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EMBRACING CIRCULAR ECONOMY IN FMCG SUPPLY CHAINS: DRIVERS AND CHALLENGES IN JORDAN

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The aim of this dissertation is to obtain a doctoral (PhD) degree in the scientific field of „Management and Business”

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DECLARATION

I undersigned (name: **Othman Mustafa**, date of birth: 09/Nov/1993) declare under penalty of perjury and certify with my signature that the dissertation I submitted in order to obtain doctoral (PhD) degree is entirely my own work.

Furthermore, I declare the following:

- I examined the Code of the Károly Ihrig Doctoral School of Management and Business Administration and I acknowledge the points laid down in the code as mandatory;
- I handled the technical literature sources used in my dissertation fairly and I conformed to the provisions and stipulations related to the dissertation;
- I indicated the original source of other authors' unpublished thoughts and data in the references section in a complete and correct way in consideration of the prevailing copyright protection rules;
- No dissertation which is fully or partly identical to the present dissertation was submitted to any other university or doctoral school for the purpose of obtaining a PhD degree.

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TABLE OF CONTENTS

1 INTRODUCTION OF THE TOPICS AND OBJECTIVES

Different governmental and nongovernmental organisations are promoting the Circular Economy as a substitute concept for the traditional economic system (Linear Economy), which is meant to be unsustainable and needs to be replaced to change and improve the flow model of materials to a cyclical flow. The linear model has been practised for a long time and has been threatening the stability of the future by following the mass production model to create mass goods that will be dumped and disposed of after a single use.

This take-make-dispose model significantly affects the environment and the climate since it plays a vital role in the depletion of natural resources and increases the carbon footprint. Hence, the CE was designed in a way that helps to protect the environment and human well-being (MURRAY ET AL., 2017). Fig.1 shows the difference between the Linear economy and the Circular economy.

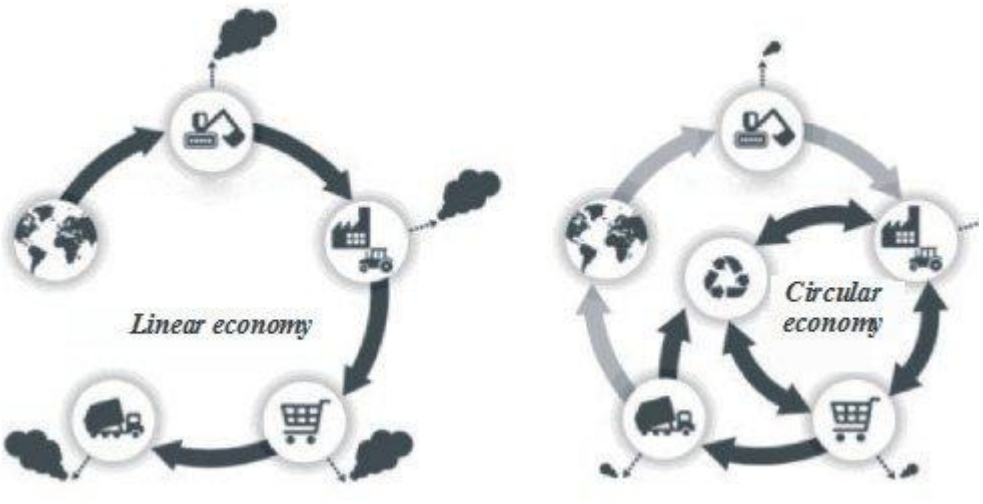

Figure 1. ***Linear Economy vs. Circular Economy.***
Source: Grigoryan & Borodavkina (2017).

The academic interest in the field of CE has increased in recent years, with a significant increase in the published literature reviews about CE with no clear and agreed-upon definition in the literature (TECCHIO ET AL., 2017). Ellen MacArthur Foundation identified the circular economy as a concept to design different environmental and waste management policies to build circular systems where the materials are being circulated instead of being generated as waste (WITHIN, 2015). The main goal of the CE is to eliminate waste and minimise the input resources by recycling, refurbishing, and reusing the materials continuously to make them a new input for other processes (BUNDGAARD ET AL., 2017). Subsequently, this approach will help extend the product lifecycle in a way that reduces the pressure on the environment and

increases competitiveness, innovation, and profit. CE and CSCM are two notions that have sparked several arguments in the recent decade. The growing integration of CE into the SCM, on the other hand, illustrates a developing area where they have explicit interactions. Furthermore, the drivers and the barriers to implementing the circular economy into the supply chain management system are unclear. As a result, the study's goal was to look at these drivers and challenges.

The primary research question for this study is: "What are the drivers and barriers to implementing Circular Supply Chain Management (CSCM) in the Jordanian FMCG industry?" This question aims to investigate various practices within a developing country's FMCG sector to understand better the barriers and challenges that prevent the implementation of CSCM. It also aims to uncover the essential drivers that support the successful implementation of CSCM. The primary objectives of this research are as follows:

- To investigate and analyse the key drivers facilitating the implementation of CSCM methods in Jordan's FMCG sector.
- To investigate and understand the barriers that prevent the implementation of CSCM practices in the same context.
- Assess the impact of identified drivers and barriers on the effective implementation of CSCM practices.
- To provide theoretical and practical recommendations for businesses and governments to overcome challenges and leverage drivers to increase the adoption of CSCM practices.
- To contribute to a better understanding of how the circular economy may be integrated into supply chain management to achieve long-term sustainability and competitiveness.

By addressing these objectives, the study aims to identify the many drivers and barriers to CSCM implementation and provide appropriate methods for mitigating challenges and leveraging drivers for better and more effective CSCM adoption. This study will also look into the governance and environmental aspects of incorporating CE principles into supply chain management, as well as the interaction between various drivers and barriers to CSCM implementation. In summary, this study aims to provide complete insights into the factors impacting CSCM practices in the Jordanian FMCG industry. The findings are intended to assist policymakers, industry stakeholders, and businesses in their attempts to transition to more sustainable and circular supply chains, ultimately adding to the larger knowledge base on sustainable supply chain management.

2 LITERATURE REVIEW

This chapter will cover an overview of the two main concepts of the research, which are the Circular Economy and Supply Chain management. The implementation of the CE in the SCM will also be reviewed and explored to gain a better understanding of the barriers and drivers of implementing the CSCM, which will be examined based on the current literature.

2.1 Circular Economy: A General Overview

2.1.1 Background

The origins of the CE are not clear in the literature, but there were different contributions from different schools of thought (WINANS ET AL., 2017). Murray and co-authors claim that CE has existed for a long time since 1848, based on the statement of the first president of the Royal Society of Chemistry (Hofman), which was: "…in an ideal chemical factory there is, strictly speaking, no waste but only products. The better a real factory uses its waste, the closer it gets to its ideal, the bigger the profit (MURRAY ET AL., 2017)."

The circular economy was applied back in the nineteenth century to use waste as a new resource at a firm level for different economic activities (SIMMONDS, 1862). The idea of the ecological economist (BOULDING, 1966) is that the Circular system is a closed-looped system with no exchange of matter outside the environment. It was claimed by (GREYSON, 2007) that Kenneth Boulding (1966) is the originator of the term, based on what he wrote:" Man must find his place in a cyclical ecological system which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy". In 1976, Stahel and Reday described the features of the Circular economy when they pictured the loop economy for waste reduction, creating job opportunities, increasing resource efficiency, and conceptualising the industrial economy in a dematerialised way (STAHEL & REDAY, 1976). The introduction of the concept has been referred to the environmental economists Pearce and Turner (1989), building on the studies of Boulding (1966) who described the influence of natural resources on the economy by supplying the inputs for production to be consumed later and by receiving the outputs in the form of waste (PEARCE ET AL., 1990). (LIU ET AL., 2009) and (YUAN ET AL., 2006) claim that the concept of Circular Economy originated and was first used in China. The origin of the CE concept is still unclear in the literature since it was connected to different schools of thought, associations, and schools, which increased the complexity and made it possible to identify the specific origins of the term. Different definitions of CE were found in the literature, with the concept of closed-loop being common among them. These definitions all agree on the idea of the recirculation of resources to reduce waste and save energy to

minimise the number of resources to reach the goal of sustainable development, which will benefit society and the economy. The following definitions of CE were found in the literature:

1. "An alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life" (KALMYKOVA ET AL., 2018).
2. "A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), to accomplish sustainable development, which implies creating environmental quality, economic prosperity, and social equity, to the benefit of current and future generations" (KIRCHHERR ET AL., 2017).
3. "A circular economy is a mode of economic development that aims to protect the environment and prevent pollution, thereby facilitating sustainable economic development" (MA ET AL., 2014).
4. "The central idea is to close material loops, reduce inputs, and reuse or recycle products and waste to achieve a higher quality of life through increased resource efficiency" (PETERS ET AL., 2007).
5. "The focus of the circular economy gradually extends beyond issues related to material management and covers other aspects, such as energy efficiency and conservation, land management, soil protection, and water" (SU ET AL., 2013).
6. "An industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models" (ELLEN MACARTHUR FOUNDATION, 2013).

Since the Circular Economy has different definitions in the literature, there was a need to systematically analyze the literature to provide a more valid view of the current understanding of the concept, Kirchherr, J., Reike, D., and Hekkert, M. (2017) have systematically analyzed 114 definitions in the literature to finally define the CE 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, 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 generation" (KIRCHHERR ET AL., 2017). Murray, A., Skene, K., and Haynes, K. have traced back the origins and the meanings of CE to propose a definition of the concept in a way that allows real benefit for both the environment and society. The following definition was suggested: "The Circular Economy is an economic model wherein planning, resourcing, procurement, production, and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being" (MURRAY ET AL., 2017). Prieto-Sandoval et al. (2018) carried out a systematic literature review to define the Circular Economy, its principles and determinants to come up with the following definition: "an economic system that represents a change of paradigm in the way that human society is interrelated with nature and aims to prevent the depletion of resources, close energy, and materials loops, and facilitate sustainable development through its implementation at the micro (enterprises and consumers), meso (economic agents integrated into symbiosis) and macro (city, regions, and governments) levels. Attaining this circular model requires cyclical and regenerative environmental innovations in the way society legislates, produces, and consumes" (PRIETO-SANDOVAL ET AL., 2018).

To reach the optimal implementation of CE in a way that returns businesses with added value and profit, the principles and the main actions identified as 3Rs (Reduce, Reuse, and Recycle) must be understood for better adoption of the concept. Ranta, V., Aarikka-Stenroos, L., and Mäkinen, S. J. (2018) have done an explorative, multiple case study to examine the business model approach with the 3Rs principle. The study has analyzed different businesses in Europe, the US, and China. It was proposed in conclusion between the 3Rs that recycling is the easiest way to adopt compared to reducing and reusing, since it has a smaller impact on businesses. It was also found that recycling principles dominate value creation in CE compared with other approaches (Reduce, Reuse). There's a need to find ways to benefit from these approaches besides recycling to create value and reach the full potential of the CE (RANTA ET AL., 2018). Ghisellini, P., Cialani, C., and Ulgiati, S (2016) have concluded in their review that the CE mainly emphasises recycling rather than reuse (GHISELLINI ET AL., 2016), which motivates designing products for a cycle disassembly and reuse to activate the principle of reusing besides recycling.

Castellani, V., Sala, S., and Mirabella, N. (2015) have evaluated the environmental benefits of reselling and reusing second-hand products through a case study. It was found that a high

number of environmental impacts were avoided due to the reusing and reselling of items in both the apparel and furniture sectors (CASTELLANI ET AL., 2015). The assessment of the environmental benefits resulting from reuse can support and steer reuse policies at different levels. To turn the waste into a profit-making resource besides being reduced and dealt with, many companies are interested in designing for remanufacturing (DfRem) to return the products after being used to their original form with the same specifications. Remanufacturing needs fewer materials and energy than a newly produced product, which means that the remanufactured products will be sold for less money but with a higher profit, besides being environmentally friendly and sustainable by preventing landfills and dumping materials into waste. Hatcher, G. D., Ijomah, W. L., and Windmill, J. F. C. (2013) have conducted case studies to identify which operational factors influence DfRem integration. It was found that design priorities, original equipment manufacturers-remanufacturer relationship, designer motivation, and design process are the internal and external factors influencing the process of DfRem (HATCHER ET AL., 2013). Fig 2. shows the 3Rs of CE and waste hierarchy.

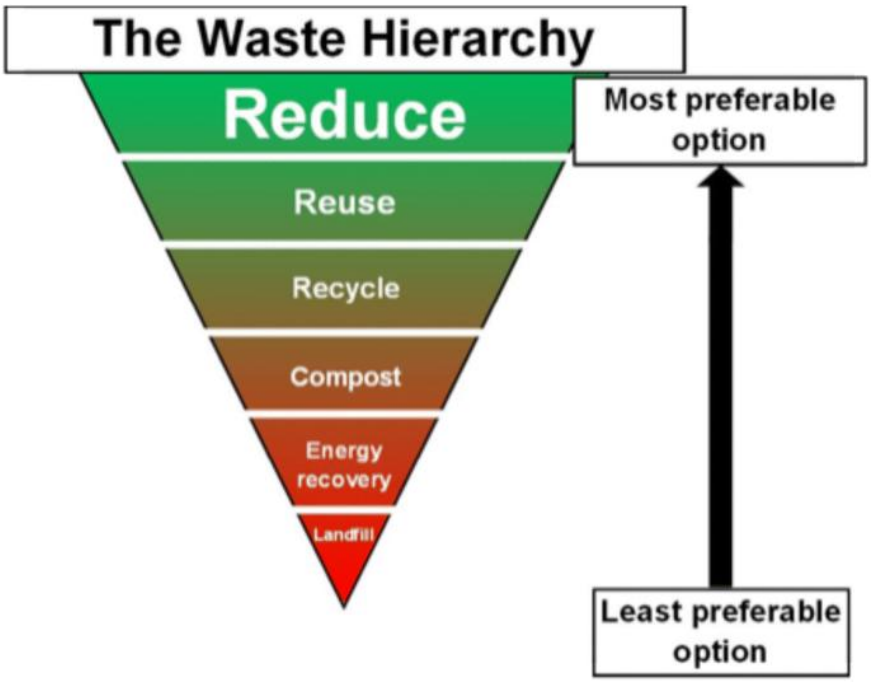

Figure 2. ***3Rs of Circular Economy and Waste Hierarchy.***
Source: Dong et al. (2021).

2.1.2 Circular Economy's Applications in SCM

Supply chain management practices have been developed in recent years to integrate environmental thinking into different practices to save the environment from the negative aspects of the production process itself and the consumption process. Traditionally, supply chain management is understood as a process in which raw materials are transformed into final

products and subsequently transported to the end consumer. This procedure includes the extraction and use of natural resources (JOHANNSON, 1994). The initial frameworks of environmental management involved operating managers only in a limited, indirect capacity, while distinct organisational units were tasked with ensuring environmental performance across domains such as product development, process design, operations, logistics, marketing, regulatory compliance, and waste management.

In recent years, a paradigm shift has occurred. Similar to the quality revolution of the 1980s and the supply chain transformation of the 1990s, it is now widely recognised that effective environmental management must be embedded within core operational activities. As a result, green supply chain management (GSCM) has attracted growing attention from both scholars and practitioners in the fields of operations and supply chain management. This heightened interest is fuelled mainly by the increasing environmental degradation, including the depletion of natural resources, the proliferation of waste, and rising pollution levels. Importantly, GSCM is not solely about environmental stewardship, it also aligns with sound business strategy and enhanced profitability (SRIVASTAVA, 2007).

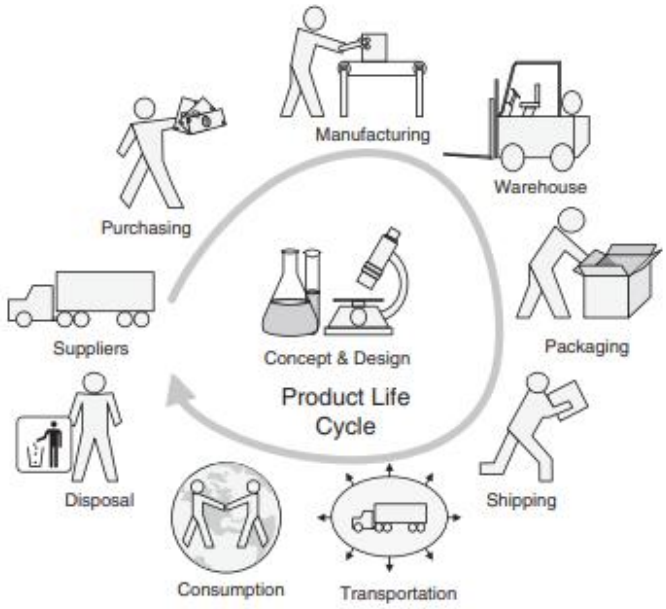

Figure 3. ***Product life cycle.***

Source: Kumar & Timpernagel (2012).

Environmental impacts should be assessed in a cumulative manner throughout the stages of a product or service's supply chain life cycle, in order to prevent the transfer of negative environmental effects between stages. A fundamental objective of green supply chains is the simultaneous enhancement of economic and environmental performance across the entire supply network, which is often pursued through the establishment of long-term, collaborative buyer-supplier relationships. To this end, organisations have implemented various green supply

chain management initiatives, such as evaluating suppliers based on their environmental performance, offering training to strengthen their environmental management capabilities, and developing reverse logistics systems to facilitate the return and reuse or remanufacture of products and packaging materials. These efforts contribute not only to environmental sustainability but also to the achievement of tangible business advantages (ZHU & COTE, 2004).

Environmentally preferable products and services are characterised by features that promote resource conservation and pollution reduction. These include reduced energy and water consumption, minimised waste generation and pollutant emissions, utilisation of recycled and recyclable materials, and the use of renewable energy sources such as bio-based fuels, solar, and wind power. Additionally, such preferences encompass alternative fuel vehicles and products that avoid hazardous or toxic substances, radioactive materials, and biohazardous agents (KUMAR & CHANDRAKAR, 2012). The objective of greening supply chains is to reconcile environmental considerations with marketing performance. In response to challenges such as energy conservation and pollution control, organisations have increasingly sought to develop environmentally sustainable supply chain networks. This involves collaborating with suppliers to procure environmentally preferable products and to establish shared strategies aimed at minimising waste and enhancing operational efficiency.

The increasing focus on SCM has resulted in the emergence of various definitions aiming to describe it. According to Handfield et al. (1997), green supply chain management (GSCM) entails the application of environmental management principles throughout all stages of the customer order cycle. This comprehensive approach encompasses activities such as product design, procurement, manufacturing and assembly, packaging, logistics, and distribution. (HANDFIELD ET AL., 1997). Srivastava (2007) has defined it as “Integrating environmental thinking into supply-chain management, including product design, material sourcing, and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life” (KALMYKOVA ET AL., 2018). Wee et al. (2011) offered a comparable definition, describing green supply chain management as the incorporation of environmental considerations into all key supply chain functions. This includes product design, material sourcing and selection, manufacturing processes, distribution of the final product to end users, and the end-of-life handling of environmentally conscious products. (WEE ET AL., 2011). Andic et al. (2012) defined it as “Minimizing and preferably eliminating the negative effects of the supply chain on the environment” (ANDIÇ ET AL., 2012). Despite this rich literature segment, a clear and widely accepted definition of the green supply chain is lacking (KLASSEN & JOHNSON, 2004).

Developing environmentally sound supply chain policies and strategies to address the related market needs, therefore, requires a clear understanding of each of the stakeholders' perspectives and priorities. This should be fitted into a framework that may be used to guide the firm's activities. For the Purchasing and Supply manager, this framework would serve as the basis for formulating the firm's environmental supply strategy. One should be able to predict the outcome of any chosen path concerning its environmental consequences and its likely impacts on the objectives of the business (LEE ET AL., 2009). Decisions made within supply chain management are closely interrelated with sustainability, influencing aspects such as the selection of manufacturing materials, the geographical positioning of suppliers, and the choice of transportation modes for delivering products to end users. The adoption of green supply chain management (GSCM) practices can significantly contribute to the advancement of industrial ecosystems.

For manufacturers, external GSCM practices have also gained growing significance. As an example, green purchasing, the first external GSCM practice, represents an emerging approach. A global study highlighted key elements of green purchasing, such as delivering design specifications to suppliers that address environmental requirements of the purchased goods, collaborating with suppliers on environmental goals, conducting environmental audits of suppliers' internal systems, and verifying suppliers' ISO14001 certification (ZHU ET AL., 2008). Moreover, major customers have placed pressure on their suppliers to improve environmental performance, which in turn increases suppliers' willingness to collaborate with customers on environmental objectives.

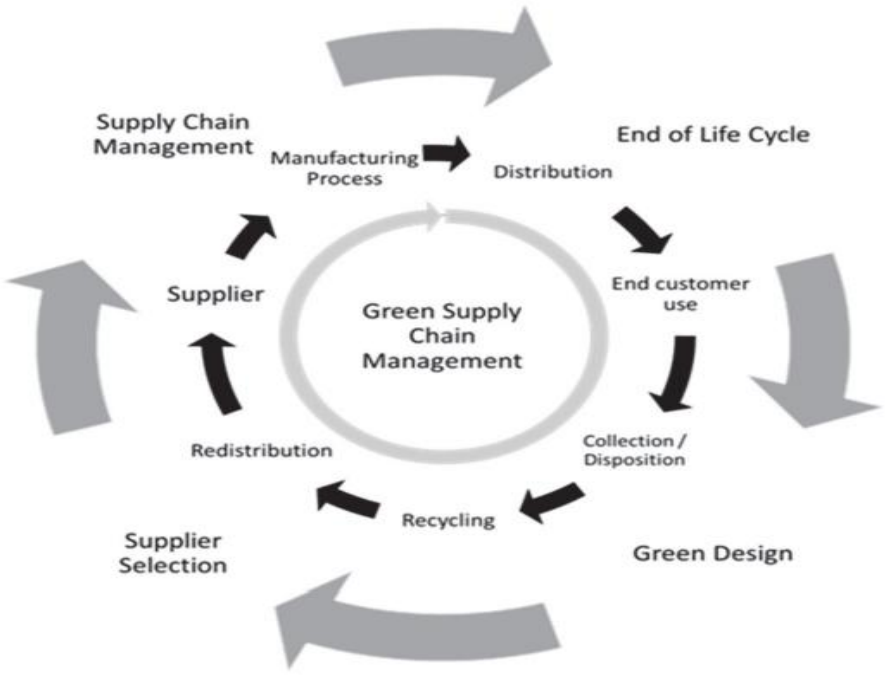

Figure 4. ***Workflow of the GSCM process.***

Source: Villanueva-Ponce et al. (2015).

Dangelico and Pontrandolfo (2013) have shortened the benefits of green collaboration with the supply chain management as follows (DANGELICO & PONTRANDOLFO, 2013):

- reduction of business-related waste,
- environmental impact (lower pollutant emissions, use of renewable energy sources, avoidance of toxic substances, and application of environmentally friendly materials),
- market performance (entry into new markets; achieving competitive advantage),
- corporate image performance (reputation; compliance with regulations), manufacturing performance (material usage efficiency; energy efficiency; innovation),
- financial performance (higher margins or market share; customers' willingness to pay a premium price for products), and supply chain cost reduction.

2.1.3 Circular Economy adoption in the MENA region

The Middle East and North Africa (MENA) area has played an important role in human civilization's history. Between the 7th and 13th centuries, important areas of the region were the world's leading economies and are currently significant places for commercial trade with various regions due to the unique location between Europe, Asia, and Africa (DRINE, 2013). The MENA region encompasses more than 15 million square kilometres and is home to around 6% of the world's population. Equivalent to the population of the European Union (EU). The region's overall population has risen from around 100 million in 1950 to almost 493 million in 2022 (EIA, 2015) (WORLD BANK, 2020). Its reliance on nonrenewable resources distinguishes MENA. It consists of 20 countries subdivided into three different regions: the Gulf Cooperation Council (GCC), the East Mediterranean, and North Africa, with a combined population of around 465 million people. Bahrain, Djibouti, and Qatar have populations of 1.7 million, 1.0 million, and 2.9 million people, respectively. Egypt and the Islamic Republic of Iran, on the other hand, have populations of roughly 102 and 84 million people, respectively. These five most populated nations, together with Algeria, Morocco, and Sudan, account for over 70% of the region's population (EIA, 2015).

From the discovery of oil, the MENA region underwent a quick structural transformation, which became more obvious in the 1970s, accompanied by significant economic development due to high oil prices at the time (AL-RAWASHDEH ET AL., 2013). The region has around 60% of the world's oil resources, 45% of the world's gas reserves, high natural gas reserves, and large petroleum reserves (KIPROP, 2019). The quantity of natural resources, such as oil and natural gas, as well as their export and consumption, has increased energy demand and the strategic importance of the region. Economic expansion in the region is fueled by the

tremendous use of natural resources, which has resulted in industrialisation, globalisation, and unsustainable events in MENA nations (MAGAZZINO & CERULLI, 2019). Most of these countries face the challenge of environmental degradation to achieve the goals of sustainable development and growth because the majority of their economic activities are inextricably linked to the use of natural resources, and few activities do not result in the creation of waste and pollution emissions (MOOSAVI & BAMERI, 2017).

Solid waste management is currently one of the most pressing environmental issues confronting countries in the Middle East and North Africa. This is due to fast population development, a thriving economy, rapid urbanisation, and high living standards in the community, all of which have greatly accelerated the pace of solid waste creation (NEGM & SHAREEF, 2020; ONWOSI ET AL., 2017). Organic food waste accounts for around 55% of total solid waste, followed by paper and cardboard (13%) and plastic (12%) (MINISTRY OF ENERGY, SAUDI ARABIA, 2023). The Middle East and North Africa (MENA) region has opportunities to activate circular economy mechanisms and benefit from their outputs to address challenges that impede sustainable development, such as waste management, resource scarcity, and most countries' reliance on imported goods and resources. The World Bank estimates that the region can recycle 10% of plastic, 3% of metals, 1% of wood, and 3% of glass if correct separation is used and enough resource recovery infrastructure is in place (MINISTRY OF ENERGY, SAUDI ARABIA, 2023).

Many CE efforts have been conducted in the Arab area. For example, Saudi Arabia's third industrial city, Riyadh, has a recycling industry. It is the first and largest waste recycling facility in the Middle East and North Africa, recycling 3 million tons of waste each year. Similarly, in the State of Qatar, a Waste Treatment Center in Masa'ada recycles household waste to create power. In the region, several green bonds have also been successfully established to promote green financing and CE. These include one for 1.2 USD billion issued by Majid Al Futtaim and another worth 1.3 USD billion issued by Saudi Electricity Company. In addition, in October and November 2021, the Islamic Development Bank and Egypt issued green bonds across the region (OTHMAN, 2022). Furthermore, the UAE adopted a national CE strategy and established a CE council comprised of officials from the federal, municipal, and business sectors. The council intends to implement the CE policy through national plans and laws that include and monitor sustainability standards, with the stages outlined below serving as a reference. Creating strategies, policies, and activities that incorporate CE principles into national plans; aiding the growth of immature markets; and improving foreign companies' capacity to enter the market (UAE GOVERNMENT, 2023).

Although numerous successful efforts in the Arab area embrace the CE, the CE confronts several challenges in the form of cultural, legal, regulatory, commercial, and technological restrictions in Arab nations (KIRCHHERR ET AL., 2018). The region's main structural challenges include its high reliance on natural resources, poor productivity and variable growth rates, weak integration with global economies, chronic unemployment, a lack of institutional changes, insufficient research capacity, and low nonoil industry exports (DAVOODI & ABED, 2003).

Saud et al., (2023) studied the relationship between the natural resources, economic complexity, education, and environmental sustainability in MENA countries. From 1980 to 2020, natural resource diversity, the complexity of the economy, education, and environmental sustainability have been investigated in "Middle East and North Africa" (MENA) countries. The empirical findings support the long-run negative correlations between economic complexity and carbon dioxide emissions (CO2 emissions) and the ecological footprint. In addition, natural resource abundance is negatively associated with CO2 emissions and the ecological impact. However, excessive CO2 emissions and the ecological footprint are hampered by education, financial development, and economic expansion (SAUD ET AL., 2023).

To fully realize the benefits of addressing climate change and achieving sustainable development goals in MENA countries, Elmassah, S. (2023) investigated approaches to integrating Industry 4.0 technologies and innovations into the circular economy in MENA countries. This is done by investigating the connections between the circular economy, climate change, and sustainable development, as well as the corresponding indicators, followed by an examination of the role of the Industry 4.0 pillars. The Egyptian case was investigated as a representative of the MENA region. By carefully examining the Egyptian case, the study presents a wide range of evident policy implications. These include, among other things, creating a legal and tax framework that supports the shift to a circular economy, creating an Egyptian Council for the Circular Economy, and creating a comprehensive national strategy for Egypt's industrial revolution (ELMASSAH, 2023).

Othman (2022) created a regional index based on widely accepted CE metrics that may be used to assess nations' progress toward implementing circular economies. Economic, business, environmental, governance, infrastructural, and social variables are among the index's primary components. With the study's index, policymakers and stakeholders in the CE can determine the countries' transmission level toward CE and adopt policies to develop CE activities in the Arab region, reducing waste in natural resources, achieving economic, environmental, and social sustainability, and increasing the added value of Arab economies (OTHMAN, 2022).

Hemidat et al. (2022) offered a complete review of national systems for municipal solid waste (MSW) management, with material and energy recovery as a major component in selected MENA nations in the context of the circular economy. The study found that the majority of waste management challenges in the nations studied appear to be the result of political considerations and the decentralized form of waste management, with multi-level administration and responsibilities. In reality, material and energy recovery in municipal solid waste management did not differ considerably across the MENA nations studied. Most people still regard "waste" as "trouble" rather than a resource. As a result, a new perspective on how the solid waste management system might be turned into a circular economy is necessary; a paradigm change from a linear economy model to a circular economy model is required (HEMIDAT ET AL., 2022).

A. Omojolaibi, J., and P. Nathaniel, S. (2022) have employed sophisticated panel data econometric techniques that take heterogeneity and cross-sectional dependence into account. They concentrated their study on the effects of environmental regulations, trade, economic growth, and energy consumption on the ecological footprint in the Middle East and North Africa (MENA) countries. The results verify that environmental restrictions have no noticeable effect on the ecological footprint. This shows that MENA's environmental laws are still not in the desired place to improve environmental sustainability successfully. Energy use, trade, and economic expansion all raise the ecological footprint, and the study revealed that economic growth is energy-dependent in MENA (A OMOJOLAIBI & P NATHANIEL, 2022).

El-Khalil and El-Kassar (2018) conducted a detailed literature analysis to determine the extent to which firms in the MENA (Middle East and North Africa) area pursue various aspects of corporate sustainability. This research investigated business sustainability strategies and their relationship to performance in the MENA area. According to the study's results, firms operating in the MENA area underachieve in all elements of sustainability except energy management. Larger corporations are more likely to engage in corporate sustainability activities such as internal and external education, external health, and resource and energy management. This study discovered a substantial positive association between sustainability and performance areas (EL-KHALIL & EL-KASSAR, 2018).

Harfoush and Krumme (2017) utilized a systematic literature review to evaluate the abstracts of several peer-reviewed papers from three MENA countries, Egypt, Jordan, and the UAE to assess the level of institutional contribution to the production of knowledge concerning the sustainability of the MENA region. Gaps in knowledge generation were identified, as well as a lack of concern for cutting-edge sustainability information in MENA experts' scientific publications. Furthermore, the study demonstrates that institutional performance and

knowledge base, both of which are important parts of the sustainable transition, do not fit with the prosperous UN-based procedures aimed particularly at the MENA area (HARFOUSH ET AL., 2017).

Binsuwadan et al. (2023) have investigated the CE's impact on economic growth in GCC nations utilizing a variety of economic and environmental metrics that have a direct and substantial impact on economic growth. The study is the first to examine the CE status in the GCC and underlines the importance of a quick transition to the CE. The empirical findings in this research offered a unique perspective on how GCC nations are still moving toward CE. GCC nations require additional work to meet their environmental goals, particularly in the context of CE model implementation, which requires frequent and substantial investments in environmental infrastructure. Furthermore, the labour force's performance in resource productivity and environmental protection was determined to be deficient. All GCC nations' local, regional, and national authorities, who are responsible for setting the groundwork for new laws, require good CE implementation and continual assessment (BINSUWADAN ET AL., 2023).

The MENA region countries are displaying a growing interest in sustainable development and the benefits of its implementation. Many national development strategies have been developed by the different Arab countries, which have included aspects of sustainable development such as the following examples:

- Qatar’s National Vision 2030 (2009)
- Saudi Arabia’s Vision 2030 (2016)
- The United Arab Emirates National Agenda Vision 21, National Green Growth Strategy, and Abu Dhabi Economic Vision 2030
- Jordan’s National Resilience Plan 2014–16 (2014) and Economic Modernization Vision 2033
- Lebanon’s National Sustainable Development Strategy (2018)
- Bahrain’s Vision 2030 (2007)
- Egypt’s Sustainable Development Strategy (2030)

There is one major difficulty that MENA societies must face. The Arab Forum for Environment and Development (AFED) finds in its ninth annual report that implementing the 2030 Agenda and reaching the SDGs in Arab nations cannot be accomplished without resolving the region's many violent conflicts (ARAB FORUM FOR ENVIRONMENT AND DEVELOPMENT, 2023).

Allen et al. (2017) examined an innovative technique created and deployed for an indicator-based evaluation of the SDGs in the Arab area, incorporating both thematic and conceptual approaches to allow for a policy-based and integrated assessment of progress and trends over the last two decades. Despite the positive advances over the last two decades, the evaluation indicated that the area is constantly falling short of worldwide criteria. In terms of fundamental requirements, there was clear development in the areas of water, sanitation, power, and health. Such advancements have come at a cost to the region's natural resource base, with the use of water greatly outstripping supply, rising reliance on food imports, and a tripling of greenhouse gas emissions. Alarming trends involving refugees and internally displaced people emphasize the major issues of peace, political stability, and security confronting the Arab region and have the potential to hinder progress on all other SDGs. Financing gaps continue to be an issue for the area, with investment dropping below worldwide norms and ODA failing to fill the region's huge shortfalls (ALLEN ET AL., 2017).

2.1.4 Circular Economy Adoption in Jordan

Jordan is a small country with limited natural resources, and like most other countries, it has followed a linear economic model in which commodities are generated by extracting resources and consumed until they are eventually disposed of as waste (take-make-dispose). In 2011 the Arabic region went through the Arabic Spring, which harmed Jordan as the country was hit by a skyrocketing percentage of unemployment, deacceleration in economic growth, and forced migration from the neighbouring countries. The increased population and the forced migrations contributed greatly to increasing the volume of the waste generated in the country in recent decades (POTTER ET AL., 2009).

Jordan hosts around 1.4 million Syrians due to the conflict in Syria, 646,700 of them are refugees, with 85% of them living outside the camps. Providing municipal and livelihood services to this group has strained Jordan's national resources, forcing the government to raise spending on subsidies, public services, and security (AL-HAMAMRE ET AL., 2017). The total municipal solid waste (MSW) generated by the residential population in 2015 was 2.6 million tons. It is expected to reach 6.0 million tons by 2039 (ALDAYYAT ET AL., 2019). Jordan's solid waste generation rate is expected to rise by 3% every year, in 2012, around 50% of Jordan's solid waste stream was organic, 16% was plastic, 15% was paper and cardboard, and the rest was a mix of glass and metal, among other sorts of waste (SWEEP, 2014). In this regard, Jordan has passed their National Waste Management Strategy, which calls for the adoption and improvement of circular economy principles in the solid waste sector. Among the strategy's key goals are incremental fee increases and increased reuse, recovery, and recycling of products

from the solid waste stream. By 2034, it is expected that 50% of recyclables (paper, metal, plastic, and glass) and 75% of bio-waste will be diverted from landfills to recycling and composting facilities (NSWMS, 2015).

Jordan's government decided to take a more sustainable and economically sustainable strategy by undergoing considerable reforms in the solid waste sector. The government has begun an ambitious set of legislations and policies aimed at establishing a sustainable solid waste management system as follows (MINISTRY OF ENVIRONMENT, 2020):

1. National Strategy and Action Plan for Municipal Solid Waste (NSAP) Management 2015–2034;
2. Revised Regulation of Waste Prevention and Fees No. 68 of 2016;
3. The Waste Management Framework Law No. 16 of 2020;
4. Regulation No. 44 of 2022 on Solid Non-Hazardous Waste Management.

Besides the policies related to waste management, Jordan has also introduced about 11 different economic reform plans and programs from 2002 to 2022, as the country is facing different challenges, especially the high unemployment rates and high public debt rates. The following are examples of the economic plans rolled out in the last two decades:

- Economic and Social Transformation Program 2002-2004
- Economic and Social Transformation Program 2004-2006
- The National Agenda 2006-2015
- The Executive Program 2007-2009
- The Executive Development Program 2011-2013
- The Government Action Program 2013-2016
- The Executive Development Program 2016-2018
- Jordan 2025 Vision
- Economic Growth Stimulus Plan 2018-2022
- Economic Reforms Matrix 2018-2024
- National Renaissance Project 2019-2020

After the economic devastation caused by the COVID-19 pandemic, the country had to bounce back and come up with a new vision for planning a successful decade ahead, aiming to improve the economic situation. In January 2022, King Abdullah II, in his royal message, addressed the need for a thorough economic overhaul by endorsing the economic modernization vision for 2033, identifying the standards of reform plans in multiple fields over the coming decade.

This vision acknowledges the ineffectiveness of the previous ones due to inadequate implementation, The 2033 vision is based on two strategic pillars: accelerated economic growth, unleashing the full economic potential, and improved quality of life for all citizens, while sharing the sustainability characteristics in both pillars of the future vision. The vision is based on eight key drivers: innovation and leadership, investment, future services, establishing Jordan as a top global tourism destination, high-impact industries, eco-friendly resources, quality of life, and environmental sustainability (JORDAN GOVERNMENT, 2023).

Al-Billeh et al., (2023) investigated Jordan's administrative control authority and the powers held by administrative and monitoring agencies by reviewing related literature and analyzing Jordan's administrative control authority regulations and laws, and assessing how effective they were. It was discovered that administrative control authorities have a good influence on sustainable development under Jordanian legislation, as they contribute to attaining social, environmental, and economic justice. Administrative authorities can have a role in developing laws and policies that encourage long-term development (AL-BILLEH ET AL., 2023).

Water scarcity remains the major looming challenge facing Jordan. The country is classed as a semi-arid to arid country with minimal water resources when compared to other Middle Eastern countries, and it is one of the poorest countries in the world in terms of water availability (MATOUQ ET AL., 2013). Through a cost-benefit and cost-effective study, Abu-Ghunmi et al. (2016) calculated the total opportunity cost of not replacing Jordan's present linear economic model with a circular one. The findings show that the expenses exceed the financial and environmental benefits of a circular approach. The outcomes of this analysis suggest that Jordan's adoption of a circular economy model in the water sector is economically justified. As a result, increasing the circularization of the water business is unavoidable if Jordan is to boost water-use efficiency and save finite water resources (ABU-GHUNMI ET AL., 2016).

Saidan et al. (2020) examined the existing situation of wastewater reuse in Jordan, taking into account 30 wastewater treatment plants with varying treatment techniques. The investigation grouped the 26 million m3 of groundwater abstraction in Jordanian governorates by key enterprises. The findings revealed that recovered wastewater can completely offset the industrial demand for fresh water in Amman, Zarqa, and Aqaba governorates. As a result, the environmental evaluation revealed that the recovered wastewater reuse scenario had a favorable influence on water depletion and climate change. The energy recovery study in small and medium-scale wastewater treatment facilities demonstrated that anaerobic sludge digestion may provide electricity with an offset of 0.11-0.53 kWh/m3 may help in reducing the costs of reclaimed wastewater (SAIDAN ET AL., 2020).

In Jordan, the current literature on circular economy implementation or practices is noticeably restricted, with a distinct lack of extensive studies on this topic. Despite increased global interest in shifting to circular economies as a sustainable and resource-efficient approach, Jordan appears to be understudied. The lack of scholarly publications addressing the circular economy in Jordan highlights a serious knowledge and understanding gap. As a result, the purpose of this study is to add considerably to the existing literature by shedding light on the current state, drivers, and barriers to adopting circular economy concepts in Jordan.

2.2 Sustainability: A General Overview

Businesses have been encouraged to achieve the goals of sustainable economic growth due to the increasing concerns about resource overconsumption, environmental degradation, and social inequity. The concepts of sustainability and sustainable development have gained increased attention in scientific research over the past years. The idea of sustainability was initially presented in 1987 by the United Nations World Commission on Environment and Development. The commission defined sustainability as "an economic development model that allows meeting the needs of the present generation without compromising the ability of future ones to meet their own needs" (WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, 1987). The concept has been dominant since the World Summit in Rio de Janeiro in 1992. It has been incorporated in different national and international constitutions of laws in different countries around the world (LUKE, 2005). The terms Sustainability and Sustainable development are used as synonyms in the academic and scientific fields, as Norton (2010) mentioned that the two concepts are often used interchangeably (NORTON, 2010). At the same time, Axelsson et al. (2011) have argued that there is quite a difference between the two concepts as they defined Sustainability as a societal policy concept with the primary goal of preventing natural resource depletion and stated that Sustainable development is more of a collaborative societal process involving a variety of stakeholders with varying levels of importance and authority (AXELSSON ET AL., 2011). In many cases, SD and Sustainability are dealt with as one approach, but not all researchers see them the same way. The approaches depend on the field of application, but what has been understood from the literature is that SD is the goal to be achieved through Sustainability. In other words, Sustainability is the process of achieving the SD goal.

The three pillars of SD are environmental, economic, and social sustainability, which must be balanced at an equal level of importance to achieve the goals of SD. The term Triple Bottom Line (TBL), which Elkington (1997) created, provides a framework to assess the performance of the business and the success of the organization using the three lines: economic, social, and

environmental (GOEL, 2010). TBL reflects the growth of the environmental agenda in a way that is both economical and socially conscious. Elkington defined the three lines as profit, people, and the planet, which are translated into economic, social, and environmental in the literature (Elkington, 1997). According to Alhaddi (2015), there was a lack of a rigid framework for sustainability in the literature, as some of the studies discussed only one line while others combined two or more lines. A few studies have included the economic line independently or in conjunction with the other two lines (ALHADDI, 2015). The company's influence on its employees and the social structure within its locality is included in the social component. Companies must consider the qualitative and quantitative impacts they have on their local, national, and worldwide resources when considering the environmental dimension. The company's financial success, capital flow, and economic participation in society are among the final, but not least, economic dimensions (JACKSON ET AL., 2011). Fig 5. Shows the TBL view of sustainability.

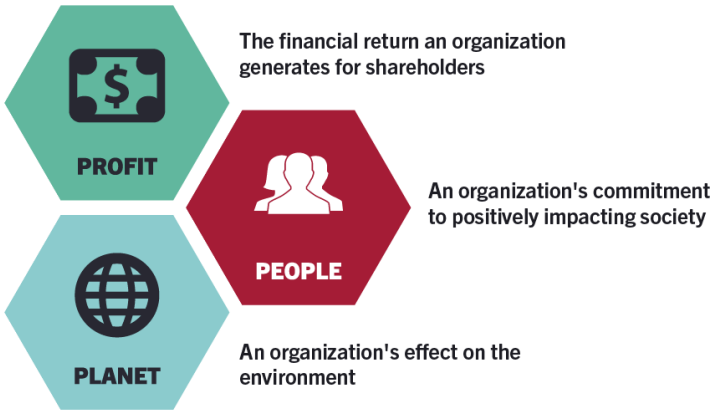

Figure 5. The Triple Bottom Line.

Source: Miller, 2020.

The environmental aspect of Sustainability aims to minimize the use of hazardous resources and tends to use renewable natural resources that be reproduced naturally to decrease the number of unwanted emissions that can be harmful to our planet by using different methods like recycling, reusing, reduction, redesigning, remanufacturing and other methods which are meant to prevent the depleting of the resources and waste minimization (RUGGIERI ET AL., 2016). The social aspect of TBL refers to safety and equality with a sustained working environment, which includes responsibilities and standards with continuously sharing work progress with the stakeholders and the public and paying taxes for the environmental damage if it happens by the organisations as a clean-up (GLAVIČ & LUKMAN, 2007). It also focuses on the population's social well-being, balancing individual needs with community needs (equity), public awareness and cohesiveness, and involvement and usage of local labourers and

companies (OLAWUMI & CHAN, 2018). The economic dimension of sustainability is concerned with the organization's effects on its stakeholders' economic situations as well as economic systems at the local, national, and global levels (BOWERS, 2010). It relates to an organization's approach toward creating value and balancing costs and revenues in the manufacturing and distribution of goods and services while considering the most effective use of resources to increase operating profit and market value (BANSAL, 2005). The UN adopted the Sustainable Development Goals (SDGs) in 2015 after they agreed and published a zero-draft proposal in their final session. Six aspects are included in the SDGs: dignity, human beings, the environment, prosperity, justice, and collaboration. The primary aim of the SDGs is to ensure that people do not survive at the expense of the environment in the process of reducing poverty and boosting economic growth, and to adhere to and implement the SD idea (STAFFORD-SMITH ET AL., 2017). Seventeen goals and 169 targets were set for the road map of sustainable development to guide SD in developed and developing countries in a way that embraces economic growth, social inclusion, and environmental protection (RUDRA & KURIAN, 2018). Out of 169 targets, 49 (29%) were regarded as well-established, 91 (54%) could be enhanced by being more precise, and 29 (17%) required substantial improvement, according to the findings of the International Council for Science in Paris (ICSU) (INTERNATIONAL COUNCIL FOR SCIENCE, 2015).

Table 1. shows the 17 SDGs and their aspects. On the 20th and 22nd of June 2012, the United Nations Conference on Sustainable Development (Rio+20) was held in Rio de Janeiro, Brazil. Rio+20 was one of the most important international events of 2012 and the largest event in UN history. It was a chance to refocus and re-energize political commitment to the three pillars of sustainable development: economic growth, social improvement, and environmental protection. Rio+20 is considered a crucial milestone in the development process of SDGs as the development proposal for the goals was included in the outcome document “The Future We Want”, It included a call to form an open working group tasked with establishing a set of SDGs. Nations gathered in September 2015 at the United Nations in New York to commit to achieving the Sustainable Development Goals (SDGs) by 2030 (UNITED NATIONS, 2015).

The Sustainable Development Goals report in 2018, which was released by the Department of Economic and Social Affairs of the United Nations, shows that the progress from 2015 to 2018 was slow and uneven in different development fields. The lack of funding was also another issue in achieving the SDGs by 2030, as the report shows that in 2017, the total amount of net official development aid was 146.6 billion dollars, down 0.6 percent from 2016. Official development aid as a proportion of donor nations’ gross national income (GNI) remained low, at 0.31 percent (SHI ET AL., 2019). SD theory has now become an important component of

government and corporate agendas. Sustainable development goals have become an integral component of the missions of research institutes worldwide (BETTENCOURT & KAUR, 2011).

Table 1. SDGS And their Aspects.

#	SDGs	Economic	Social	Environmental	Governance
1	NO POVERTY		✓		
2	ZERO HUNGER			✓	
3	GOOD HEALTH AND WELL-BEING		✓		
4	QUALITY EDUCATION		✓		
5	GENDER EQUALITY		✓		
6	CLEAN WATER AND SANITATION			✓	
7	AFFORDABLE AND CLEAN ENERGY			✓	
8	DECENT WORK AND CONOMIC GROWTH	✓			
9	INDUSTRY, INNOVATION, AND INFRASTRUCTURE	✓			
10	REDUCED INEQUALITIES	✓			
11	SUSTAINABLE CITIES AND COMMUNITIES		✓		
12	RESPONSABILE CONSUPMTION AND PRODUCTION	✓			
13	CLIMATE ACTION			✓	
14	LIFE BELOW WATER			✓	
15	LIFE ON LAND			✓	
16	PEACE, JUSTICE AND STRONG INSTITUTIONS		✓		
17	PARTNERSHIPS FOR THE GOALS				✓

Source: United Nations, 2015.

2.2.1 Corporate Social Responsibility (CSR) and Sustainability in Jordan

Since 2011, the Middle East region's instability and variations in the global oil market have had a significant impact on the use of fossil fuels such as oil and natural gas, which can be addressed by certain economic implications reflected in the oil price volatility. Considering the political implications of Jordan's unstable bordering nations, these situations, together with environmental considerations, highlight the necessity for Jordan to transition toward sustainable

development. In the economic modernization vision for 2033, sustainability is a core element of the vision, which shows the efforts of the country to achieve the sustainable development goals toward a green economy and attract investments in sustainable initiatives, hence increasing access to green funding (JORDAN GOVERNMENT, 2023).

Scholars claim that market-based concepts like corporate social responsibility and self-regulation under the shadow of hierarchy may solve the problems of sustainable development by providing dynamic change with an environmental and social conscience. Environmental and social reporting has begun to emerge in specific corporate reports, and some governments have begun to drive firms in this direction through regulation. CSR efforts and disclosures have gotten a high of attention from the government in Jordan. The Jordanian government has taken significant steps to improve CSR, including the enactment of legislation and regulations requiring Jordanian organizations to disclose social and environmental information in their annual reports, to ensure the quality and reliability of the annual report as a means of attracting foreign investment (ISMAIL & IBRAHIM, 2008). Investors are more willing to invest in firms that participate in CSR activities because CSR improves financial performance and access to capital, lowers operational expenses, boosts corporate reputation, and promotes consumer loyalty (SAID ET AL., 2009).

Jordan has a religiously inspired culture that urges social cooperation; therefore, CSR can be easily adopted, and the behaviour toward its implementation can be expected. Since the establishment of the country in 1921, CSR has been practised as a philanthropic work based on the tradition and the beliefs of the Arab norms and the religion of Islam. Later, particularly until the end of the twentieth century, most Jordanian firms were still unaware of the notion of CSR and saw it as part of their corporate philanthropy, with no distinct attitude towards social responsibility concerns. To that purpose, the Jordanian government has passed legislation and rules requiring Jordanian organizations to include social and environmental reporting in their yearly reports. Firms are expected to publish information on social plans and events such as environmental policies, grants for human resources, and community contributions (QA'DAN & SUWAIDAN, 2018).

Jordan's government has introduced legislation and regulations aimed at improving the quality and reliability of annual reports. The Environmental Protection Law was first enacted in 1995. This was followed by the Securities Commission Law No. 1 in 1998, and then the JSC's accounting and reporting standards and instructions in 2004. In 2006, the amended Environmental Protection Law was issued to safeguard the environment and promote the long-term sustainability of its elements. Furthermore, the 2009 corporate governance codes (CGC) require businesses to publish their environmental and social activities in Chapter Five (Article

2.4: Non-Financial Disclosure), stating that "Directors should review all of their disclosure standards relating to non-financial information." Non-financial information covers a wide range of topics, such as social responsibility."

These legal and regulatory reforms were adopted to guarantee that firms comply with environmental control requirements and to improve CSR reporting in annual reports (HADDAD ET AL., 2017). The Jordan Securities Commission adopted the corporate governance code for firms listed on the Amman Stock Exchange (ASE) in 2009, which mandates corporations to provide social and environmental data in their annual reports. This is addressed in Chapter 5 (Disclosure and Transparency), Article 5, which states: "The company shall disclose its policy regarding the local community and the environment" (JORDAN SECURITIES COMMISSION, 2009).

R. M. Alrousan, M. A. Bader, and I. Abuamoud (2015) investigated the impact of stakeholder approaches on hotel CSR in their study. The research was conducted on two Jordanian five-star hotels, and the data was evaluated using both within-case and cross-case analysis. The findings of the study clearly show that hotels in Jordan are exploring innovative ways to include CSR internal and external elements in their operations. The integration of these CSR components modifies the core process of stakeholder evaluation. The data reveal that hotels undertake CSR in terms of legal, ethical, and economic issues. Finally, the findings of this study show that the stakeholders' interaction with the CSR method validates the stakeholder theory (ALROUSAN ET AL., 2015).

Qa'dan, M. B. A., & Suwaidan, M. S. (2018) assessed the extent and nature of corporate social responsibility (CSR) disclosure in Jordan. The study also empirically explored the impact of board composition parameters on CSR disclosure levels. During the period (2013-2015), content analysis was used to examine the scope and form of CSR disclosure in the annual reports of Jordanian manufacturing businesses listed on the Amman Stock Exchange. The possible influence of board composition and ownership structure on CSR disclosure level was investigated using regression analysis employing panel data. It was found that a manufacturing business listed in Jordan has, on average, declared 30.8 percent of the 42 CSR elements that are included in the disclosure index. Board size was shown to be substantially and favourably correlated with the degree of CSR disclosure. The amount of CSR disclosure on the board was found to be significantly impacted negatively by the percentage of independent (non-executive) directors on the board, the dual roles of CEO and chairman, the age of the directors, the concentration of board ownership, and the proportion of outstanding shares held by institutional shareholders (QA'DAN & SUWAIDAN, 2018).

Qaisi, F. A. (2019) studies the influence of CSR components (environmental, social responsibility, and human resources) on financial success as assessed by return on assets. The study selected (15) Jordanian firms listed on the Amman stock exchange as a sample for this research from 2012 to 2016. Data from yearly reports was collected and analyzed using simple and multiple linear regression techniques. It was found that the three dimensions of CSR (environmental, social responsibility, and human resources) have a positive impact on financial performance, as measured by the return on assets in the tested firms (QAISI, 2019).

Al Fadli et al. (2020) investigated the effect of board independence on the degree of corporate social responsibility (CSR) reporting in Jordan over time, as well as the level of influence before and after the release of the Jordanian corporate governance code (JCGC) in 2009. For the years 2006-2015, data from all non-financial listed businesses on the Amman stock market were collected and analyzed. The annual reports' CSR reporting was evaluated using the content analysis approach. The association between board independence and the degree of CSR reporting was investigated using ordinary least square regression. The findings show that board independence has a favourable and significant impact on the degree of CSR reporting. This impact grew dramatically once Jordan's corporate governance legislation was issued. According to the findings, the presence of independent directors on the board promotes corporations to provide extra CSR information as one of the legitimation tactics to manage stakeholder expectations (AL FADLI ET AL., 2020).

Ghaleb et al. (2021) investigated the association between CSR reporting, board gender diversity, and real earnings management. The study additionally investigates how the link between CSR reporting and actual earnings management varies between organizations that are gender diverse and those that are not. CSR reporting was evaluated using content analysis. The ordinary least squares regression method was used to investigate the associations for 475 firm-year data listed on the Amman Stock Exchange between 2011 and 2016. According to the findings, CSR activities relate to reduced real earnings management, implying that more socially responsible enterprises in Jordan are less likely to participate in real earnings management methods. Second, organizations with gender diversity have fewer genuine earnings management techniques, implying that female directors strengthen the board's monitoring function and prevent earnings manipulation, thus boosting financial reporting quality. It was also found that board gender diversity impacts the link between CSR and real earnings management. Subsample analyses support the moderating influence of board gender diversity, as the negative link between CSR disclosure and actual earnings management is observed in companies with female directors but not in companies without female directors. (GHALEB ET AL., 2021).

To determine whether there was a change in the scope and caliber of disclosure practices before and following the new CSR regulations, Omar and Alkayed (2021) looked at the amount and quality of CSR disclosure in Jordan for the years 2005–2006 and 2014–2015. The study also tried to find out if rules have a significant role in altering CSR disclosure practices. A descriptive study was conducted on the annual reports of fifty-five manufacturing businesses listed on the Amman Stock Exchange for the years 2005–2006 and 2014–2015, to determine the scope and quality of CSR. The findings show that the scope and quality of mandated disclosures for Jordanian enterprises increased significantly over the post-regulation era (2014-2015) compared to the pre-regulation period (2005-2006). However, the volume and quality of voluntary disclosure did not alter between the two periods for Jordanian enterprises (OMAR & ALKAYED, 2021).

Zraqat et al. (2021) evaluated the association between SCR disclosure and firm performance as an indication of corporate socially responsible conduct and corporate market performance of Amman stock exchange-listed businesses. The study focused on the annual reports of 42 publicly traded firms from 2014 to 2019. The findings show a negative but statistically significant link between CSRD and corporate market performance. The findings contradict the assumption of a commercial justification for CSR, indicating that the greater the CSRD, the poorer the Market performance. The findings also revealed a lower degree of awareness among investors and market participants, supporting previous claims on the disparity in market perceptions of CSR in developing countries vs industrialized countries (ZRAQAT ET AL., 2021).

AL-Qudah et al., (2022) investigated the influence of social corporate obligations on Jordanian manufacturing enterprises' financial reporting quality. The corporate reports of the top fifteen manufacturing companies have been reviewed from 2010 to 2020. According to the findings, social corporate obligations have a favourable influence on the financial reporting quality of Jordanian manufacturing enterprises. It was established that Jordan's listed manufacturing enterprises are more responsible in terms of social responsibility, which explains their excellent financial performance and quality financial reporting (AL-QUDAH ET AL., 2022).

2.3 Supply Chain Management (SCM): A General Overview

The supply chain is a series of facilities that purchase raw materials, turn them into intermediate items, and then distribute finished products to customers via a distribution system. Procurement, production, and distribution are all covered. To fulfill orders efficiently, one must understand the interconnections and interdependencies between all the supply chain's main pieces (LEE & BILLINGTON, 1995). Supply chain management is considered a critical approach for

organizations to compete effectively in the market. Since the term was introduced in 1982, it has gained increased interest in the literature as well as practice. Over the last 20 to 30 years, several definitions of SCM have been proposed, but none of them is universal. Part of the reason for the absence of a common definition of SCM is how the supply chain idea was established (CROOM ET AL., 2000). Supply chain management was defined by Christopher (1998) as: “a network of organizations that are involved, through upstream and downstream linkages in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer” (CHRISTOPHER, 1999). As per this definition, the aim of SCM is customer satisfaction. All processes and activities along the SC must be designed to meet the customers’ needs. The Council of Supply Chain Professionals (CSCMP), the leading association of supply chain practitioners, academics, and academicians, defined supply chain management as: “SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management within and across companies” (BALLOU, 2007). JB Houlihan (1988) has identified the distinctions between supply chain management and traditional materials and production control: “1) The supply chain is viewed as a single process. Responsibility for the various segments in the chain is not fragmented and relegated to functional areas such as manufacturing, purchasing, distribution, and sales. 2) Supply chain management calls for, and in the end depends on strategic decision-making. “Supply” is a shared objective of practically every function in the chain and is of particular strategic significance because of its impact on overall costs and market share. 3) Supply chain management calls for a different perspective on inventories used as a balancing mechanism of last, not first, resort. 4) A new approach to systems is required, integration rather than interfacing” (HOULIHAN, 1988).

In the literature, the supply chain has been studied from multiple perspectives. Due to its diverse roots, formulating a single, universally accepted definition of SCM remains challenging. Despite the difficulties in creating a common definition of SCM, Mentzer et al. (2001) explore various definitions of the terms "supply chain" and "Supply Chain Management" to synthesise two definitions, one for supply chain and one for SCM. They are as follows: A supply chain is a „set of three or more entities directly involved in the upstream and downstream flow of products, services, finances, and information from a source to the customer” (JACKSON ET AL., 2011). Supply chain management is „the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, to improve the long-term performance

of the individual companies and the supply chain as a whole" (MENTZER ET AL., 2001). Three main reasons for forming supply chains were identified in the literature (SPANAKI ET AL., 2018):

1. Reducing the inventory investment in the chain.
2. Increasing customer service
3. Helping to build a competitive advantage

Tracking the SCM back in the years shows the continuous evolution of the concept. Since its introduction in the early 1980s, SCM has become one of the most prominent management ideas (LA LONDE, 1997). Due to the intense global competition, the development of SCM continued throughout the 1990s, and world-class companies were driven to produce low-cost, high-quality, and dependable goods with more design freedom (TAN ET AL., 1998)

The concept was broadened to include management of all different functions within the chain, minimising the overall cost instead of only being related to inventory management (CHOPRA & MEINDL, 2001). The growth of supply chain management continued throughout the 1990s, as companies expanded best practices in corporate resource management to encompass strategic suppliers and the logistics department. The definition of supplier efficiency was expanded to incorporate more comprehensive cost and quality reconciliation. Rather than repeating non-value-added processes like receiving inspection, manufacturers relied on suppliers' quality control by acquiring solely from a small number of approved or certified vendors (INMAN & HUBLER, 1992).

Different authors have divided the evolution of SCM into stages. The evolution has been segmented into three different stages as follows (LAVASSANI ET AL., 2008):

1. The creation period began in the 1980s when the customer and supplier realized the advantages of working together. The word SCM appears for the first time during this period.
2. The integration period began in the 1990s, with the introduction of IT systems (ERP, EDI, and so on). These systems are designed to manage not only the resources of a single company but also the resources of the entire supply chain.
3. The implementation of trade liberalization policies and the founding of institutions such as the World Trade Organization (WTO) and other international institutions that deal with global/regional trade policy marks the beginning of the globalization period.

Ballou (2007) has described the evolution of SCM in a figure that shows the different stages of activities and the integration between them through the years, the SCM last stage (2000+) stage

in which all operations are fully integrated, resulting in cost savings, a faster new product development process, enhanced information flow, improved cash flow, and higher customer satisfaction (BALLOU, 2007). Fig 6. Shows the SCM evolution accordingly.

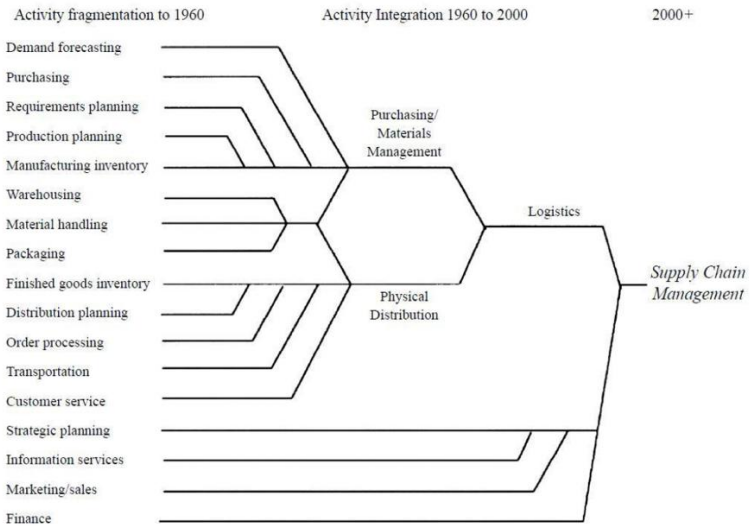

Figure 6. ***Supply Chain Evolution.***
Source: BALLOU, 2007.

2.3.1 Circular Supply Chain Management

The environment is an important part of the triple bottom line, and it has been in the news recently due to climate change and rising energy prices. The increased public awareness has grown the attention on reverse logistics and circular supply chains (DOWLATSHAHI, 2000) CSCM is seen as the backbone of implementing the Circular Economy principles at a micro and meso level. Environmental rules have compelled businesses to take responsibility for the end-of-life of their products as well as the usage of packaging materials. A variety of variables can influence the acceptance, implementation, and effective operation of a CSCM. Customer awareness of environmental protection has risen in recent years, and this has played a key role in the adoption of CSCM implementation (WEI & ZHAO, 2013). Governments in numerous nations have adopted legislation and regulations to incorporate CLSC principles because of greater awareness (JAYARAMAN ET AL., 2008). Government regulations compelled manufacturers to manage their end-of-life (EOL) items. For example, in 2003, the Waste Electrical and Electronic Equipment (WEEE) directive (directive 2002/96/EC) entered European legislation, establishing mandatory collection, recycling, and recovery standards for all sorts of electrical products, with a minimum rate of 4 kilos per person per year (GEORGIADIS & BESIOU, 2010).

The terms "sustainability" and "environment" have also been conflated to some extent. The environmental aspects of supply chain management have been the research's leading focus over the past 20 years (CARTER & EASTON, 2011). Many previous scholars have argued the importance of integrating the circular economy into supply chain management practices. Current macroeconomic, regulatory, and environmental changes are making more resource-efficient corporate strategies more appealing to stay competitive. Despite the CE's growing popularity in political and corporate circles, the scholarly debate around it is still in its youth. The literature on the subject is fragmented and scattered among several more established topics, with little emphasis paid to implementation and the consequences for business models and supply chains (AMINOFF & KETTUNEN, 2016). The decision to use a circular supply chain strategy demonstrates that the company has begun to think about environmental management and product lifecycle management, as well as the ability to differentiate traditional supply networks from more sustainable CSCs (GUIDE & VAN WASSENHOVE, 2003). Companies have realized that there are different ways to establish closed-loop supply chain models to help them grow revenue and expand into new markets. CSCs began with the implementation of new industry standards and a focus on environmental problems. This involves collaborating with vendors to minimize the environmental effects of products and operations.

Circular supply chains are difficult to design and operate, but they also have serious implications for the supply chain (SAVASKAN ET AL., 2004). They must include typical supply chain activities like efficient distribution and reverse supply chain activities like returns, product repair/refurbishment, testing, sorting, and reselling (AMINOFF & KETTUNEN, 2016). Guide Jr, V. D. R., & Van Wassenhove, L. N. (2009) have defined closed-loop supply chain management as: “The design, control, and operation of a system to maximize value creation over the entire life cycle of a product with the dynamic recovery of value from different types and volumes of returns over time” (GUIDE JR ET AL., 2009). Closing the loop is a method of reversibly linking the end point of a forward supply chain to its beginning point, resulting in a unique system and value. Forward activities cover everything from creating a new product to promoting it. Reverse logistics, on the other hand, refers to all the steps involved in closing the loop (DE GIOVANNI & ZACCOUR, 2014).

Processing damaged products, seasonal inventory, replenishment, salvage, recalls, and surplus inventory are all part of reverse logistics. Recycling initiatives, hazardous material programs, old equipment disposition, and asset recovery are all included (ROGERS & TIBBEN-LEMBKE, 1999). Reverse logistics, product disposal (sort, test, and grade), remanufacturing/repair, and remarketing are all examples of product recovery operations (GUIDE & VAN WASSENHOVE, 2002). Suppliers, manufacturing plants, distribution

centres/warehouses, retailers/customers, and recovery facilities are the five essential components of a CSC. Many businesses are paying greater attention to their reverse logistics strategies as they know that a well-designed reverse supply chain may save and reduce costs, increase customer satisfaction, and gain a competitive advantage (TONANONT, 2009). The American Reverse Logistics Executive Council defined reverse logistics as: “The process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin to recapture value or proper disposal” (ROGERS & TIBBEN-LEMBKE, 1999). According to Thierry, Wassenhove, Van Nunen, and Salomon (1995), reverse logistics is widely employed in the car industry, including BMW and General Motors. Hewlett Packard, Storage Tek, and TRW are among the firms that use reverse logistics as a supply chain technique (THIERRY ET AL., 1995). Reverse logistics might eventually assist businesses in being more competitive within their sector (SRIVASTAVA, 2007). Fig 7. shows a generic supply chain for both forward and reverse logistics. Solid lines and dashes represent the traditional (forward) and reverse supply networks, respectively. Possible decisions on returning products are made at the return evaluation step.

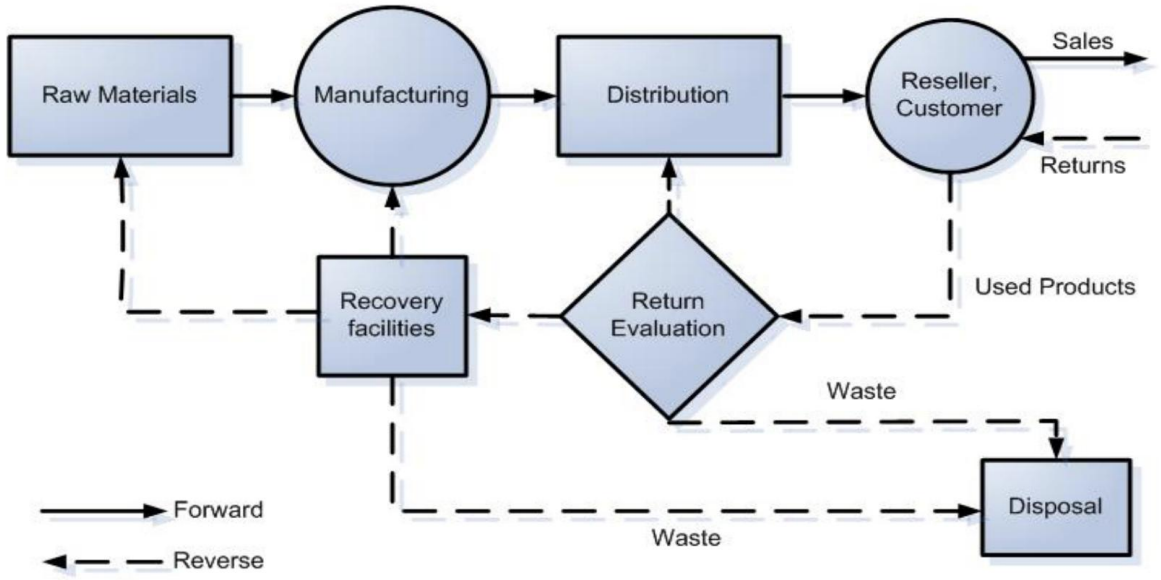

Figure 7. ***Generic Supply Chain.***

Source*: Tonanont, 2009.*

Several researchers have concentrated on determining the most effective method for collecting used items. It's also crucial to consider how to handle the goods gathered. The after-collection techniques of the corporations and the structure of the formed loop are inextricably linked. As a result, numerous reprocessing alternatives such as remanufacturing, recycling, and refurbishment, are considered, all of which might impact the structure (SHEKARIAN & FLAPPER, 2021). The recovery choice determines the quantity of value recovered from the

remanufactured product. The academic literature describes six alternative options: reuse, repair, remanufacturing, refurbishing, retrieval, and recycling (DE BRITO & DEKKER, 2004), (FLEISCHMANN ET AL., 1997), (THIERRY ET AL., 1995). Remanufacturing has become a significant industry in Europe, driven by both economic viability and regulatory pressures imposed by the European Union. Recent legislative measures, such as the Waste Electrical and Electronic Equipment (WEEE) Directive and the End-of-Life Vehicles (ELV) Directive, are being progressively implemented across EU member states, either at the industry level or within individual companies. (ÖSTLIN ET AL., 2008).

Implementing the various directives would create an atmosphere in which remanufacturing becomes profitable, assuming it wasn't previously profitable before the take-back legislation was implemented. Companies will have greater control of their remanufacturing industry if these directions are executed company by company, and each firm will be accountable for its goods (WEBSTER & MITRA, 2007). The original manufacturer may not participate in the gathering and remanufacturing of discarded objects, which is done by third-party manufacturers, for cost or brand concerns (ZHANG & REN, 2016). The remanufacturing sector was worth US$ 53 billion in 1996, with around 73,000 companies. The sales statistics were comparable to the steel industry in the United States. The direct employment statistic of 480,000 was double that of the American steel sector and equaled that of the consumer durables industry (LUND, 1996).

Remanufacturing has several general features that complicate the supply chain when compared to manufacturing. For example, a corporation may collect discarded items (also known as cores) from core providers, who are often end customers but might also be trash yards, core brokers, or incurrence organizations. In terms of end consumers, estimating the quantity and timing of returns is quite challenging. Another complication is that the quality of the items utilized is frequently unknown (DANIEL ET AL., 2000),(VAN NUNEN & ZUIDWIJK, 2004). Many businesses have learned that collecting cores and recycling post-consumer waste may save them hundreds of millions of dollars each year, allowing them to save production costs while also improving their social position (LEE ET AL., 2011), (ZHANG & REN, 2016). Remanufacturing was defined by Lund, R. T. (1983) as: "…an industrial process in which worn-out products are restored to like-new condition. Through a series of industrial processes in a factory environment, a discarded product is completely disassembled. Useable parts are cleaned, refurbished, and put into inventory. Then the new product is reassembled from the old and, where necessary, new parts to produce a fully equivalent- and sometimes superior- in performance and expected lifetime to the original new product" (LUND, 1983). Material flows are critical to the entire remanufacturing system's success (GUIDE JR, 2000). Traditionally,

closed-loop supply networks were thought to consist of two separate material supply chains: forward and reverse. In general, the forward chain is concerned with the flow of physical items from the manufacturer to the consumer. In contrast, the reverse chain is concerned with moving old physical products from the customer to the remanufacturer, who then acts as a supplier. These flows are subsequently "closed" by operations such as remanufacturing (ÖSTLIN ET AL., 2008). The customer frequently functions as both a customer for remanufactured goods and a supplier of cores to the remanufacturing firm, which is one of the fundamental contrasts between the "forward" and "closed" supply chains (KRIKKE ET AL., 2004).

As a result of the increasing emphasis on sustainable development and a green economy in a variety of industries, there has been a significant amount of study in the fields of supply chains and logistics. Circular Supply Chain Management (CSCM), Green Supply Chain Management (GSCM), Closed-Loop Supply Chain Management (CLSCM), Reverse Supply Chain Management (RSCM), Reverse Logistics (RL), and Sustainable Supply Chains (SSC) are some of the keywords that have been utilised. CSCM, CLSCM, RSCM, and GrSCM challenges are more complicated, requiring greater work to govern forward and reverse logistics while considering environmental consequences (KUMAR & KUMAR, 2013). The CSC has some changes compared to the traditional SC. The traditional supply chain tries to reduce costs and increase supply chain efficiency to maximise economic advantages. CSCM also aims to optimise economic benefits, minimise resource and energy consumption, and reduce pollutant emissions to establish a socially responsible company with a balance of economic, social, and environmental consequences (KUMAR & KUMAR, 2013). However, adopting CSC designs may be tied to considerable initial investments due to the requirement to set up specific facilities for collecting and reprocessing items after the end of their usual service life (NAGASAWA ET AL., 2017). Because of the long-term implications of such decisions, the design of CSCs is a highly important strategic decision. To cautiously examine the viability of CSC arrangements, proper planning and design techniques are necessary (MAHMOUMGONBADI ET AL., 2021). To maximize earnings or decrease overall expenses during the life cycle of a product, a successful CSC should be effectively planned, regulated, and operated (SPANAKI ET AL., 2018). Many challenges, including facility allocation, product flow control, and the trade-off between environmental preservation and cost reduction, must be considered by supply chain managers while designing the CSC network (PRAJAPATI ET AL., 2019), (GOVINDAN & SOLEIMANI, 2017).

2.4 The Application of CSCM in the FMCG Industry

The importance of the Fast-Moving Consumer Goods (FMCG) industry comes from its consistency in a large part of our daily purchases, as FMCG products are rapidly consumed and sold quickly at relatively low costs (LEAHY, 2011). The FMCG sector comprises mainly processed foods, ready-to-eat meals, beverages, fresh or frozen and dry goods, medications, cosmetics, and other non-durable products. Therefore, it can be categorised into three major categories: food, beverage, and household. FMCG is a critical industry that meets a massive volume of everyday human demands regardless of age, gender, or boundaries. There appears to be a fundamental need to use green methods in FMCG supply chains because of the importance of the subject, as well as growing general awareness of technologies used in product manufacturing and distribution, in addition to the importance of the goods being produced. Due to the industry's size, achieving environmental criteria and sustainable development may result from its greener supply chain. Thus, leading FMCG firms' green supply chain managers work to use green logistics and enhance their environmental performance throughout the supply chain as a tactical weapon to obtain an advantage over their competitors (ARLBJØRN, 2010).

The FMCG industry has a large potential to implement the CE principles since it produces goods with high throughput volumes, frequent purchases, and large physical volumes offered at affordable prices (EMF, 2013). Currently, FMCG makes up 35% of the economy's material inputs, a significant portion of consumer expenditure on physical items, and 75% of municipal solid waste disposal (EMF, 2012). The increasing use of single-use packaging is quickly evolving in the FMCG sector, which makes it one main driver of unsustainable consumption development as the single or limited-use and disposal products can conveniently and temporarily satisfy customer needs before the remaining packaging enters a linear resource flow at the end of their life (VAN DER & AURISICCHIO, 2019). The FMCG industry uses many resources since the packaging is typically made of virgin materials, which can be difficult to recycle (BOCKEN ET AL., 2011). For instance, in Europe, the average amount of packaging trash created per individual in 2019 was 177 kg, and this amount has only increased over time (EUROSTAT, 2021). Ten million tons of plastic waste are thought to be received by the world's oceans annually, including single-use containers, endangering biodiversity and marine ecosystems (BOCKEN ET AL., 2022). Hence, Fast-moving consumer goods (FMCG) use endangers the environment since it fuels global waste problems and resource depletion that might cause shortages in the future (MACARTHUR, 2017).

The circular economy can provide innovation opportunities for the FMCG industry as it's an alternative paradigm to the linear economy "take-make-dispose" (KUZMINA ET AL., 2019).

FMCGs should be developed in a way that promotes the greatest value of resources, according to circular economy principles (LACY ET AL., 2020). It has been argued that in a circular economy, mechanisms should be created in a way that enables dematerialization of consumption, enhanced resource usage, and resource recovery, while also taking the effects of changes on relevant business models into account (BAKKER ET AL., 2014), (BOCKEN ET AL., 2016). It is suggested that firms may benefit from circular business models by cutting costs on labour, materials, and energy while also having the ability to eliminate harmful externalities, including toxic materials, water pollution, and greenhouse gas emissions (BOCKEN ET AL., 2016). In start-up companies, circular business models (CBM) involve incorporating CE techniques into the business model design process from the stage of developing a company idea (GULDMANN & HUULGAARD, 2020), while in major organizations, this involves altering current linear economy innovation processes and it's marked by intense experimentation in pursuit of an ambitious circular value creation objective (WEISSBROD & BOCKEN, 2017). Because only minor changes are typically possible after product specifications are set, it is crucial to incorporate circular economy concerns early in the product design process. Once resources, infrastructures, and activities have been committed to a particular product design, it is challenging to change course (WEISSBROD & BOCKEN, 2017).

Economic value is produced for the participants in the value chain via a conventional linear business model. Since a circular business model (CBM) captures economic value while sustaining or regenerating environmental, social, and economic capital outside its organizational bounds, it requires a broader understanding of value and stakeholders (SCHALTEGGER ET AL., 2016). CBM blends economic and environmental value creation by switching the business logic from making profits from one-time sales of items to making profits from a continuous flow of recycled materials and products over time (BAKKER ET AL., 2014). The flow of resources is being slowed by extending the utilisation of the products or increasing product usage, and resource loops are being closed by recycling post-use materials and re-injecting them into the manufacturing system, enhancing the material utilisation time (STAHEL, 2010). The primary challenge for FMCG manufacturers seeking to address sustainability is applying sustainable policies and practices to other supply chain partners. Stakeholders do not distinguish between the many actors and their responsibilities in the supply chain. As a result, the sustainability performance of an FMCG manufacturing business may be compromised by unethical supply chain partners (SANCHA ET AL., 2016).

The circular business model concept encompasses concepts such as product-service systems (PSSs), which are particularly important to the FMCG industry. It has been recommended that in a circular economy, systems like PSSs should be designed to enable dematerialisation of

consumption, intensified resource usage, and resource recovery while also taking the impact of changes on relevant business models into account (STAHEL, 2013). The term “product–service systems” (PSSs) has been defined as “a marketable set of products and services capable of jointly fulfilling a user's need. The product/service ratio in this set can vary in terms of function fulfilment or economic value” (GOEDKOOP ET AL., 1999). PSSs are relevant for the FMCG industry because PSS is a value-capturing approach that shifts the emphasis from products to generating services that sell satisfaction rather than goods to fulfil client demands (MANZINI & VEZZOLI, 2003). PSSs can constitute a revalorization service, which includes offerings that try to close the product material cycle by accepting items back, reusing useful components in new products, and recycling materials if reuse is not possible (MONT, 2002). Yang, M. et al., (2018) have adopted an exploratory case study of a big manufacturing corporation with a typical product-based business model and three different types of PSS business models (i.e., product-, use-, and result-oriented PSSs). The supply chain activities of four diverse company models are examined, as are the corresponding circularities. The results demonstrate that business models like result-oriented PSS have tighter and more efficient supply chain operations, which implies the system for repair, reuse, and remanufacturing is faster and more frequent (YANG ET AL., 2018).

Mishra et al. (2018) have explored the rule of the closed-loop supply chain (CLSC) in creating value from the supply chain process in the FMCG sector. The study covers four circular economy-led closed-loop product case studies from a major European FMCG firm and assesses how these cases created value, for whom value was created, and important implementation obstacles. This research aims to gain a better understanding of consumer reactions to remanufactured items, as well as the link between product design and recovery efforts. The findings emphasise the fact that each case is unique. Closing loops and developing effective value propositions are difficult tasks that need the simultaneous reconfiguration of essential building elements to achieve consumer acceptance and corporate sustainability (MISHRA ET AL., 2018).

Rizos et al. (2019) explored the opportunities and challenges associated with applying circular economy strategies to the mobile phone value chain. Their analysis included a review of the value chain and different circular approaches, which was complemented by a scenario analysis aiming to estimate the potential effects of specific methods such as recycling, refurbishment, and extending product lifespan. The study highlights a considerable untapped potential for material recovery, both from the yearly stream of mobile phones nearing the end of their life cycle in Europe and from the accumulated stock of idle, so-called hibernating devices found in EU households. Achieving high recycling rates for these devices may provide chances to reduce

EU reliance on imported materials and increase the availability of secondary raw materials on the EU market. Circular techniques in the mobile phone value chain can also result in employment development in the refurbishing industry. Extending the life of mobile phones can also help to reduce CO2 emissions by delaying the creation of new devices (RIZOS ET AL., 2019).

Gong et al. (2020) have addressed a critical gap in the literature by showcasing current initiatives being used in the UK FMCG industry through an in-depth examination of four case organisations that have joined the UK Plastic Pact, a pioneering collaborative initiative on plastic recycling. Plastic has emerged as a highly significant concern for the FMCG business, according to the findings. FMCG companies are implementing different initiatives. Core practices included modifications to packaging through innovation or partnership with their supply chain, consumer education through package labels and in-store campaigns, and merchants testing collection facilities to simplify the CE process and promote participation. The research also highlighted fundamental obstacles, such as a lack of infrastructure to support plastics in the CE and technical packaging problems (GONG ET AL., 2020).

Bocken et al. (2022) have investigated the success determinants, drivers, and challenges of an FMCG reuse business model using a mixed-methods approach. Using a mixed-method approach, we investigated the success determinants, drivers, and challenges of an FMCG reuse business model. Brand and retailer alliances, customer involvement, operational efficiency, business model profitability, and the formation of an ecosystem were identified as five success criteria. The potential positive environmental impact is the key motivator for customers to engage in the circular business model, while there were worries about additional environmental impact due to logistics in the e-commerce model. Furthermore, customers value the reuse model's ease of use and accessibility. Costs have been regarded as the most significant impediment to firms engaging in reusability (BOCKEN ET AL., 2022).

Kuzmina et al. (2019) used an inductive scenario planning technique to investigate the future possibilities of the FMCG business within a CE framework. Five future scenarios for the FMCG business were developed: (1) Rinse and Reuse, (2) The Cycling of Pure Materials, (3) The Rise of the Circular Retailer, (4) A World Without Supermarkets, and (5) Connected Living. The scenarios offered are glimpses of what a circular future may hold and, as such, conceptual tools for influencing a circular future (KUZMINA ET AL., 2019).

