F. Amuquandoh

Ag. UCCIRB Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST