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**KNUST SCHOOL OF BUSINESS**

**DEPARTMENT OF SUPPLY CHAIN INFORMATION SYSTEMS**

# THE IMPACT OF CIRCULAR ECONOMY PRACTICES ON FIRM PERFORMANCE IN THE PHARMACEUTICAL INDUSTRY IN GHANA

**BY**

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**THE IMPACT OF CIRCULAR ECONOMY PRACTICES ON FIRM PERFORMANCE IN THE PHARMACEUTICAL INDUSTRY IN GHANA**

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# DECLARATION

'I hereby declare that this submission is my own work towards the "**Master of Science in Procurement and Supply Chain Management"** Degree and that, to the best of my knowledge and belief, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text'.



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# ABSTRACT

The current changes in climate coupled with the depletion of raw materials have increase interest in sustainability practices such as circular economy. The purpose of this study was to use empirical data to examine the impacts of circular economy practices on firm performance in the pharmaceutical industry. The purposive sampling approach was used to collect data from a cross-section of respondents. The Partial Least Square Structural Equation Modeling (PLS SEM) was used to explore the relationships among the variables. The results indicate a strong statistically significant positive between circular practices (recycling, repackaging, and remanufacturing) have a positive and significant relationship with firm performance. However, the study discovered that reuse was not significant. This is an original research that examined the impacts of circular economy practices on firm performance in the beverage industry. This research adds to the body of knowledge and motivates practitioners and direction for future studies.


# DEDICATION

I would like to dedicate this work to the Almighty God for giving me the strength to complete this work successfully, to all the members of my team who contributed their time, effort, and expertise to make this project a success. Each member of my team played an essential role in bringing this project to fruition.

To my supervisor, Professor Henry Mensah, I express my sincere gratitude for your guidance, support and encouragement throughout this project. Your expertise and feedback have been invaluable and Iam grateful for the opportunity to learn from you.

To the Osei-Bonsie Family, Opoku Family and friends, I thank you for your unwavering support and encouragement, even during the most challenging moments. Your belief in me and your words of encouragement helped me to stay motivated and focused.

To all the participants who contributed their time and efforts to our study, we express our heartfelt appreciation. Your willingness to share your experiences and insights was essential in shaping our understanding of the subject matter.

Finally, to all the other members of the team, we are proud of what we have achieved together, and we know that this experience will serve us well in our future endeavors.

This work is a reflection of our collective effort and dedication. We are honored to have worked with such an exceptional team, and we dedicate this work to each member of our group.



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| | |
|---|---|
| CE: | Circular Economy |
| FP: | Firm performance |
| GSS: | Ghana Statistical Services |
| ROA: | Return on Assets |
| ROI: | Return on Investment |
| PMS- | Performance Measurement System |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background to the study

According to Preston (2012), the circular economy is a strategy for changing the way resources are used in the economy. Factory waste might be used as a useful input in another process, and items could be repaired, repurposed, or enhanced rather than being discarded. EEA (2014) states that the circular economy relates primarily to physical and material resource components of the economy, focusing on recycling, reducing and reusing physical inputs to the economy, and utilizing waste as a resource, resulting in lower primary resource consumption. Mitchell (2015) goes even further, emphasizing the significance of keeping resources in use for as long as feasible in a circular economy, as well as getting the greatest value from goods and materials by utilizing them for as long as possible before recovering and recycling them. Returns management is a circular economy method utilized when a customer is dissatisfied with a product in some way. Products may, for example, be the incorrect size, shape, or content. Defective merchandise is another major reason for product returns. Finally, people are prone to altering their views after purchasing things that meet their expectations (Yu & Goh, 2010). According to Rogers et al. (2002), returns management, includes all actions relating to returns, including avoidance, gatekeeping, circular economy, and disposal. Returns management is becoming the norm rather than the exception in recent years. According to Pienaar et al. (2012), The component of returns management that plans, implements, and controls the efficient, effective movement of commodities and related information between the point of consumption and the place of origin in order to recover value or dispose of the items correctly is known as the circular economy. Circular economy examples include damaged items, seasonal inventory, restocking, salvage, recalls, excess inventory, recycling programs, hazardous material programs, old equipment temperament, and asset recovery (Rajagopal et al, 2015). Recalls of drugs are widespread in nations with well-defined regulatory rules, and they frequently include faulty items that endanger patients' health (Venkatesh et al, 2017).

The reuse of items and resources is becoming more important as environmental concerns and population grow. Some nations have gone so far as to charge manufacturers for the full product life cycle. In the not-too-distant future, product recovery operations will explode globally, and businesses will see an opportunity to tap into this new market sector by combining environmental stewardship with product recovery (Pollack, 2015). Companies are increasingly dedicating significant time and money to learning about and implementing circular economy practices. Marketing returns, quality issues, overstock, improper delivery, broken products returned for refurbishment or re-manufacturing, and other factors affect almost every company nowadays. As a result, circular economy techniques are increasingly being recognized as an important component of close-loop supply chain management (SCM) and as a means of attaining sustainable development. Many businesses that had previously ignored circular economy management have begun to invest in this element of their supply chain (Rogers & Tibben-Lembke, 1998).

According to Lebreton (2007), the act of transporting goods from their site of consumption to a consolidation point in order to capture value or dispose of them correctly is known as a circular economy. Gathering items, bringing them to a central location, and classifying them according to

their intended purpose, such as remanufacturing, refurbishing, reusing, or recycling, are all part of the process. The shift to a circular economy is critical because it closes the loop on product lifecycles (Green Biz, 2015). By communicating and persuading the market about the company's capacity to generate and preserve value for its goods, the circular economy may help enhance a company's customer service abilities (Kariuki &Waiganjo, 2014). Some of the widely acknowledged advantages of the circular economy include increased customer satisfaction and retention, decreased part and subassembly acquisition, increased revenue and profitability of the company through increased product/service availability, and improved efficiency and effectiveness of the company, all of which result in appreciable increases in the company's efficiency (Kannan, Shaligram, & Kumar, 2009). Improved time-bound sensitivity to listening to customers' voices is another advantage that enables businesses to foresee their needs and wishes long before the customers themselves are even aware of them. It results in the development of relationships with clients on an intellectual and emotional level, which culminates in the conviction that they made the best decision possible by choosing the business (Pinna & Carrus, 2012).

Sharma et al. (2011) further indicate that increased knowledge of circular economy might result in cost savings through the reuse of returned goods. According to Alvarez-Gil et al. (2007), the adoption of the circular economy is fueled by supply chain actors. According to Ravi and Shankar (2005), one of the most significant challenges to circular economy implementation is supply chain stakeholders' unwillingness to cooperate. In addition, enterprises need government financial backing and legislation to use a circular economy. The lack of effective environmental regulations enacted by the government may reduce the organization's desire to use a circular economy (Lau & Wang, 2009).

Global problems include the risks that circulating damaged, outdated, and counterfeit medications pose to both human health and the environment. The social, ethical, and economic significance of RL policies, programs, or systems created to recover value and ensure disposal is highlighted by this global issue. Despite the crucial part that circular economy plays in supply chain management, it is still studied separately in terms of the issues that are looked into, strategies that are employed, and contexts that are addressed (Narayana et al., 2014). With an emphasis on effectiveness rather than efficiency, each product produced in a circular economy should be built so that the biological and technical components may be easily separated and recirculated in the system in accordance with cradle-to-cradle principles. By introducing new business models that concentrate on selling services rather than products in order to minimize resource use, it also builds on the principles of the performance economy (Rockstrom & Wijkman 2012). The three Rs—Reduce, Reuse, and Recycle—must be followed by human economic activities in order for there to be an ecological economy, which is why the circular economy is fundamentally an environmental shift (Li-Jun & Ying, 2012). As a result, businesses must switch over to a circular model based on resources and goods that have been reused, repurposed, or repaired in place of the linear take-make-waste paradigm. In a circular economy, closed material loops are necessary so that resources can be used once more as bulk material, products, or components (Mentink, 2014). Because most of the value produced in the original manufacturing process stays with the components, reuse, and remanufacturing are preferred to recycling wherever possible (Linder & Williander, 2017; Bardhi & Eckhardt, 2012; Geng et al. 2009).

## 1.2 Statement of Problem

Returns management (RM), which includes circular economy, returns, gatekeeping, and avoidance, is an important facet of supply chain management (Rogers et al., 2002). In order to handle returns as a business process, a supply chain must transcend functional silos and embrace an integrative process approach (Croxton et al., 2001). Management efforts must transition from a purely circular economy approach to a more holistic one, with returns managed as a critical supply chain management operation. For a circular economy to be useful, it requires a significant financial commitment. To lower the cost of analyzing, dismantling, or identifying important components in end-of-life items, it necessitates the employment of various types of equipment and training. These are the initial expenses that enterprises must bear when using circular economy procedures, and they have a substantial impact on the profitability of the company (Azevedo, Carvalho & Cruz Machado, 2011). Because the pharmaceutical supply chain technique was created to develop medicines that traveled from suppliers to customers rather than the other way around, several manufacturing pharmaceutical enterprises find it difficult to embrace the circular economy of medicine.

Using experimental data, researchers such as (Rao and Holt, 2005); Eltayeb et al. (2011); Azevedo et al. (2011); From Giovanni and Vinzi (2012); and Green et al. (2011) attempted to link organizational success and circular economy adoption. Azevedo et al. (2011) find a combination of positive relationships as well as other meaningful relationships, while De Giovanni and Vinzi (2012) find that the relationship is not meaningful at present. Rao and Holt (2005) found a positive relationship between circular economy activities and organizational performance. Geographical or research context may have contributed to the difference in results. This is because different countries may have different adoption and deployment rates for circular economy activities (Kwarteng et al., 2021). There is therefore no agreement among researchers regarding how the circular economy affects organizational performance. Automobiles, electronics, paper recycling, sand recycling, and even carpet recycling have all been the focus of studies on the circular economy because they all have high rates of product return and thus offer opportunities for more effective and environmentally friendly strategies. Less empirical research has been done on returns management or the circular economy in the pharmaceutical sector in developing countries, particularly Ghana. The pharmaceutical industry, which contributes significantly to the growth of national economies, has recently seen an increase in activity due to the spread of pandemics. It is appropriate to study the concept of circular economy in this context because the pharmaceutical industry is gradually integrating circular economy practices into their operations. This study aims to investigate how pharmaceutical companies performing in Ghana are affected by a circular economy.

## 1.3 Objectives of the Study

The main objective of this study is to examine the effects of circular economy on the firm performance of pharmaceutical companies in Ghana. Specifically, the study seeks to:

1) To examine the extent to which pharmaceutical companies in Ghana adopt circular economy practices in their operations.
2) To determine the relationship between circular economy practices adoption and firm performance of pharmaceutical companies in Ghana.
3) To identify measures that can be adopted to improve circular economy in the pharmaceutical industry in Ghana.

## 1.4 Research Questions

The study seeks to find answers to the following research questions in its bid to examine the effects of circular economy on the organizational performance of pharmaceutical businesses in Ghana.

1) To what extent do pharmaceutical companies in Ghana adopt circular economy practices in their operations?
2) What is the relationship between circular economy practices adoption and organizational performance of pharmaceutical companies in Ghana?
3) What measures can be adopted to improve circular economy in the pharmaceutical industry in Ghana?

## 1.5 Significance of the Study

The study provides empirical evidence on understanding the relationship between the circular economy and the performance of pharmaceutical companies. To the logistics and supply chain practitioners, the study will be of significance in bringing out the role that circular economy plays and the level of impact it has on the profitability of companies.

The findings of this study will bring to bear the impact of circular economy and subsequently help inform the management of organizations and other relevant stakeholders. This will therefore help influence policies regarding circular economy in the future. The study also contributes to academia in the aspect of providing additional literature on the topic of the study by highlighting the role of return management or circular economy on the profitability of organizations.

## 1.6 Scope of the Study

The study focused on the effects of circular economy on the performance of companies in the pharmaceutical industry in the country focusing on Ghanaian-based pharmaceutical firms and their outlets in Accra.

## 1.7 Overview of Proposed Methodology

This study shall adopt the research methodology posited by Saunders et al., (2011). From the perspective of theory development, the deductive approach will be used, because this study seeks to use empirical data to test some hypotheses and the Natural Resource Based View (NRBV) theory. The methodological choice in this study is the quantitative research approach. Regarding the research strategy, the survey strategy will be used. This strategy is in line with the objective of testing hypotheses using quantitative data and methods. On the subject of time frame, this study is a cross-sectional study. The data used will be collected using a well-structured questionnaire from a simple purposively sampled respondents. The unit of analysis is the firms in the pharmaceutical industry in Ghana. In terms of data analysis, this study will use partial least square structural equation modeling (PLS-SEM) multiple regression using the Statistical Package for Social Sciences.

## 1.8 Organization of the Study

The study will be divided into five sections. Chapter one of the study comprises of the background of the study, statement of the problem, the objectives of the study, research questions, significance of the study, limitations of the study, scope of the study, and the organization of the study. Chapter two of the study comprises a review of literature relevant to the study, both theoretically,

conceptually, and empirically. Chapter three of the study covers the methodology. This comprises the research design, the population, sample size, and the sampling technique. Chapter four covers the analysis of the data, presentation, and discussion of results. Finally, chapter five of the study comprises a summary of the findings, conclusions, recommendations, and suggestions for further studies.



# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter reviews relevant literature on circular economy. This section discusses theories, the concept of circular economy, and return management process. The chapter also presents empirical literature on circular economy by other researchers.

## 2.2 Conceptual Review

The section discuss on the circular economy

### 2.2.1 Circular Economy

According to Krarup, Kiorboe, and Sramkova (2015), a circular economy is a new economic or business model that creates, delivers, and recycles waste from the environment. A traditional economic model known as the linear economy, in which businesses produce and deliver goods to customers or consumers but have no interest in recovering waste from the environment, is very different from this. Because the linear economy cannot be sustained, there is currently a paradigm shift from a linear to a circular economy (Bocken et al., 2017). Additionally, the transition from a linear to a circular economy has been fueled by the rise in pollution, climate change, and resource depletion (Kwarteng et al., 2022). Circular economy in this study is conceptualized as "an economic system that replaces the 'end of life' concept with reducing, alternatively reusing, recycling, and recovering materials in

production/distribution and consumption processes. It operates at the micro-level (products, companies, and consumers), meso-level (eco-industrial parks) and macro-level(city, region, nation, and beyond), to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity, and social equity, to the benefit of current and future generations" (Kirchherr et al., 2017).

A regenerative industrial system known as a "circular economy" aims to use renewable energy, minimize the use of fossil fuels, do away with dangerous chemicals, and eliminate waste through thoughtful design. The circular economy idea is the most recent attempt to think about how to sustainably combine economic growth and environmental well-being (Stahel, 2016). The circular economy, in contrast to the nominal definition, involves reevaluating how goods and services are produced and consumed, including the use of renewable energy in place of the traditional use of fossil fuels (Benton, Hazell, & Hill, 2015). Krarup, Kiorboe, and Sramkova (2015) contend that waste is innately intended to be rebuilt and reused in their circular economy theory. Therefore, waste is a concept that does not exist. Therefore, biological components can be recycled and composted, whereas man-made nutrients like metals and polymers can be made to be recycled with little energy input. Second, it is important to take advantage of nature's inherent diversity and produce goods that can be used in a variety of markets.

Management of end-of-life products is frequently referred to as circular economy. The circular economy, according to Carter and Ellram (1998), emphasizes returning or moving goods and resources from the point of consumption to the forward supply chain for reuse, recycling, remanufacturing, repair, refurbishment, or safe disposal. The circular economy puts less emphasis on getting goods to consumers and more on getting them back from them. The circular economy is the movement of packaging waste, recyclable packages, and customer returns along the logistics chain. It's also important to note that source substitution and reduction are prioritized in the circular economy over reuse and recycling (Wu & Dunn, 1995). By using fewer resources to achieve the same result, waste is eliminated. Reuse, remanufacturing, and recycling are the three main tenets of the circular economy (Eltayeb et al., 2011).

#### 2.2.1.1 Nature and Practice of Circular Economy

A regenerative industrial system known as the circular economy aims to use renewable energy, reduce the use of fossil fuels, do away with dangerous chemicals, and eliminate waste through thoughtful design. The circular economy, in contrast to the nominal definition, involves reevaluating how goods and services are produced and consumed, including the use of renewable energy in place of the traditional use of fossil fuels (Benton, Hazell, & Hill, 2015). Krarup et al. (2015) contend that waste is innately intended to be rebuilt and reused in their circular economy theory. Therefore, waste is a concept that does not exist. Therefore, biological components can be recycled and composted, whereas man-made nutrients like metals and polymers can be made to be recycled with little energy input. Second, it is important to take advantage of nature's inherent diversity and produce goods that can be used in a variety of markets. Management of end-of-life products is frequently referred to as circular economy. The circular economy, according to Carter and Ellram (1998), emphasizes returning or moving goods and resources from the point of consumption to the forward supply chain for reuse, recycling, remanufacturing, repair, refurbishment, or safe disposal. The circular economy puts less emphasis on getting goods to consumers and more on getting them back from them. The circular economy is the movement of

packaging waste, recyclable packages, and customer returns along the logistics chain. It is also worth mentioning that in the circular economy, source substitution and reduction take precedence over reuse and recycling (Wu & Dunn, 1995). This refers to attaining the same outcome using fewer resources, which eliminates waste. Three main principles underpin the circular economy: reuse, remanufacturing, and recycling (Eltayeb et al., 2011). In order to reduce waste, this refers to getting the same result while using fewer resources. According to Eltayeb et al. (2011), the circular economy is based on three main tenets: reuse, remanufacturing, and recycling. According to Bocken et al. (2017) and Stahel (2016), there are two different kinds of circular economy business models: those that use resource-cycle-closing recycling and those that use reuse, repair, repurpose, refurbish, recondition, upgrade, retrofit, and remanufacture to extend product life.

#### 2.2.1.2 Dimensions of Circular Economy

The dimensions of circular economy basically refer to the practices of circular economy. These include reuse, recycling, remanufacturing, and repackaging.

##### 2.2.1.2.1 REUSE PRACTICES

Reuse is the practice of acquiring brand-new or barely used products from customers and returning them to the supply chain without any modifications or processing (Eltayeb et al., 2011). Reuse is one of the waste management approaches that is regarded as being the most environmentally advantageous, according to Amemba (2013). Reusing is the act of obtaining any usable portion of returned goods, according to Hazen et al. (2011). Customers who return items to the retailer where they were originally purchased and reintroduce the item into the supply chain are referred to as reusing materials. Another way to reuse resources is by reusing shipping or packaging supplies.

Customers typically return items that are either completely unopened or barely used, according to Hazen et al. (2011). Products must be able to be used without any improvements or modifications if they are to be reused after being partially used. Products that can no longer be used must be given back to the manufacturer for maintenance or development in the circular economy. Reuse, to put it simply, is the ability to use a product for a purpose that is related to the one for which it was intended (Rogers & Tibben-lembke, 1998). Reuse can take the form of repairing, refurbishing, cleaning, or recovering discarded items. Additionally, packaging can be recycled, extending the time an item is usable and putting off its eventual disposal or recycling. (Rao & Holt, 2005) Examples of reuse techniques include returning used goods and packaging to suppliers for reuse, developing quality standards for reuse, generating energy from renewable sources, and designing goods for reuse. It's critical to understand the difference between reusing and remanufacturing. Reusing is the process of putting lightly used or abandoned items back on the market without further processing. This indicates that using rather than recycling or remanufacturing requires less energy. However, because no manufacturing is done to enhance performance or bring the product back to a new-like state, the product's value is reduced (Eltayeb et al., 2011). With the reusing process, objects are inspected and sorted, repairs are made without the need for processing, products are cleaned in preparation for reuse, and then goods are distributed to customers.

##### 2.2.1.2.2 REMANUFACTURING PRACTICES

Remanufacturing, according to Eltayeb, Zailani, and Ramayah (2010), is the process of refurbishing, repairing, or replacing problematic components of a product that has been taken off the market in order to restore it to a condition akin to new or improve its performance. Tires, furniture, automobiles, cameras, cellphones, automatic teller machines, vending machines, automotive parts, and electrical equipment are examples of remanufactured goods. According to Steinhilper

(2001), the main steps in remanufacturing are disassembly, cleaning of the parts, inspection and sorting, repair, refurbishment or replacement of defective parts, and finally assembly and testing. You might be able to increase your operational effectiveness by remanufacturing. Its potential to assist businesses in recovering the value of items that would otherwise be lost if they were not returned is one of its key advantages. Remanufacturing is said to save 85% or more of the original energy and resources (Statham, 2006). As a result, the price of raw materials as well as other energy related costs such as electricity decrease. Second, refurbishment allows a company to test a product to improve its functionality and design, thereby enhancing the quality of the final product. Third, because refurbishing takes less time than rebuilding a business, it takes less time for products to reach customers.

#### 2.2.1.2.3 RECYCLING PRACTICES

Recovering any usable components from a returned product is a recycling process. In recycling, used materials are obtained through the collection and disposal of waste. The identity and functionality of the original document is lost (Eltayeb et al., 2011). The use of well-designed business incentives, a well-documented recycling policy, and the return of used goods and packaging to suppliers for recycling are all examples of such practices. recycling techniques. Another strategy related to recycling is consumer awareness or education. Three clockwise interlocking arrows placed on the recycling label to indicate that the product or packaging should be recycled can help organizations raise awareness (Laosirihongthong et al., 2013).

Recycling involves breaking down materials into their simplest forms, which are then reused (Rogers & Tibben-Lembke, 1998). Recycling is the process of gathering used goods, parts, or materials from the field, disassembling them, sorting them into groups of related goods, and then turning them into new goods, parts, or materials (Beamon, 1999). The act of gathering, sorting, or getting rid of waste materials so they can be put back into the economy where they can be used again as raw materials or finished goods under a different definition of recycling (Global Recycling Network, 2008). After a product has been disassembled, businesses can "extract" the parts that can be used again or sold (Ji, 2008).

#### 2.2.1.2.4 REPACKING PRACTICE

Repackaging per the European Federation of Corrugated Boards (2000), is the process of ensuring the physical protection, containment, handling, transportation and marketing of products, from raw materials to finished products. The three levels of rehabilitation are primary, secondary and tertiary. Primary repackaging refers to packaging that comes into direct contact with a product, such as a tube of toothpaste.

While the third repacking is used for distribution and storage, such as using pallets or containers, the second repacking is used to promote and advertise the product, for example like toothpaste box showing brand, feature and function. According to Hazen, Hall & Hanna, (2012), repackaging has an influence on a company's operational success. Firstly, repackaging is more cost-effective than recycling and remanufacturing. Secondly, repackaging increases operational flexibility by packaging resources in various sizes so that clients may select the package size they desire. Repackaged items, on the other hand, take up less storage space than unpackaged materials. When a warehouse has more open space, it is simpler for workers and goods to move around, therefore, increasing productivity.

### 2.2.1.3 Benefits of Circular Economy

The economic, environmental and social benefits of the circular economy are all visible. From an economic perspective, the circular economy increases profits, reduces operating costs, and improves operational flexibility (Saruchera and Asante-Darko, 2021; Afum et al., 2019). Environmentally, the circular economy is better because it reduces air, water and land pollution as well as emissions of carbon and other greenhouse gases (Kwarteng et al., 2022). Finally, as a component of sustainability, the circular economy creates permanent employment opportunities for a country's citizens (Agrawal et al., 2022).

### 2.2.1.4 Circular Economy in the Pharmaceutical Industry of Ghana

The nature of pharmaceutical products, as well as the need for precise tracking and visibility, batch and expiry control, cold chain requirements, proper storage and disposal, pedigree reporting and anti-counterfeiting measures, and so on, set the pharmaceutical industry apart from other industries in terms of circular economy (Kabir, 2013; Kwame et al., 2014). Circular economy is big business for pharmaceutical companies. Pharmaceutical returns handling is estimated to be a $2.5 billion industry, with $5 billion in expired, recalled, broken packaging, or incorrectly delivered goods (Martin, 2007; Teunter et al., 2003). Total returns costs are expected to range between 3% and 6% of annual pharmaceutical sales (Hunter et al., 2005). This indicates that the cost of Merck's returns in 2007 was expected to be between $726 million and $1.452 billion, based on the company's $24.2 billion in sales (Kumar et al., 2009).

According to Yu, Li, Shi, & Yu (2010), the pharmaceutical industry is heavily regulated in many countries due to the particular nature of medication supply and demand. In addition, the pharmaceutical business is known for its complicated procedures, various activities, and several organizations involved in drug research, development, and production (Shah, 2004). Owing to a temporary difficulty or a permanent withdrawal of the product from the market due to health and safety concerns, the manufacturer recalls the medicine from other supply chain partners (distributors, wholesalers, hospitals, and pharmacies). The challenge with medication recalls is that the producer must coordinate and manage the removal of all unsold drugs from every point in the supply chain (Singh, 2005). According to Kabir (2013), the complexity of medication recalls grows when organizations do recalls for a single defective production batch. In such instances, product recalls are subject to a variety of legal and financial issues. Expired pharmaceuticals must be removed from the supply chain and from client locations, and one of the biggest issues for pharmaceutical companies is to keep track of how many expired drugs are on the market (Singh, 2005). Due to the inability of most producers in having control over the full supply chain for product distribution, pharmaceutical businesses rely on information from distributors and wholesalers during product recalls or the removal of expired items from the market (Kumar, Dieveney, & Dieveney, 2009). As a result of product returns in the pharmaceutical business being mainly handled by third parties or distributors, the return of medicine can be a highly complicated procedure (Narayana, Elias, & Pati, 2014).

The pharmaceutical industry encompasses all of the practices, activities, and organizations involved in the research, development, and production of pharmaceuticals and therapies (Shah, 2004). It is defined by high R&D investment, quality constraints, protracted manufacturing times, high waste-to-product ratios, and shorter product cycles, all of which can lead to large sales margins across the pharmaceutical supply chain (PSC). The high waste-to-product ratios also explain why researchers are concentrating their efforts on environmental challenges and waste

minimization throughout the manufacturing process. However, because the majority of inventory management in the PSC is push-based up to the wholesale level, inventory levels downstream are often relatively high (Shah, 2004). Inventory management methods based on just-in-time or stockless philosophies have been critiqued in the literature for not being practical, given the importance of drug availability. As a result, product recovery efforts have the potential to reduce the load on production while also being economically beneficial. Product recalls are becoming more common, such as Merck's Vioxx and Johnson & Johnson's Tylenol, and they have the potential to erode a company's confidence among end users. Counterfeiting is another issue plaguing the industry, with the World Health Organization estimating yearly counterfeit drug sales at $35 to $40 billion (8-10 percent of total sales). Requests have been made for the PSC to take serious action to safeguard consumers, the environment, and the manufacturers' brand image (Kumar et al., 2009; Ritchie et al., 2000). Due to pharmaceutical products being high-value chemicals, effective circular economy systems are required for the appropriate handling of product returns, expired stock, and product recalls. Teunter et al (2003) investigated the recycling activities in a pharmaceutical company's manufacturing process and their consequences on production planning operations. The economic effects of managing product returns and recovery operations in downstream distribution networks (Amaro & Barbosa-Povoa, 2009) or hospital logistics have been explored (Ritchie et al., 2000). In the pharmaceutical business, there has also been an attempt to define performance measurements for circular economy procedures (Kumar et al., 2009).

Turrisi, Bruccoleri, and Cannella (2013) argue that it is vital for manufacturing pharmaceutical companies to have suitable circular economy channels in place, as circular economy might sometimes occur in the manufacturing facility rather than at the customer's site. Elmas and Erdomuş (2011) state that medicine might be returned due to faults in the product or packaging. If the wrong drug was given, the medicine expired, or the customer no longer requires the medication, it might be returned. The circular economy covers handling returned products due to seasonal inventory, obsolete equipment, recalls, replenishment, damage, salvage, recycling programs, surplus inventory, hazardous material programs, and asset recovery (Rajagopal, Sundram & Naidu, 2015). Recalls of drugs are widespread in nations with well-defined regulatory rules, and they frequently include completely faulty items that endanger patients' health (Venkatesh, Bigoniya & Kumar, 2017). According to Olorunniwo and Li (2011), product returns occur for a number of reasons, including things being delivered to the incorrect location, incorrect products being ordered, damaged products, consumers changing their minds, and product defects (Benylin, 2015).

Expired pharmaceuticals, discarded drugs, and open containers of drugs that can't be utilized are all examples of pharmaceutical waste (Pratyusha et al., 2012). Hazardous waste may be damaging to people's health and the environment. It can be flammable, poisonous, corrosive, or reactive, and it can be liquid, solid, or gaseous. Even though the non-hazardous waste is made up of components that are thought to have no substantial hazardous qualities, they might get contaminated or combined with other substances, necessitating a hazardous property evaluation prior to disposal (Pratyusha et al., 2012). In addition, improper use of circular economy would make it easier for unauthorized intermediaries to operate in the pharmaceutical supply chain, allowing them to engage in illegal activities such as relabeling packages and extending expiration dates in order to resell expired pharmaceuticals back into the market (Kwateng et al., 2014). Kabir (2013) additionally points out that excessive repeated handling in circular economy and return delays

enhance the likelihood of illegal intermediaries diverting medications to the black market, where expired items would be changed and branded as saleable.

Transportation is one of the most important operations in circular economy; it involves the actual movement of products, equipment, and resources from one place to another inside the circular economy network, and it is referred to as the transportation process (Shaik, 2015). Other activities mentioned by Pienaar and Vogt (2016) in return management include customer service and help-desk inquiries, gate-keeping, the management of hazardous-material programs, measuring vendor performance in terms of product failures, the management of return policies and procedures, accounting and reconciliation practices related to returned products, and service logistics. Circular economy operations have become more effective and efficient as a result of the processing of product returns, with the efficiency of circular economy achieved by decreasing inventory investments, reducing waste, optimizing collection networks, and recapturing recovered value (Shaik, 2015). The rise in efficiency of circular economy is one method through which companies aim to maintain and enhance their effectiveness and market dominance (Agrawal & Choudhary, 2014). Pharmaceutical companies should consider if they are aware of circular economy activities and practices in their organizations, and whether they are able to manage these activities and processes efficiently (Badenhorst & Nel, 2012). Hospital pharmacies are increasingly concerned with waste reduction and product recalls. Product recalls appear to be getting more common in the private sector (Ritchie et al., 2000). Hospital pharmacists are required to conduct circular economy operations on a regular basis, especially when a recalled medicine is being delivered to hospital patients or end-users (Ritchie et al., 2000). As a result, product recalls must be completed quickly and efficiently. Pharmaceutical items, on the other hand, vary from other common products in that they are rarely fixed or resold after being returned or recalled. Instead, pharmaceuticals are disposed of appropriately or destroyed (Kabir, 2013). The demand for destruction has been connected to regulated production facilities' incapacity or onerous limitations in ensuring that pharmaceuticals are treated properly when they leave their control and that a secure chain of custody is maintained (Kabir, 2013).

### 2.2.2 Firm Performance

Le (2005), asserts "firm performance" (FP) is an economic category that measures a company's ability to use both physical and human resources to achieve its goals. The effect of using commercial tools in the production and consumption process must also be considered by the FP. According to Truong and Tran (2009), the performance of an enterprise represents the relationship between the output and the input resources used in the operation of the enterprise. Return on Assets (ROA), Return on Equity (ROE) and Return on Investment (ROI) are some of the metrics commonly used to measure business performance. These financial ratios, derived from balance sheets and income statements, represent accounting metrics of business performance that have been used by many researchers, including Mehran (1995) and Ang et al. (2000).

#### 2.2.2.1 Measuring Firm Performance

Measuring the performance of firms has been the focus of many studies (Chenhall and Langfield, 2007). According to Wernerfelt and Montgomery (1988), the performance of firms can be measured in terms of improved profits, improved customer satisfaction, cost containment, recovery of products, regulatory compliance, and reduced stocks. Most business processes have a strategic impact on the performance of their firms, and therefore finding the right performance measures is an important part of the firm’s strategy. It is extremely important for firms to trace

their performance because this helps them to track their trajectory (past, present, and future), to ensure continuous improvement. This can be achieved by putting in place a good performance measurement system (PMS).

Performance measurement is the process of quantifying the effectiveness and efficiency of the actions of firms (Arif-Uz-Zaman et al., 2014). Effectiveness is the ability to meet customer expectations, whereas, efficiency refers to how firms economically use their resources to achieve a predetermined level of customer satisfaction (Bor, 2021). PMS is described as the overall set of metrics used to quantify the effectiveness and efficiency of a firm's action. The importance of PMS is to determine whether customers' expectations are met (Bor, 2021). Some metrics used to measure performance are operating cost, inventory cost, flexibility, and delivery (Cadden et al., 2013; Gunasekaran et al., 2001).

Measuring performance helps firms to compare performance at different times. Through measurement, managers can create simplified numerical concepts from complex reality for easy communication and action (Lebas, 1995). A PMS must help the firm assess whether it is receiving the expected contribution from employees, suppliers, and other stakeholder groups and it helps the firm to monitor its strategic plan (Atkinson et al., 1997). According to Ghalayini & Noble (1996), the forces of globalization have introduced a non-traditional approach of low-cost production to quality, flexibility, and delivery focus in performance measurement. Some of the models that are used to measure FP are the balanced scorecard and the performance prism.

#### 2.2.2.2 Dimensions of Firm Performance

There are various dimensions of firm performance in extant literature. Gupta (2021) studied the dimensions of firm performance and listed four dimensions. These are financial performance, customer satisfaction, internal business process, and organizational capacity. The financial performance dimension deals with how the firm performs in terms of its profits, sales, market share, etc. That is, the financial performance of firms is determined by these and other metrics in the financial statement of firms. Besides, customer satisfaction deals with how the firm is able to meet or exceed the expectations of its customers. This is because customers compare the service or products rendered to them to their expectations from the firms (Kotler, 2010). Internal business processes basically deal with how the firm effectively and efficiently converts inputs into outputs to meet customer expectations. A well-designed internal process is likely to mitigate costs thereby improving profits (Slack et al., 2010). Finally, organization capability refers to what the firm can do, with the kind of resources they possess (Barney, 2001)

#### 2.2.2.3 Factors Affecting Firm Performance

Zeitun and Tian (2007) used research data gathered from 167 companies listed on the Amman-Jordan Stock Exchange covering 16 different business areas in the non-financial sector from 1989 to 2003 to investigate factors affecting firm performance and market value of enterprises. The findings of the study indicate that debt ratio has the biggest effect on a firm`s performance, while total asset growth, firm size, and tax rate also have a positive effect. Onaolapo & Kajola (2010) also conducted a survey of 30 non-financial companies listed on the Nigerian stock exchange between

2001 and 2007 to assess the influence of determinants on these companies' performance. The authors use quantitative research methods, with OLS regression model. The research results show the following factors: debt ratio, size (assets), proportion of fixed assets, growth rate (assets), asset turnover, the company's age, and business lines have different degrees of influence on the performance of firms (return on total assets-ROA and return on equity-ROE). Besides, Pouraghajan and Malekian (2012) studied the impact of capital structure on the performance of enterprises with a sample of 400 firms in 12 industries listed on the Tehran Stock Exchange in the years 2006–2010. The results showed a significantly negative relationship between debt ratio and firm performance. Asset turnover, firm size, tangible asset structure, and growth rate had a statistically significant and positive relationship with the firm's business performance (ROA and ROE). The research scope in the study by Pervan and Višić (2012) on manufacturing enterprises in Croatia from the period 2002–2010, the authors use the mixed research method to study the effects of firm size on firm performance.

#### 2.2.2.4 Nature of Firm Performance

Firm performance is characterized by how the firm performs in terms of the following criteria: profitability, growth, market value, the total returns on shares, economic value added, and customer satisfaction, based on the stakeholders' expectations (Carroll, 2004). Indeed, it is the objective of every firm to see growth in their firms from the perspectives of the above-mentioned criteria. The output of this measure gives an indication to stakeholders, especially shareholders about how good or bad the firm is doing in the market.

## 2.3 Theoretical Review

This section review literature on some theories relevant to the study. It reviews circular economy theory and inventory theory.

### 2.3.1 Circular Economy Theory

Pearce and Turner (1990) developed the term circular economy in their critique of the linear economic model which had severe environmental effects. Despite this, Boulding (1966) proposed a cyclic material flow economic model. According to Steffen et al. (2015), the linear model is unsustainable because natural resources have availability and accessibility restrictions. Life is threatened in a world with dwindling resources and rising pollution, rendering the linear model outdated (Nassar & Tvaronaviien, 2021; Androniceanu, 2019; Andryeyeva et al., 2021; Marino & Pariso, 2021). The circular economy encourages waste reduction, reuse, and recycling. This is because waste is a precious resource (Murray et al., 2017; Rizos et al., 2017; Kirchherr et al. 2017).

Products that have been used or are damaged can be fixed and re-used, while others can be recycled or reused directly. The circular economy's adoption will imply: minimizing waste generation; boosting resource productivity; treating trash as a valuable product; encouraging the recycling of valuable materials; and lowering the negative environmental effect of production and consumption activities (Liu et al., 2013; Geng et al., 2013).

In the circular economy concept, economic progress may be achieved by re-cycling materials already in the system and lowering the consumption of natural resources (Esposito et al., 2015). As a result, the circular economy makes a significant contribution to long-term economic growth (Geng et al., 2012; Andronicеanu, et al., 2020). According to Banait (2016), the circular economy reduces the use of natural resources while increasing energy consumption, resulting in increased pollution (Ionescu, 2020; Nekmahmud et al., 2020). Circular economy has proven to help keep the value of recycled materials while reducing trash output (Borocki et al., 2019; Bayar et al., 2020; Grondys et al., 2021; Era et al., 2020). By 2050, if current trends continue, the exploitation-production-disposal economy will have depleted the resources of three planets (Stott et al., 2010). Furthermore, the production and use of new materials are responsible for half of all greenhouse gas emissions and more than 90% of biodiversity loss. This is why transitioning to a use-reuse-regeneration economy is vital for environmental conservation and long-term viability.

### 2.3.2 Institutional Theory

The establishment of institutions, habits, rules, and norms as acceptable patterns of behavior is addressed by institutional theory. Businesses operate in a way that meets customer needs as well as legal requirements. Pressure from these two groups has an impact on the adoption of environmentally responsible behaviors (Laosirihongthong et al., 2013). Organizations have institutionalized circular economy activities in response to internal and external pressures. Companies institutionalize circular economy strategies out of fear of losing market share to competitors and perceived consequences of failing to meet environmental mandates (Carter et al., 2000). ). In addition, the demand for eco-friendly products is increasing from consumers and environmental organizations. These expectations and impediments push firms to consider the environmental impact of their operations. Three institutional strategies may affect managerial decisions to implement environmental management initiatives: normative, coercive, and mimetic (Di Maggio & Powell, 1983). Organizations are obliged to comply due to normative constraints, such as consumer expectations, in order to be viewed as more legitimate (Zhu & Sarkis, 2004). Depending on their influence, a variety of external stakeholders can exert coercive pressure on businesses. Government entities, for example, might influence the adoption of environmental practices by businesses by enforcing strict environmental regulations (Delmas, 2022). Managers may also implement environmental practices as a strategy to imitate and surpass competitors who have gained a competitive advantage due to their environmental stewardship (Zhu et al., 2 These requirements and barriers force companies to think about how their actions will affect the environment. Normative, coercive, and imitation institutional strategies can influence management choices regarding the implementation of environmental management initiatives (Di Maggio & Powell, 1983). Due to normative requirements, such as consumer expectations, organizations must follow them to be taken more seriously (Zhu & Sarkis, 2004). Various external stakeholders can exert coercive pressure on companies depending on their level of influence. For example, by enforcing strict environmental regulations, government organizations can influence companies to adopt environmental protection measures (Delmas, 2022). Managers can also use

environmental activities as a tactic to copy and outperform competitors that have an advantage over them due to their environmental management (Zhu et al., 2007).

## 2.4 Empirical Review

Green et al. (2011) states that effective implementation of GSCM practices such as eco-design, customer collaboration, green purchasing and circular economy will improve economic and environmental performance, which in turn will promote improve organizational performance. Furthermore, their findings imply that the cost-saving features of the circular economy will drive economic efficiency and improved operational efficiency will be the result of economic and environmental performance. improved. These are cost effective and show that a business can adapt to changing customer demand for environmentally friendly goods and services.

Langat (2012) conducted a study on reverse supply chain management practices in Nairobi-based large-scale manufacturing companies. His research found that using reverse supply chain methods has a considerable impact on an organization's financial success. Gitau (2010) also conducted a related study on circular economy research in Kenya, looking at the effects of circular economy on the performance of East African breweries. The two were shown to have a favorable association in this study.

Serut (2013) conducted a study on the circular economy and organizational performance, focusing on the financial aspects of successful organizations. According to this study, circular economy is a broad term that should be broken down into sub-components such as reuse, refurbishment and recycling of circular economy activities, although his research has found a link between the circular economy and organizational performance. While his data mainly focuses on the financial aspect of an organization's success, our research focuses on the overall performance of the organization, including marketing and sales performance. finance.

Sriyogi (2014) developed a framework to create a successful circular economy network among Indian liquefied gas trading bodies after studying performance factors affecting economic activity. cyclic. Order fulfillment, delivery time, inventory shipping costs, acceptable inventory turnover rate, volume flexibility, cylinder utilization ratio, inventory cylinder CCT Distributor operations and active inventory ratios have been shown to be key performance indicators for successful circular economy implementations.

Circular economy performance measures and their effects on the product lifecycle were studied by Agrawal and Chowdhary (2014). They made an effort to show how the circular economy affects every stage of a product's lifespan. The adoption and support of new technology, customer satisfaction, strategic partnerships, eco-compatibility and environmental performance, value recovery, and knowledge management were found to be the most crucial enabling strategies for the circular economy. They also suggested using a balancing scorecard to evaluate the effectiveness of the circular economy.

In Nairobi, Ongombe (2012) studied the circular economy and competitive advantage in the bottled water sector. She found a direct correlation between the circular economy and competitive advantage, with the main circular economy practices used by water bottling companies being returned defective items, tracing, refurbishment, reuse, and recycling. The survey found that keeping positive connections with stakeholders is essential to ensuring the ongoing success of

circular economy initiatives. Contrarily, research prioritizes competitive advantage over operational success.

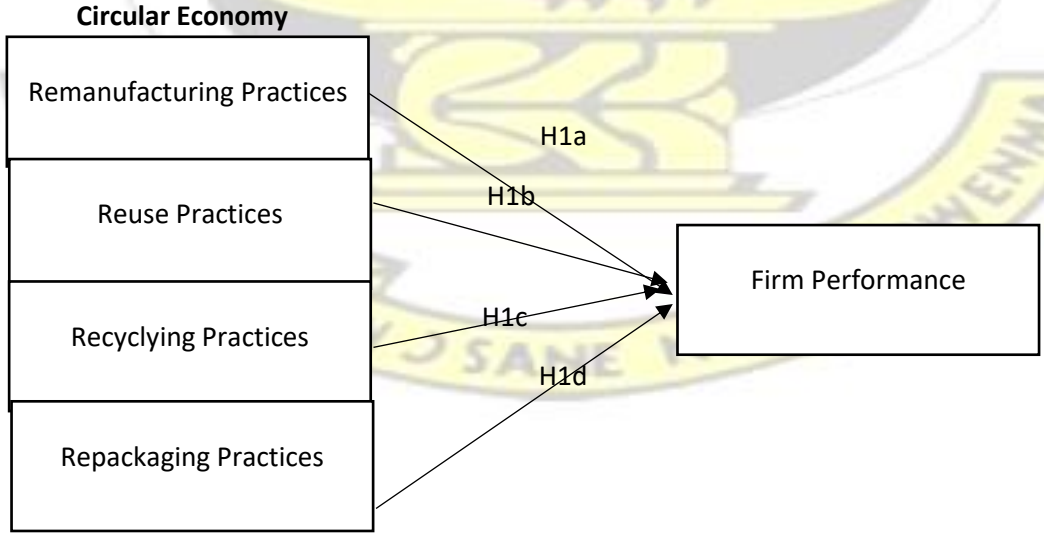
Wainaina (2014) examined the circular economy strategies and financial performance of large manufacturing firms in Nairobi. He found that large companies in Nairobi are not adopting much of the circular economy due to a lack of knowledge or information about it. He also found that despite not using the huge amount of energy released by landfill gas, most industrial companies use landfills to dispose of their waste. Research focuses on the application of circular economy practices and their link to profitability rather than their impact on operational performance.

Kiberenge (2014) conducted a study on the use of circular economy in Kenyan information and communication technology companies. He found that some operators in the ICT sector have embraced the circular economy to a considerable extent due to its importance to their business. According to his observation, the main obstacles to effective adoption of the circular economy are lack of financial resources, lack of human resources, lack of coordination among supply chain partners, infrastructure, etc. lackluster IT and the size of the company. He also lists other important factors that affect the circular economy, such as resource allocation, the quality of returns, and performance evaluation.

Kabergey and Richu (2015) examined how the circular economy affects the performance of processing companies in Nakuru County, Kenya. They found that product reuse had a statistically significant positive effect on the performance of sisal processing companies. This is because reused materials are cheaper than newly manufactured materials, giving the company a cost advantage. Second, by reusing products, processing efficiency is increased because it takes less time to obtain resources.

## 2.5 Conceptual Framework

The diagram below indicate the conceptual framework on the relationship between the dependent and independent variables. Hence, the conceptual framework below indicate the effect of circular economy practices on firm performancel




Source: Author's Construct (2022)

Figure 2.1 Conceptual Framework

## 2.5 Hypothesis Development

### 2.5.1 Reuse practices and Firm Performance

The act of reusing waste or returned products have a relationship with firm performance (Mazzucchelli et al., 2022). In line with the circular economy theory firms that reject return products are likely to increase their performance (Kirchherr et al. 2017). This is because such firms are likely to operate at lower costs and increase their profits. Also from the perspective of the institutional theory, it can be deduced that firms that practice circular economy practices such as reusing non-damaged items, will be seen as good corporate citizens. They will have a good image in the eyes of the public. This can translate into an increase in sales, therefore increasing performance. From the above arguments, this study, therefore, postulates that there is a positive relationship between reuse practice and the performance of organizations.

*H1a: There is a positive relationship between reuse practice and the performance of pharmaceutical companies.*

### 2.5.2 Remanufacturing Practices and Firm Performance

Besides, as firms remanufacture returned products or packaging, it can lead to performance enhancement (Khan et al. 2021). In line with the circular economy theory, it is known that firms that practice circular economy such as remanufacturing are likely to be innovative (Kwarteng et al., 2022) and it also increases the speed of operations (Saruchera and Asante-Darko, 2021). This gives customers innovative products and increases the delivery time of products to customers. In line with the above argument, this study postulates that there is a positive relationship between remanufacturing practices and the performance of organizations.

*H1b: There is a positive relationship between remanufacturing practices and the performance of pharmaceutical companies.*

### 2.5.3 Recycling Practices and Firm Performance

Furthermore, there is a relationship between recycling and firm performance (Saruchera and Asante-Darko, 2021). That is pharmaceutical firms that are able to recycle their waste or the non-recoverable returned items are most likely to improve their performance. This is because recycling increases flexibility and innovation. That is, such firms are able to remold the waste into new items and hence come out with innovative products (Mazzucchelli et al., 2022). And customers like innovative products, hence this is likely to increase sales and profits. Therefore, this study postulates that there is a positive relationship between recycling practices and the performance of organizations.

*H1c: There is a positive relationship between recycling practices and the performance of pharmaceutical companies.*

### 2.5.4 Repacking Practices and Firm Performance

Just like reuse, recycling, and remanufacturing practices, repackaging is also known to affect firm performance (Agrawal et al., 2022). Repackaging allows firms to change the appearance of old products (Khan et al. 2021). During this practice, returned or waste products are repackaged and sold in secondary firms ((Kwarteng et al., 2023). This allows the firm to better manage its waste or inventory. This also enables firms to resell items that would have ended up on landfill sites. The

study therefore hypothesizes that, as illustrated in Figure 1, there is a positive correlation between repacking practice and organizational performance.

*H1d: There is a positive relationship between repacking practices and the performance of pharmaceutical companies.*

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter contains the method used for the study which includes the research design, the sources of data for the study, the population targeted in the study, sampling, the research instrument, and the data analysis used for the responses collected from respondents through the questionnaire.

## 3.2 Research Design

According to Creswell (2009), the research design is composed of both study plans and procedures. The design of the analysis can be defined as a guide showing how the study will be performed. It is an overall strategy detailing how the researcher will answer the study questions. The study adopted the descriptive research design. Mugenda and Mugenda (2003) propose the use of descriptive research seeks to provide accurate descriptions of the observations of a specific phenomenon. This would enable the researcher to conduct intensive research and to determine the particular factors involved in the case. The design of this study helps the researcher to describe the data and characteristics of the studied population and phenomenon. The study design also employed the quantitative research approach. Questionnaires were distributed among respondents employees and the results were subjected to statistical computation in the form of tables, frequencies, and percentages.

## 3.3 Population of the Study

The term "population of the sample" emerges as a crucial concept, embodying a categorical representation of individuals or items that researchers aim to extrapolate their findings onto the broader canvas of knowledge (Cooper & Schindler, 2008). Within the vibrant context of the study at hand, the spotlight is cast on the dynamic realm of employees within the Pharmaceutical industry, their collective experiences and perspectives serving as the focal point for investigative scrutiny. Nestled in the bustling heart of the Greater Accra regions of Ghana, this chosen population becomes the pulsating lifeblood of the research, their diverse roles and responsibilities contributing to the rich tapestry of data sought after by the diligent investigators. The selection process, akin to an intricate dance, unfolds with precision as employees are carefully plucked from various departments, each a distinct ensemble within the organizational symphony. Purchasing and logistics, stores, production, marketing, and sales emerge as the distinct arenas from which these participants are drawn, showcasing the deliberate effort to capture the multifaceted dimensions of the industry. As the research canvas expands to encompass this eclectic mix of professionals, the promise of nuanced insights and comprehensive understanding beckons, creating a narrative where the population of the sample becomes not just a statistical subset but a vibrant microcosm of the broader professional landscape.

## 3.4 Sampling Procedure and Sample Size

According to Saunders and Rojon (2014), a sampling technique is a method for choosing a particular population sample. According to Buame (2010), there are basically two sampling techniques which are classified as probability or non-probability sampling. Non-probability sampling has no prior knowledge of the exact research population so techniques like snow ball, purposeful survey

techniques, and convenience sample techniques are used (Cooper & Schindler, 2008). The study adopted the non-probability sampling technique, which was a convenience and purposive sampling technique in selecting the sample for the study. This technique was deemed appropriate for this study as Blumberg et al. (2011) explained that this technique is appropriate for survey research where cases within samples can be randomly selected. The adoption of the convenience and purposive sampling method allowed the researcher to select individuals who were available and had expertise in the subject matter under review and who would answer the research questions. The sample size is a way of evaluating the number of elements of the sample population (Creswell, 2013). The sample size is the number or collection of respondents from a research study (Kothari, 2012). The study sampled employees in the pharmaceutical industry in Ghana. A total of 120 respondents were used for the study.

Table 3.1 Sample Size

| Department | Total |
|---|---|
| Purchasing and Logistics | 25 |
| Logistic Managers | 25 |
| Production | 30 |
| Supply Chain Managers | 30 |
| Total | 120 |

## 3.5 Data Collection

### 3.5.1 Types and Sources of Data

Researchers, in their bid to achieve the objectives of a study, can use primary or secondary sources, or both. Primary data is an exact record of results and observations, according to Boateng (2014). Primary data is the data collected by the researcher to report directly from the source. According to Cooper and Schlinder (2011), secondary data is the interpretation of primary data. To examine the link between the circular economy and business performance, data from Thiary. However, the study used the main relationship between circular economy and business performance which was examined in this study using primary data.

### 3.5.2 Methods of Data Collection

The data collection tool used to collect the data for this study was a structured questionnaire. This questionnaire was used to collect primary quantitative data from respondents. The questionnaire for this work was administered to the respondents, and to ensure a high recovery rate, the data collectors were present at the organization while the questionnaires were being completed. Some of the employees felt reluctant initially however upon explaining that the research was aimed at improving the state of the organization, they cooperated. The questionnaire captured close-ended (forced-choice) statements or questions. These closed-ended questions will deal with issues such as; sex, educational background, age, income status, and so on. The statements on the questionnaire were scales or items that were represented by a 5-point Likert scale.

### 3.5.3 Instruments for data Collection

The instrument used for the study is a structured questionnaire. The questionnaire was structured in three sections; the first section is the background information of the respondents which talked about their gender, level of education, years of experience in the organization, and their position in the organization. The second section deals with statements on the main variables of the study namely: remanufacturing, reuse, recycling, and repackaging. The third section deals with the statements on firm performance.

These variables were operationalized in line with best practices in extant literature. According to Lewis-Beck et al., (2003), operationalization is an important step in the process of developing methodologically sound study design. In the opinion of these authors, to operate a variable under study, the researcher starts with a concept and the conceptualization of this concept is clearly defined and described by a theoretical background. . Activation allows researchers to convert concepts and theories into measurable variables to test the validity and reliability of research results (Saunders et al., 2016). In this study, operationalization was achieved by linking the findings of the theoretical reviews and literature to propose a conceptual framework. Consequently, operationalization was created by adapting structured questions or statements in the questionnaire. Table 2.1 illustrates the theoretical concepts or variables and the details of the sources of the measurement items used.

TABLE 2.1 OPERATIONALIZATION OF THE VARIABLES IN THE STUDY

| **Theoretical concepts (Variables)** | **Theoretical Definitions** | **Operational Definitions** | **Measurement items** | **Sources** |
|---|---|---|---|---|
| Remanufacturing | This process entails rebuilding defective products | The approach manufacturers in the pharmaceutical firms use to rebuild and returned products or packaging items. | Refurbishing Reworking | Afum et al., (2019); Rogers and Tibben-Lembke (2001) |
| Reuse | It involves the practice where a product can be used for the same purposed for which it was created or designed. | This refers to the way pharmaceutical firms reuse items | Purpose repetition Purpose cycling | Wainaina, (2014); Hazen et al., (2011) |
| Recycling | This involves the breakdown of an already used product or waste into manageable and reprocessed into an original or new form. | The process by which players in pharmaceutical firms extract and recover new parts or products from returned products. | Reprocessing of items Reclaiming of waste | Eshikhati (2014); Hazen et al. (2011); Fernández et al., (2004) |
| Repackaging | This is about giving returned products a new look | This refers to how logistics practitioners or their | Rebranding | Saruchera & Asante-Darko |

| | | | | |
|---|---|---|---|---|
| | | third parties recover faulty packaging items, such as crates. | | |
| Firm Performance | This deals with the method by which organizational activities are coordinated. | This is a dependent variable that assesses the coordination of activities of the firm. | Financial performance | Pushpamali et al., (2020) Coyle et al. (2013). |

## 3.6 Data Analysis

The data from the survey was first of all edited, coded, and analyzed using the Statistical Package for Social Science (SPSS version 20.0) software and the Smart PLS software 4.0. The findings from the survey were presented using descriptive statistical tools such as frequencies, tables, and multiple regression. Factor analysis (exploratory factor analysis and confirmatory factory analysis) and Structural equation modeling (SEM) are the statistical techniques used to analyze the relationship between the relationships between the variables of the study. According to Hair et al., (2010) SEM is used to analyze multiple relationships as is the case of this study. Besides, the PLS-SEM was used because it makes no assumptions about the normality of data and it can handle small sample sizes.

## 3.7 Validity and Reliability

The consistency of a measure is referred to as reliability (Hair et al., 2010). Internal consistency, consistency across items, and inter-rater reliability are the three types of consistency that psychologists take into account. The results should be consistent over time when researchers measure a construct that they believe to be constant over time. The degree to which this is actually true is determined by test-retest reliability. Internal consistency, or the consistency of people's responses on a multiple-item measure, is a second type of reliability (Creswell, 2010). People's scores on those items should be correlated with one another because, in general, all the items on such measures are supposed to reflect the same underlying construct. Numerous behavioral measurements entail a significant amount of observer or rater judgment. The degree to which various observers make consistent judgments is known as inter-rater reliability, according to Patton (2001). The Cronbach's alpha test was utilized in this study to achieve reliability.

Validity is the extent to which the scores from a measure represent the variable they are intended to. The types of validity include face validity, content validity, and criterion validity. Validity refers to how accurately a method measures what it is intended to measure. Patton (2001) states that validity is a feature that any researcher should focus on while designing a study, analyzing the results, and judging the quality of the study. If the data is not reliable and valid, if the assessment techniques are not reliable and valid, and if the design features do not create satisfactory internal and external validity, the research is worthless in scientific eyes. The four different types of validity are; construct, content, criterion, and face validity (Hair et al., 2010). But as far as this work is concerned, we are using face validity. Face validity is a test of internal validity. As the name implies, it asks a very simple question; on the face of things, it requires investigators to step outside of their current research context and assess their observations from a common sense perspective.

## 3.8 Ethical Considerations

According to Saunders et al., (2012), a researcher has a moral commitment to her respondents and potential researchers to guarantee that their work follows stringent ethical norms. Before respondents were given a questionnaire to fill out, the goal of the study was thoroughly described to them, and their agreement was obtained. The researcher informed the study participants that they are entitled to opt-out. The researcher ensured that all responses received were handled with the utmost confidentiality and privacy.

## 3.9 Profile of Study Context

Generally, the pharmaceutical industry is made up of all firms involved in researching, producing, and distributing drugs for human or veterinary use. Mostly the product of the pharmaceutical industry is medicines and biopharmaceutical. These substances are used to diagnose, cure, reduce, treat, or prevent sickness or diseases. The supply chain of a typical pharmaceutical firm will include suppliers, manufacturers, wholesalers, retailers, and customers. According to the GCB report (2022), Ghana's pharmaceutical industry is one of the largest in West Africa though small on the global scale. According to this report Ghana's pharmaceutical market was valued at GHS2.6 billion ($443 million) in 2021, which is fairly modest in global terms and even by regional standards. This is projected to reach GHS2.8 billion ($449mn) by 2022. Prescription medicines dominate the market representing 74% by market value, while over-the-counter (OTC) medicines occupy a considerably smaller share at 26%. Moreover, it notes that Pharmaceutical sales accounted for 0.60% of GDP and 18.2% of total healthcare expenditure in 2021. The Pharmaceutical Manufacturers Association of Ghana has 35 registered members, with domestic companies accounting for 30% of the country's pharmaceutical market.

The main domestic players are Danadams, M&G Pharmaceuticals, Ayrton Drug Manufacturing, LaGray Chemical Company, Tobinco Pharmaceutical, Natural Scientific Pharmaceuticals, Aidcom, Alhaji Yakubu Herbal Company, Cima Pharmaceutical, Goldleaf Pharmacare, Health Concept Pharmaceutical, and King David Pharmaceuticals. There is a multinational presence in Ghana, and some work in collaboration with local firms through domestic partnerships -GlaxoSmithKline, for example, uses Ghanaian firm Ernest Chemists (which works in retail,distribution and drug manufacturing).

The nature of pharmaceutical products, as well as the need for precise tracking and visibility, batch and expiry control, cold chain requirements, proper storage and disposal, pedigree reporting and anti-counterfeiting measures, and so on, set the pharmaceutical industry apart from other industries in terms of circular economy. Circular economy is big business for pharmaceutical companies. Pharmaceutical returns handling is estimated to be a $2.5 billion industry, with $5 billion in expired, recalled, broken packaging, or incorrectly delivered goods (Martin, 2007; Teunter et al., 2003). Total returns costs are expected to range between 3% and 6% of annual pharmaceutical sales (Hunter et al., 2005). This indicates that the cost of Merck's returns in 2007 was expected to be between $726 million and $1.452 billion, based on the company's $24.2 billion in sales (Kumar et al., 2009).

If the wrong drug was given, the medicine expired, or the customer no longer requires the medication, it might be returned. The handling of returned goods as a result of seasonal inventory, out-of-date machinery, recalls, replenishment, damage, salvage, recycling programs, surplus inventory, hazardous material programs, and asset recovery is covered by the circular economy.

Pharmaceutical waste includes things like unused medications, discarded medications, and open medication containers. Both the environment and people's health may be harmed by hazardous waste. It can be gaseous, liquid, or poisonous. It can also be corrosive, reactive, flammable, or poisonous. Despite the fact that the non-hazardous waste is composed of materials that are thought to have minimally hazardous properties, they may become contaminated or mixed with other materials, necessitating a hazardous property assessment before disposal.

# CHAPTER FOUR

# DATA ANALYSIS AND DISCUSSION

## 4.1 Introduction

This chapter presents the analysis of the data collected and the results of the study. These include the results of the demographics statistics, descriptive statistics of the constructs, validity and reliability test, correlations, factor analysis, the PLS-SEM results, and the discussion of the results.

## 4.2 Demographic Characteristics of Respondents

As shown in Table 4.1 73 (60.8%) of the data collected for the study were provided by male employees of the case organizations (which is typical of most organizations in Ghana where male employees largely dominate and the pharmaceutical industry is of no exceptional) the rest of the respondents been female had 47 (43.3%). Furthermore, out of a total of 120 respondents, a greater percentage fell within the 18- 30 age bracket representing 67 respondents (55.8%), and a total of 37 respondents representing 30.8% were in the 31- 40 age group. Also, a total of 9 respondents representing 7.5% were in the 41- 50 age group. 4 and 3 respondents representing 3.3% and 2.5% respectively fell between the ages of 51-60 years and above 60. This shows that the youth in the sample population dominates more in the pharmaceutical industries. In terms of their educational background, most of them have at least SHS education with 44.2% representing 53 respondents (this gave some level of assurance that the respondents had an adequate level of understanding of the questionnaires administered to them), this was followed by Tertiary with 40.0% representing 48 respondents, Post-graduate with 7.5% representing 9 respondents, Professional certificate with 5.0% representing 6 respondents and Other educational background with 3.3% representing 4 respondents.

Additionally, from the table it could be seen that out of 120 respondents 55 representing 45.8% of the respondents work in the production department which is the main hub of the industry, followed by 34 respondents representing 28.3% work in the Supply chain department, and also the remaining 17 and 14 respondents representing 14.2% and 11.7% respectively work in other departments and the Logistics and Purchasing department. And these results prove that the production department is the pivot of every pharmaceutical industry.

Lastly, this result depicts that all the sampled respondents were workers with varying working experiences. For instance, 52 of the respondents have between 6-10 years of experience representing (43.3%). 41 of them have between 2–5-year work experience representing 34.2%. 19 of the respondents have less than 1 year of experience representing 15.8% and 8 of them representing 6.7% have over 10 years of working experience. Based on the data gathered it could be seen that the majority of the workers in the pharmaceutical industry have much more experience in their field and this makes the pharmaceutical companies well respected.

Table 4.1: Demographic profile of respondents

| | | *n* | % |
|---|---|---|---|
| Gender | Male | 73 | 60.8 |

| | | | |
|---|---|---|---|
| | Female | 47 | 39.2 |
| | | | |
| Age | 18- 30 | 67 | 55.8 |
| | 31- 40 | 37 | 30.8 |
| | 41- 50 | 9 | 7.5 |
| | 51- 60 | 4 | 3.3 |
| | Above 60 years | 3 | 2.5 |
| | | | |
| Education level | SHS | 53 | 44.2 |
| | Tertiary | 48 | 40.0 |
| | Post-Graduate | 9 | 7.5 |
| | Professional Certificate | 6 | 5.0 |
| | Other | 4 | 3.3 |
| | | | |
| Departments | Logistics &purchasing | 14 | 11.7 |
| | Production | 55 | 45.8 |
| | Supply Chain | 34 | 28.3 |
| | Other | 17 | 14.2 |
| | | | |
| Working Experience | Less than 1 years | 19 | 15.8 |
| | 2- 5 years | 41 | 34.2 |
| | 6- 10 years | 52 | 43.3 |
| | Over 10 years | 8 | 6.7 |

**Source: Field Study (2023)**

## 4.3 Validity and Reliability

### 4.3.1 Validity Test (Factor Loadings/CFA)

In this research, the confirmatory factor analysis was performed in the SMART PLS 4.0. This process was employed to confirm the measurement model of the study. Therefore, through this process, the reliability and validity of the indicators used in the study were assessed. The validity of the items used for this study are were determined by ascertaining convergent and divergent validities. The convergent validity was examined using the indicator loadings and AVEs. The values in Table 4.7 show that indicator loadings were above 0.7 as prescribed by Hair et al., 2010). Also, the AVEs

were greater than the threshold of 0.5. By these criteria, this study affirmed that convergent validity was achieved. Discriminant validity was assessed using three criteria: hetrotrait-monotrait (HTMT) correlations ratios. Fornell-Lacker and indicator cross-loadings. The result of the HTMT (see Table 4.5) shows that the threshold of 0.9 was not exceeded. Besides, the Fornell-Lacker test shows that diagonals correlations are higher than inner correlation values (see Table 4.6). Finally, the indicator cross-loading results show that the items load more under their respective constructs than on other constructs. These results confirm that discriminant validity was achieved.

### 4.3.2 Measurement model (Reliability and Validity tests)

TABLE 4.2: MEASUREMENT MODEL

| Variables | indicators | loadings | Cronbach alpha | rho A | Composite reliability | Average variance extracted (AVE) |
|---|---|---|---|---|---|---|
| Remanufacture | REM1 | 0.798 | 0.775 | 0.804 | 0.868 | 0.687 |
| | REM2 | 0.872 | | | | |
| | REM3 | 0.816 | | | | |
| Reuse | RU1 | 0.885 | 0.885 | | 0.928 | 0.812 |
| | RU2 | 0.926 | | | | |
| | RU3 | 0.891 | | | | |
| Recycle | RCYC1 | 0.845 | 0.811 | 0.825 | 0.887 | 0.724 |
| | RCYC2 | 0.822 | | | | |
| | RCYC3 | 0.885 | | | | |
| Repackage | RPAC2 | 0.785 | 0.699 | 0.686 | 0.788 | 0.555 |
| | RPAC3 | 0.736 | | | | |
| | RPAC1 | 0.711 | | | | |
| Firm performance | FP1 | 0.859 | 0.853 | 0.855 | 0.911 | 0.773 |
| | FP2 | 0.883 | | | | |
| | FP3 | 0.895 | | | | |

TABLE 4.3: HETROTRAIT MONOTRAIT CORRELATION RATIOS

| | Firm performance | Recycle | Remanufacture | Repackaging | Reuse |
|---|---|---|---|---|---|
| Firm performance | | | | | |
| Recycle | 0.756 | | | | |
| Remanufacture | 0.768 | 0.626 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Repackaging | 0.867 | 0.755 | 0.622 | | |
| Reuse | 0.092 | 0.134 | 0.172 | 0.121 | |

TABLE 4.4: FORNELL-LACKER CRITERION

| | **Firm performance** | **Recycle** | **Remanufacture** | **Repackaging** | **Reuse** |
|---|---|---|---|---|---|
| Firm performance | ***0.879*** | | | | |
| Recycle | 0.637 | ***0.851*** | | | |
| Remanufacture | 0.642 | 0.515 | ***0.829*** | | |
| Repackaging | 0.624 | 0.527 | 0.446 | ***0.745*** | |
| Reuse | -0.079 | -0.118 | -0.023 | -0.042 | ***0.901*** |

TABLE 4.5: INDICATOR CROSS-LOADINGS

| | Firm performance | Recycle | Remanufacture | Repackaging | Reuse |
|---|---|---|---|---|---|
| FP1 | *0.859* | 0.6 | 0.633 | 0.493 | -0.088 |
| FP2 | *0.883* | 0.519 | 0.498 | 0.555 | -0.030 |
| FP3 | *0.895* | 0.556 | 0.555 | 0.600 | -0.086 |
| RCYC1 | 0.534 | *0.845* | 0.420 | 0.451 | -0.185 |
| RCYC2 | 0.465 | *0.822* | 0.368 | 0.422 | -0.034 |
| RCYC3 | 0.612 | *0.885* | 0.512 | 0.470 | -0.079 |
| REM1 | 0.478 | 0.396 | *0.798* | 0.280 | 0.152 |
| REM2 | 0.638 | 0.516 | *0.870* | 0.490 | -0.049 |
| REM3 | 0.447 | 0.341 | *0.816* | 0.301 | -0.159 |
| RPAC2 | 0.460 | 0.383 | 0.294 | *0.785* | -0.096 |
| RPAC3 | 0.507 | 0.393 | 0.413 | *0.736* | 0.022 |
| RPAC1 | 0.419 | 0.403 | 0.277 | *0.711* | -0.025 |
| RU1 | -0.055 | -0.064 | 0.040 | -0.038 | *0.885* |
| RU2 | -0.082 | -0.103 | -0.074 | -0.044 | *0.926* |
| RU3 | -0.071 | -0.144 | -0.006 | -0.031 | *0.891* |

### 4.3.3 Reliability Test (Cronbach Alpha test)

The reliability of the indicators was examined using Cronbach's alpha (Hari et al., 2010). The results in Table 4.3 shows the indicators used in this study are reliable because their Cronbach's alphas were greater than 0.6. Specifically, Cronbach's alpha for remanufacture was 0.775, reuse was 0.885, recycle was 0.811, repackage was 0.699, and firm performance was 0.853.

## 4.4 Descriptive Statistics

### 4.4.1 Circular Economy Practices

The results in Table 4.8 indicates that for the remanufacturing (REM) items, REM1 had the highest mean score (m) of 2.18 and standard deviation (d) of 0.978. This was followed by REM1 (m=1.79, d=0.787). This implies that the respondents somewhat agreed that their "employees are trained on the importance of remanufacturing". REM2 ranked second with (m=3.74, d = 0.787). This means that most of the respondents agreed that "their companies remanufacture returned products through repairs, refurbishing or replacement." In the third position was REM 3 (m=3.18, d=0.978) implying that the respondents agree that "their firms have a policy on remanufactures returned products through repairs, refurbishing or replacement." REM 4 rated fourth (m=1.67, d = 0.639) implying that the respondents disagreed on the "existence of a warehouse for storage of products that can be remanufactured."

Besides, from the perspective of reuse, the results show that RU1 ranked as the highest item (m=3.86, d=0.853). This indicates that the respondents agreed that "products are reused and sent back to the market." RU3 (m=3.46, d = 0.049) raked second, illustrating that "The company encourages customers and distributors to reuse products". RU2 (with m= 3.08, d=0.981) shows that "Employees are trained on reuse as an environmental management strategy." This was followed by RU4 (m = 0.646, d = 0.646) indicating that the respondents agreed that their "firm has a reuse policy."

Additionally from the perspective of recycling it was discovered that the respondent largely agree on the items on recycling. For example, RCYC1 (m=3.86, d = 0.804) had the highest mean score. This implies that the respondents agreed that "The company returns expired products to supplier for recycling." RCYC2 (m=3.18, d = 0.067) had the second-highest mean. The mean score suggests the "existence of a documented and communicated recycling policy." RCYC 3 followed with a mean of 3.01, d=0.990. This means that respondents agreed that "Employees are trained on recycling as a waste management strategy." This was followed by RCYC4 with a mean of 2.24 and a standard deviation of 0.531. This indicates that the respondents did not agree that "Our firm has a recycling policy."

Finally regarding, repackaging, RPAC3 with (m =3.96, d = .894) had the highest mean score. This result implies that the respondents agreed on the "existence of a documented and communicated repackaging policy". RPAC2 (m= 3.96. d= .737) ranked second. This shows that the respondents agreed that "Returned products are repackaged and distributed back to the customers." RPAC1 (m=3.36, d= .564), indicating that respondents agreed that "their company receives returned products for repackaging."

TABLE 4.6: DESCRIPTIVE STATISTICS

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| REM1 | 120 | 1 | 5 | 3.79 | .820 |
| REM2 | 120 | 1 | 5 | 3.74 | .787 |
| REM3 | 120 | 1 | 5 | 3.18 | .978 |
| REM4 | 120 | 1 | 5 | 1.67 | .639 |
| RU1 | 120 | 1 | 5 | 3.86 | .853 |
| RU2 | 120 | 1 | 5 | 3.08 | .981 |
| RU3 | 120 | 1 | 5 | 3.46 | .049 |
| RU4 | 120 | 1 | 5 | 1.39 | .646 |
| RCYC1 | 120 | 1 | 5 | 3.86 | .804 |
| RCYC2 | 120 | 1 | 5 | 3.18 | .067 |
| RCYC3 | 120 | 1 | 5 | 3.01 | .990 |
| RCYC4 | 120 | 1 | 5 | 2.24 | .531 |
| RPAC1 | 120 | 1 | 5 | 3.36 | .564 |
| RPAC2 | 120 | 1 | 5 | 3.65 | .737 |
| RPAC3 | 120 | 1 | 5 | 3.69 | .894 |
| RPAC4 | 120 | 1 | 5 | 2.07 | .543 |
| Valid N (listwise) | 120 | | | | |

### 4.4.2 Firm Performance

The results in Table 4.9 indicates that FP2 with a mean score of 3.98 and a standard deviation of 0.787. This implies that the respondents agreed that “their firm has increased profits.” This was followed by FP1 with a mean score of 3.91 and a standard deviation of 0.756. This indicates that the respondents agreed that “their firm has increased sales.” FP3 with a mean score of 3.19 and a standard deviation of 0.940, indicating that the respondents agree that “their firm has increased market shares.” Finally, FP4 with a mean score of 2.24, and a standard deviation of 0.984 shows that the respondent did not agree that “their firm has been improving its environment.”

TABLE 4.7: DESCRIPTIVE STATISTICS FOR FIRM PERFORMANCE

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| FP1 | 120 | 1 | 5 | 3.91 | 3.91 |
| FP2 | 120 | 1 | 5 | 3.98 | .787 |

| | | | | | |
|---|---|---|---|---|---|
| FP3 | 120 | 1 | 5 | 3.19 | |
| FP$ | 120 | 1 | 5 | 2.42 | |
| Valid N (listwise) | 120 | | | | |

## 4.5 Correlational Analysis

This study also conducted a correlational analysis to examine the relationship between the various variables. This kind of analysis enables researchers to identify the relationship between constructs (Hair et al., 2010). Specifically, the Pearson correlation coefficients (r) allow for telling not only the relationship between variables but also their directions. The r ranges between -1 to +1 representing negative and positive correlations respectively. The absence of a relationship between the variables is indicated by a value of zero (Saunders *et al.,* 2007). This study undertook a correlational analysis to examine the association of the constructs in the study. The correlation matrix produced was inspected for any variables that were not strongly correlated with any other variable using the minimum criteria of $r \geq 0.3$ (Hair *et al.,* 2006). Hence, every variable needed to have at least one correlation with another variable at the level of $r \geq 0.3$ in order to be considered. Table 5.38 shows the results of the correlation analysis (correlation coefficients estimated for the relationship between the variables) using SPSS 20. A thorough evaluation of the correlation matrix revealed that all the variables had at least one correlation coefficient greater than 0.3. It is observed from Table 4.10 that there is a positive and significant relationship between remanufacture and firm performance ($r = 0.510$). There was a positive and non-significant relationship between reuse and firm performance (r =0.491). Also, recycling had a positive and significant relationship with firm performance (r = 0.458). The results of the analysis also show that repackage had a positive and significant relationship with firm performance (r = 0.461). This implies that increases in remanufacturing, recycling, and repackaging will lead to an increase in firm performance. Furthermore, the results of the correlational analysis show that the sex or gender of respondents had a negative and nonsignificant association with firm performance (r = -.076). The age of respondents also had a negative and nonsignificant correlation with firm performance (r = -0.024). The educational background of the respondents also had a negative and nonsignificant relationship with firm performance (r = -0.019). The correlation between work experience and firm performance is positive but not significant (r = 0.205). Finally, income and firm performance also had a positive but not significant association. These results indicate that there are no relationships between gender, age, work experience, the income of respondents, and the firm performance.

TABLE 4.8: CORRELATION RESULTS

| | Sex | Age | Educational background | Work Experience | Income | Remanufacture | Reuse | Recycle | Repackage | Firm performance |
|---|---|---|---|---|---|---|---|---|---|---|
| Sex | 1 | .071 | -.097 | .532** | .083 | -.088 | -.056 | .041 | -.089 | -.076 |
| | | .485 | .336 | .000 | .409 | .384 | .580 | .686 | .380 | .453 |
| Age | .071 | 1 | .407** | .120 | -.116 | .017 | -.120 | -.106 | .016 | -.024 |
| | .485 | | .000 | .235 | .252 | .864 | .235 | .292 | .872 | .815 |
| Educational background | -.097 | .407** | 1 | -.016 | -.017 | .058 | .006 | .041 | .154 | -.019 |
| | .336 | .000 | | .874 | .869 | .568 | .952 | .685 | .125 | .855 |
| Work Experience | .532** | .120 | -.016 | 1 | .068 | -.118 | -.157 | -.001 | -.142 | -.128 |
| | .000 | .235 | .874 | | .502 | .243 | .118 | .991 | .160 | .205 |
| Income | .083 | -.116 | -.017 | .068 | 1 | -.189 | -.248* | -.164 | -.227* | -.058 |
| | .409 | .252 | .869 | .502 | | .060 | .013 | .104 | .023 | .568 |
| Remanufacture | -.088 | .017 | .058 | -.118 | -.189 | 1 | .639** | .590** | .687** | .510** |
| | .384 | .864 | .568 | .243 | .060 | | .000 | .000 | .000 | .000 |
| Reuse | -.056 | -.120 | .006 | -.157 | -.248* | .639** | 1 | .478** | .557** | .491** |
| | .580 | .235 | .952 | .118 | .013 | .000 | | .000 | .000 | .060 |
| Recycle | .041 | -.106 | .041 | -.001 | -.164 | .590** | .478** | 1 | .710** | .458** |
| | .686 | .292 | .685 | .991 | .104 | .000 | .000 | | .000 | .000 |
| Repackage | -.089 | .016 | .154 | -.142 | -.227* | .687** | .557** | .710** | 1 | .461** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | .380 | .872 | .125 | .160 | .023 | .000 | .000 | .000 | | .000 |
| Firm performance | -.076 | -.024 | -.019 | -.128 | -.058 | .510** | .491** | .458** | .461** | 1 |
| | .453 | .815 | .855 | .205 | .568 | .000 | .060 | .000 | .000 | |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

## 4.6 PLS-SEM Analysis on Effect of Circular Economy Practices on Firm Performance

After confirming the measurement model, this study proceeded to validate the structural model. This was achieved by assessing the beta coefficients of the path diagram (illustrated in Figure 4.2), the R-squares, f-square, and Q-square values which were obtained by using 5000 bootstrap samples at a 95% confidence interval. From the PLS-SEM results in Table 4.8, the beta (β) coefficient for recycling is 0.286 and the t-value is 2.649 with a confidence interval of 0.109 to 0.53. The beta coefficient for remanufacture is 0.353 and the t-value of 4.052. The beta coefficient for repackaging is 0.315 and t-value of 3.24 and a confidence interval of 0.11 and 0.484. The beta coefficient for reuse was -0.024, with a t-value of 0.396 and a confidence interval of -0.138 and 0.096. Moreover, the R-square was 60.7%. This implies that remanufacture, reuse, repackage, and recycling explain 60.7% of the variation in firm performance. Finally, the f-square values of the independent variables recycle, remanufacture, repackage, and reuse were 0.128, 0.22, 0.172, and 0.001 respectively. These results show that recycling, remanufacturing, and repackaging have a medium effect on firm performance but the effect size for reuse was negligible.

**Figure 4.1: PLS-SEM Path Diagram**

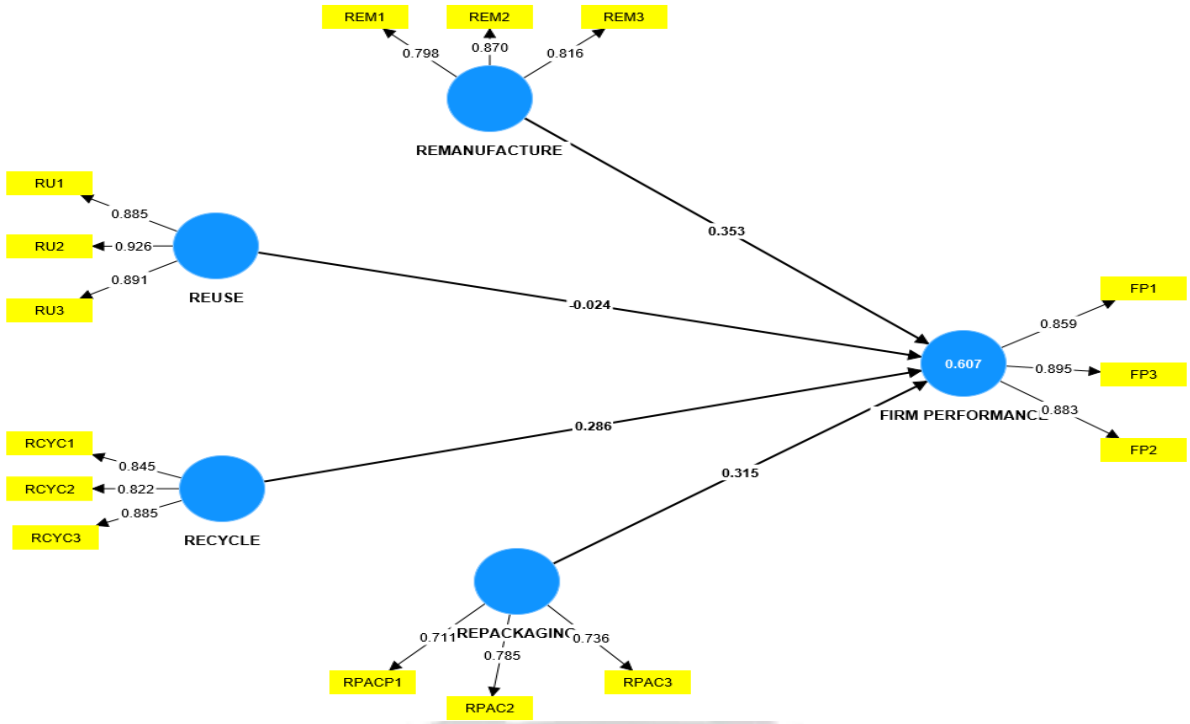



**Table 4.9: PLS-SEM results**

| | Beta coefficient | Standard deviation (STDEV) | T statistics | P values | Decision | 2.50% | 97.50% |
|---|---|---|---|---|---|---|---|
| Recycle > firm performance | 0.286 | 0.108 | 2.649 | 0.008 | Supported | 0.109 | 0.530 |
| Remanufacture > firm performance | 0.353 | 0.087 | 4.052 | 0.000 | Supported | 0.170 | 0.510 |
| Repackaging > firm performance | 0.315 | 0.097 | 3.240 | 0.001 | Supported | 0.110 | 0.484 |
| Reuse -> firm performance | -0.024 | 0.06 | 0.396 | 0.692 | Not supported | -0.138 | 0.096 |

The results in Table 4.8 results that the beta coefficient (β =0.353, p-value <0.05) between remanufacturing and firm performance was positive and significant. Also, the beta coefficient (β =0.315, p-value <0.05) between repackaging and firm performance was positive and significant. The beta coefficient (β =0.286, p-value<0.05) between recycling and firm performance was also positive and significant. However, the beta coefficient (β = - 0.024, p-value>0.05) between recycling and firm performance was negative and not significant. In terms of magnitude, remanufacturing had the highest effect, followed by repackaging and recycling.

## 4.7 Discussions of the Results

As previously established, this study sought to investigate the effect of four circular economy practices on firm performance in the pharmaceutical industry in Ghana. A quantitative survey approach and exploratory research design were employed with the aid of a well-structured questionnaire. This instrument was used to collect data from 120 respondents in the pharmaceutical industry. The items used in this questionnaire were adapted from extant literature. The empirical data collected were then coded, cleaned, and tested for validity and reliability. However, PLS-SEM was used to test the proposed relationship between the variable in the model. The following sections present a discussion of the results obtained from the tests carried out in line with the objectives of the study.

### 4.2.1 The degree of the effect of the various circular economy practices

The first objective of the study sought to explore the degree or extent of the effect of the four circular economy practices on firm performance in the pharmaceutical industry. The results show that remanufacturing of returned items or packaging had the highest effect on firm performance. This was followed by repackaging. Recycling of returned products or waste pharmaceutical materials was third. However, the reused prove not to have any effect on firm performance. This could be due to the fragility of drugs, such that such are not reused in the industry, or reusing them will not enhance performance by any degree.

### 4.2.2 The Effect of Circular Economy Practices on Firm Performance

The second objective of this study sought to investigate the effect of the various circular economy practices (remanufacturing, recycling, reuse, and repackaging) on firm performance. In this study, four hypotheses based on evidence from extant literature were proposed. These proposals were tested and some were found to be valid and others otherwise. In this study, recycling was hypothesized to have a positive and significant relationship with firm performance. The results in Table 4.8 results that this hypothesis was supported. This is because the beta coefficient was significant (with $\beta = 0.286$, $p<0.05$. Therefore it can be concluded that in pharmaceutical operations, a unit increase in the recycling of items (such as drugs) will lead to a 28.6% increase in firm performance. This result is in line with Kwarteng et al., (2022) and Mehmood et al., (2021) who concluded that reusing returned or waste products improves firm performance, in terms of its sales, profits, assets, and market shares. This is also in consonance with the principles of the NRBV theory which suggested that environmental strategies such as circular economy practices enhance the performance of firms. That is to say that as pharmaceutical firms recycle medical waste they are likely to improve their performance.

**Remanufacturing Practices and Firm Performance:**

Based on evidence in the extant literature, the second hypothesis of this study stated that remanufacture has a positive and significant relationship with firm performance. The results in Table 4.8 confirms that the hypothesis is true and hence held in this study. This is because of the parameter estimate ($\beta = 0.353$, $P< 0.05$). Consequently, it can be concluded that in pharmaceutical operations, remanufacturing of returned items will culminate in an increase in firm performance. The research delved into the impact of remanufacturing practices on firm performance, revealing a substantial and positive relationship. With a robust beta coefficient of 0.353 and a significant p-value, remanufacturing emerged as a potent driver of enhanced firm performance. This signifies that businesses engaged in remanufacturing processes are likely to experience positive outcomes, emphasizing the strategic importance of integrating such practices into the operational fabric to

achieve sustainable and thriving organizational performance. The positive impact of remanufacturing practices on firm performance aligns with circular economy principles and the associated innovation and operational speed enhancements. Khan et al. (2021) and Kwarteng et al. (2022) argue that firms engaged in circular economy practices, including remanufacturing, are likely to exhibit higher levels of innovation. Additionally, Saruchera and Asante-Darko (2021) suggest that such practices can contribute to operational efficiency, resulting in timely product delivery. These findings underscore the multi-faceted advantages of remanufacturing beyond ecological benefits, extending into the realms of innovation and operational agility.

**Repackaging Practices and Firm Performance:**

Furthermore, using evidence in the existing literature, this study posited that repackaging returned pharmaceutical items has a positive and significant relationship with firm performance. The result of the study (see Table 4.8) supported these postulations. The beta coefficient ($\beta$ =0.315, $p<0.05$) was significant. This means that a one-unit increase in repackaging will translate into a 31.5% increase in firm performance. Within the realm of repackaging practices and their intersection with firm performance, the study unraveled a compelling narrative. A positive and significant beta coefficient of 0.315 illuminated the influential role of repackaging in shaping organizational success. This suggests that businesses incorporating thoughtful repackaging strategies are likely to witness positive outcomes in terms of overall performance. The findings highlight the strategic importance of considering packaging not merely as a logistical concern but as a pivotal element that can contribute significantly to the broader success and sustainability of a firm. The study's identification of the positive impact of repackaging practices on firm performance is corroborated by existing literature. Agrawal et al. (2022) note that repackaging influences firm performance, allowing companies to alter the appearance of old products. Khan et al. (2021) highlight that repackaging involves the transformation of returned or waste products for resale, enabling effective waste and inventory management. This practice, as pointed out by Kwarteng et al. (2023), not only aids in waste reduction but also presents an opportunity for secondary sales, contributing to enhanced overall performance. The literature collectively underscores the strategic significance of repackaging practices in augmenting both environmental sustainability and organizational success.

**Resuse Practice and Firm Performance**

Moreover, based on the indication in the existing literature, this study suggested that the reuse of returned pharmaceutical items such as drugs has a positive and significant relationship with firm performance. The result of the study (see Table 4.8) supported these postulations. The beta coefficient ($\beta$ = - 0.024, $p<0.05$) was negative and not significant. This means that a one-unit increase in reuse will not translate into an increase in firm performance. In scrutinizing the relationship between reuse practices and firm performance, the study unraveled a nuanced narrative. The beta coefficient of -0.024, coupled with a non-significant p-value, indicated a negligible impact of reuse on firm performance. This suggests that, within the studied context, the act of reusing materials or resources does not significantly contribute to the overall performance of firms. Despite its potential environmental benefits, the findings underscore the need for businesses to focus on other sustainability practices for substantial performance improvements. The study's finding that the act of reusing waste or returned products has a relationship with firm performance aligns with the circular economy theory. Mazzucchelli et al. (2022) emphasize that firms engaging in circular economy practices, such as reusing non-damaged items, are likely to

operate at lower costs and increase profits. Additionally, from an institutional theory perspective, these practices position firms as good corporate citizens, enhancing their public image (Kirchherr et al., 2017). This underscores the importance of reusing practices not only for economic reasons but also for cultivating a positive organizational identity that resonates with societal expectations and values.

**Recycling Practices and Firm Performance:**

The exploration of recycling practices and their influence on firm performance unveiled a notable connection. The positive beta coefficient of 0.286, coupled with a significant p-value, underscores the constructive impact of recycling on organizational success. As businesses increasingly adopt recycling initiatives, the findings suggest a favorable correlation with improved performance. This underscores the growing importance of incorporating environmentally conscious practices into business strategies, not only for ecological reasons but also as a catalyst for bolstering overall organizational performance. The positive relationship between recycling practices and firm performance is supported by Saruchera and Asante-Darko (2021). Their study highlights that pharmaceutical firms engaging in recycling are more likely to enhance their performance due to increased flexibility and innovation. Mazzucchelli et al. (2022) further accentuate that recycling allows firms to remold waste into new items, leading to the creation of innovative products. This innovation, appealing to customer preferences, becomes a catalyst for increased sales and profits, emphasizing the pivotal role of recycling in shaping organizational success.

# CHAPTER FIVE

# SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATION

## 5.1 Introduction

This study sought to explore the effect of circular economy practices on firm performance in the pharmaceutical industry in Ghana. This chapter discusses the empirical result of the study as against the research questions and hypotheses developed. The discussion in this section also juxtaposes the study's findings with other findings from the existing literature. Also present in this chapter is the discussion on the theoretical and managerial implications of the study's findings as well as suggestions for further research.

## 5.2 Summary of findings

This study unearthed some key findings. To start with the study proved that there were more male than female circular economy operations in the pharmaceutical industry in Ghana. The outcome of the study also indicated that the industry has a lot of young educated workers. Furthermore, this study discovered that the most dominant circular economy practice in the pharmaceutical industry is reuse. The is basically because of the reuse is most cost efficient circular economy practices. Two, the study discovered that remanufacture has the most effect on firm performance. The outcome of the study also showed that recycle and repackage also has significant effect on firm performance. Finally this study revealed that by implimentation of circular economy practices enhances firm performance. Moreover, this study discovered that remanufacturing positively correlates with firm performance. Recycle to is positively related to firm performance. Repackage also had a positive correlation with firm performance. Which simply meant that any increase in the

levels of these circular economy practices is associated with increase in firm performance. However the study indicated that there are no relationships between gender, age, work experience, the income of respondents, and the firm performance.

## 5.3 Conclusion of the Study

This comprehensive study aims to investigate the impact of circular economy practices on the firm performance of pharmaceutical companies in Ghana. The primary objectives include assessing the extent to which pharmaceutical companies in Ghana integrate circular economy practices into their operations. Additionally, the study endeavors to establish the relationship between the adoption of circular economy practices and the overall performance of these pharmaceutical companies. Furthermore, the research seeks to identify and recommend measures that can be implemented to enhance circular economy practices within the pharmaceutical industry in Ghana.. The study evaluated the proposed theoretical model using data from 120 purposively sampled respondents in the pharmaceutical industry in Ghana. This study investigates the nexus between demographic profiles, circular economy practices, and firm performance in Ghana's pharmaceutical sector. Demographic insights reveal a male-dominated workforce, a prevalence of youth, and substantial experience among employees. Circular economy practices, such as remanufacturing, repackaging, and recycling, exhibit positive correlations with firm performance. Remanufacturing emerges as a significant contributor to performance, while repackaging and recycling also show substantial impacts. Reuse, however, demonstrates a negligible effect. PLS-SEM analysis affirms the positive influence of remanufacturing, repackaging, and recycling on firm performance. This research contributes practically by offering pharmaceutical companies in Ghana actionable insights into enhancing their circular economy practices, particularly in remanufacturing, repackaging, and recycling, to boost firm performance. In policymaking, the findings underscore the importance of incorporating circular economy principles into industry regulations and incentives, promoting sustainable practices that align environmental responsibility with economic success in the pharmaceutical sector.

## 5.4 Reccommendations

This study has some implication and recommendations. First, this study unlike Kwarteng et al. (2022) has demonstrated the individual effect of the circular economy practices on firm performance. A direct implication is that managers of pharmaceutical firms should provide high levels of remanufacturing, repackaging, and recycling in their operations. Therefore it is recommended that pharmaceutical firms should prioritize circular economy strategies such as remanufacturing, repackaging and recycling. That is, the study shows that managers of pharmaceutical operations and their supply chain partners can prioritize remanufacturing, repackaging, and recycling in closed-loop supply chain activities. Finally, with these outcomes, some policy implications may arise. Governments in developing countries need to organize seminars and training for firm managers to understand the effect of circular economy activities on a firm’s performance and also on the environment. Such a program will help create a green culture in the firms so that they can adopt and implement circular economy practices in order to have cleaner production and sustainable cities. Consequently, this study recommends that government in especially developing countries should pass legislations that the enhance circular economy practices in their country. This because circular economy will help to reduce the filth or waste in these countries. Finally, from the perspective of research this study suggest that future studies in this area should consider other industries such as the beverage industry, automobile, textile etc. Future studies should consider more firms, and also firms in the service sector. Future studies

should consider the mediating or moderating roles of social reputation, competitive advantage, citizenship behavior in the relationship between circular economy and firm performance.



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# APPENDIX 1

**QUESTIONNAIRE**

Dear Sir/Madam,

I am a final year MSc Procurement and Supply Chain Management student of the KNUST carrying out a research. This questionnaire is designed to ascertain information for my research work on the topic "*Effects of circular economy on firm performance in the pharmaceutical industry*". I would be grateful if you could provide answers to the following questions. All the answers you provide will be treated with the utmost confidentiality and for academic purpose only. Thank you.

**Section I – Demographic Information**

1. Gender: [ ] Male [ ] Female

2. Age:

   [ ] 18- 30 years [ ] 31-40 years [ ] 41-50 years [ ] 51-60 years

   [ ] Above 60 years

3. Educational Qualification:

   [ ] SHS [ ] Tertiary [ ] Post Graduate [ ] Professional Certificate

   [ ] Other

4. Please select the department you are currently working in:

   [ ] Logistics & Purchasing [ ] Production [ ] Supply chain

   [ ] Other ……

5. How long have you been working with your organization

Less than one year [ ] 2-5years [ ] 6-10years [ ] over 10 years [ ]

**Section II - Circular Economy**

6. Indicate the extent to which your company has implemented the following circular economy practices by ticking where appropriate. Use a scale of 1-5 with where
*1 = Strongly Disagree 2 = Disagree 3 = Unsure 4 = Agree 5 = Strongly Agree*

| **Statement** | **Likert Scale** | | | | |
|---|---|---|---|---|---|
| **Remanufacturing** | | | | | |
| Employees are trained on the importance of remanufacturing | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Existence of a documented and communicated remanufacturing policy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| The company remanufactures returned products through repairs, refurbishing or replacement | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Existence of a warehouse for storage of products that can be remanufactured | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| **Reusing** | | | | | |
| Products are reused and sent back to the market | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Employees are trained on reuse as an environmental management strategy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| The company encourages customers and distributors to reuse products | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our firm have a reuse policy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| | | | | | |
| **Recycling** | | | | | |
| The company returns expired products to supplier for recycling | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Existence of a documented and communicated recycling policy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Employees are trained on recycling as a waste management strategy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our firm have a recycling policy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| **Repackaging** | | | | | |
| The company receives returned products for repackaging | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Returned products are repackaged and distributed back to the customers | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Existence of a documented and communicated repackaging policy | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our has a dedicated centre for repackaging items | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |

**Section III – Measures on firm performance**

7. Read the statements below carefully and rate how much you agree or disagree with each statement. Use a scale of 1-5 with where

*1 = Strongly Disagree  2 = Disagree  3 = Unsure  4 = Agree  5 = Strongly Agree*

| **Firm performance** | **Likert Scale** | | | | |
|---|---|---|---|---|---|
| Our firm has increased sales | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our firm has increased profits | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our firm has increased market shares | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |
| Our firm has been improving its environment | **1**[ ] | **2**[ ] | **3**[ ] | **4**[ ] | **5**[ ] |

***Thank you for your participation!!!***