2.5 Previous studies on the drivers and the barriers of CSCM

For the bibliometric analysis, term co-occurrence was employed as the primary method. The results are visualised as a network graph, where the size of each node indicates the frequency

of a term's appearance, the thickness of the connecting lines represents the strength of the association between terms, and the clusters illustrate how frequently specific terms are examined in conjunction with one another. (PERIANES-RODRIGUEZ ET AL., 2016). To identify the drivers and barriers of CSCM, a co-occurrence analysis of terms from articles in the dataset was carried out. The objects of interest in this study are keywords, which were collected from the title, abstract, and keyword list of all publications retrieved. The frequency with which two keywords appear together in a document determines a co-occurrence connection. The greater the frequency with which two keywords appear together in a single document, the stronger their co-occurrence association. Clusters of frequently co-occurring terms suggest general thematic topics or research issues covered in the CSCM literature. The bibliometric maps have been constructed and developed using VOSviewer, which is intended to aid in the creation and visualization of easily interpretable bibliometric maps. It organizes data from the literature effectively, identifying similarities between selected things and major topics within the boundaries (TOURINHO ET AL., 2021). The following sub-sections provide additional information to aid in the analysis of the co-occurrence bibliographic maps.

2.5.1 Drivers and enablers for CSCM

Using the co-occurrence of terms approach, fig. 8 illustrates the primary drivers and possibilities for SSCs identified in the bibliometric study. The most co-occurred terms are connected to supply chain management, green supply chain management, sustainability, sustainable development, sustainable supply chain management, environmental management, barriers, interpretive structural model, and implementation process. The map separated clusters by their colors; the red clusters show the connection of terms like supply chain management, environmental management, green supply chain management, and barriers. The connection with (barriers) indicates that these two terms have been explored together in the literature. The bibliometric background validates the themes addressed in the study and enables the conducting of a more forceful bibliometric search to be reviewed.

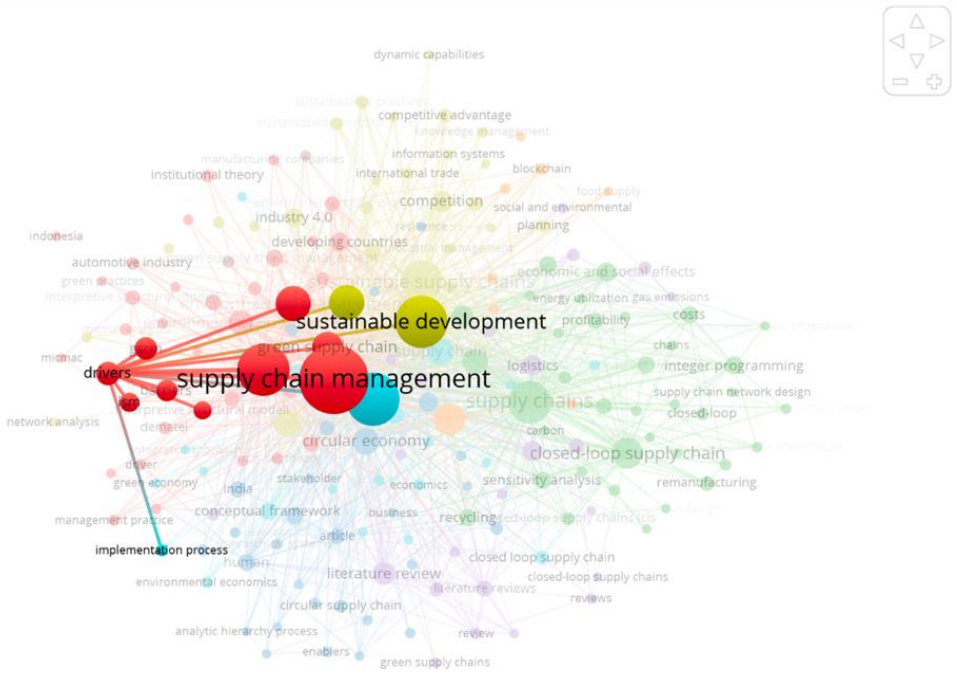

Figure 8. ***Drivers/Enablers and CSCM Analysis.***

Source: Developed by the Author.

Implementing circularity initiatives in supply chain management is becoming increasingly crucial for organisations today; hence, the major purpose of this research is to identify the features that motivate and allow such activities. However, adopting circular economy-related initiatives and practices is frequently affected by internal and external variables (SCHRETTLE ET AL., 2014). As a result, identifying the critical drivers emphasized by various internal and external factors aids in the achievement of overall circular supply chain goals and promotes extensive stakeholder engagement (SAEED & KERSTEN, 2019). External and internal variables (such as government, community, investors, consumers, suppliers, and workforce) influence firms to implement SSC initiatives (HASSINI ET AL., 2012). The drivers of SSCM can be defined as "motivators or influencers that encourage or push organisations to implement sustainability initiatives throughout the supply chain" (SAEED ET AL., 2017).

Mann, Hanuv, et al. (2010) have identified the drivers that motivate turning into SSC. These drivers were classified into two main categories (external and internal drivers). Two drivers were identified as external to the business, which are: "legislation drivers" and "environmental drivers", while three other drivers were identified as internal drivers: "financial drivers", "internal business process", and "drivers related to the customer" (MANN ET AL., 2010).

Tay, Mee Yean, et al. (2015) have summarised the drivers of SSCM in two main categories: internal and external drivers by reviewing the literature. The external drivers include the government, competitors, customers, suppliers, investors, and NGOs. While the internal drivers

were related to people issues, strategic issues, and functional issues (TAY ET AL., 2015). Saeed, M. A., Waseek, I., & Kersten, W. (2017) have adopted a systematic literature review to address the drivers of SSCM. Three main external drivers were identified, including market pressure, societal pressure, and regulatory pressure. In contrast, the internal drivers were classified into four groups: corporate strategy, organization's culture, organization's resources, and organization's characteristics (SAEED ET AL., 2017). Zimon et al. (2020) categorised the key drivers of sustainable supply chain management (SSCM) implementation into three overarching groups. The first includes internal organisational factors such as managerial commitment, employee involvement, a supportive corporate culture, productivity enhancement, waste reduction, and the pursuit of competitive advantages. The second group relates to stakeholders across the supply chain—specifically customers and suppliers—encompassing aspects like compliance with social and environmental standards, demand for green products, requirements for reverse logistics, and active participation of supply chain partners. The third category involves external institutions and broader contextual influences, including regulatory and institutional pressures, international environmental regulations, market competition, corporate reputation, and social responsibility (ZIMON ET AL., 2020).

For the application of GSCM at a chip manufacturer, Trowbridge (2001) distinguished between internal and external drivers. Internal drivers involve the intention to enhance risk management in response to possible supply chain disruptions, along with collaboration with suppliers to develop substitute materials and equipment that lessen environmental impacts. External drivers include stakeholders such as customers, investors, and non-governmental organisations. Walker et al. (2008) conducted a literature review and outlined the factors that drive organizations' implementation of green supply chain management initiatives; these include internal drivers, such as organizational factors, as well as external drivers, such as regulation, customers, competitors, society, and suppliers (TROWBRIDGE, 2006).

Sajjad et al. (2020) have examined the factors that drive a company's implementation of SSCM through a qualitative research approach. The drivers were divided into two main categories: internal and external drivers. Internal drivers were divided into ethical and instrumental categories. Internal normative drivers include value-based orientation and top management commitment, while instrumental internal drivers include cost reduction, operational efficiency, risk management, sales increase, and long-term orientation. The external drivers include customer expectation/pressure, corporate reputation, government regulation, public expectation, and NGO pressure (SAJJAD ET AL., 2020).

Saeed and Kersten (2019) conducted a systematic literature review to identify and classify the different drivers of SSCM. The drivers were classified into internal and external drivers.

External drivers include regulatory pressures (certifications, government legislation, regional or international regulators and trade associations), societal pressures (social well-being, consumer organizations, media, and public pressure), and market pressures (globalization, customers pressure, reputation image, suppliers' pressure, competitive advantage, competitors' pressure, shareholders pressure, and institutional pressure). On the other hand, internal drivers include corporate strategy (operational/economic performance, organization strategy, cost-related pressures, and top management commitment), organizational culture (socio-cultural responsibility; innovativeness; code of business conduct; information dissemination, and health and safety), organizational resources (resource depletion; human capital, employees pressure/involvement, technology and equipment, and training and development) and organizational characteristics (position in the supply chain, industrial sector, size, geographical location, degree of internationalization, and current level of sustainability actions) (SAEED & KERSTEN, 2019). Table 2 shows different barriers based on the current literature.

Table 2. Drivers of CLSC.

Category	Driver	Description	Source
Internal	Top management commitment	The top management of an organization's willing to change their current practices. Which makes the implementation of CSCM possible with the support of the top management.	(EVANGELISTA ET AL., 2010), (NEW ET AL., 2002), (SEN, 2009)
External	Cooperation with suppliers	collaboration with suppliers to discover ecologically friendly products and equipment to limit environmental exposures.	(XIE ET AL., 2023), (SEURING & MÜLLER, 2008), (CARTER & DRESNER, 2001), (KLASSEN & VACHON, 2003)
External	Investor’s pressure	An increased pressure from investors has also been observed in the development of environmental policies	(TROWBRIDGE, 2006)
External	Regulations	requirements, policies and legal guidelines set by the government concerning social issues and the environment.	(PREUSS, 2005), (EVANGELISTA ET AL., 2010), (ISAKSSON & HUGE-BRODIN, 2010), (ZHU ET AL., 2005)
External	Competitive advantage	The idea that competition may be a direct motivator for incorporating	(FERGUSON & TOKTAY, 2006), (ARORA & NANDKUMAR,

		sustainability into supply chain operations Companies must get a competitive advantage to become more aware of their consumers' needs.	2012), (PREUSS, 2007)
External	Consumers	Consumers' awareness of sustainability and willingness to purchase sustainable products might push firms to implement a sustainable corporate strategy.	(MONT, 2002), (HALL, 2006), (DARNALL, 2006), (DONTHU ET AL., 2021)
Internal	Organization's strategy	Sustainability concerns must be addressed in the organization's strategy and purpose statement.	(HERVANI ET AL., 2005), (HANNA ET AL., 2000), (LANGER ET AL., 2007), (HAVERKAMP ET AL., 2010)
Category	Driver	Description	Source
Internal	Economic performance	Implementing sustainability initiatives can lead to a better financial performance by reducing the use of virgin materials, energy savings and increased profit.	(HERVANI ET AL., 2005), (PIL & ROTHENBERG, 2003), (LANGER ET AL., 2007)
External	Social responsibility	Societal drivers include NGOs' pressure, the Media, and different societal groups.	(MAIGNAN ET AL., 2002), (HALL, 2006), (GOVINDAN ET AL., 2016)
Internal	Certifications	Certifications encourage sustainable supply chain practices. Companies that are certified are more likely to embrace sustainable practices.	(CHEN, 2005), (HANDFIELD ET AL., 2005), (BEAMON, 1999), (XU ET AL., 2013)
External	Reputational image	Fulfilling stakeholder's sustainability expectations so that the organization's reputational image improves.	(MZEMBE ET AL., 2016)
Internal	Employee's involvement	Employees can put pressure on businesses to implement sustainability measures to enhance their organisation's sustainability performance.	(HUANG & KUNG, 2010), (BAI ET AL., 2015), (HANNA ET AL., 2000), (EVANGELISTA ET AL., 2010)

Source: Developed by the Author.

2.5.2 Barriers and Challenges of CSCM

Fig. 9 shows the co-occurrence analysis of SSC's challenges and barriers. The co-occurred terms are supply chain management/supply chains, green/sustainable/circular supply chain, sustainability, sustainable development, and circular economy. These are connected to decision-making, stakeholders, developing countries, environmental sustainability, environmental performance, environmental practices, environmental impact, environmental regulations, and industrial research.

The red cluster, for example, shows the topics of environmental practices and environmental performance as potential barriers in terms of SSC and might be connected. On the other hand, the light blue cluster combines different barriers related to the topics of stakeholder, prioritization, and decision-making, bringing to the debate a management viewpoint on sustainable supply chain practices as well as the company's performance, which is a concern when evaluating the implementation of sustainable supply chain initiatives. This bibliometric background validated the issues covered in this study and enabled a more forceful bibliometric search for the subsequent review.

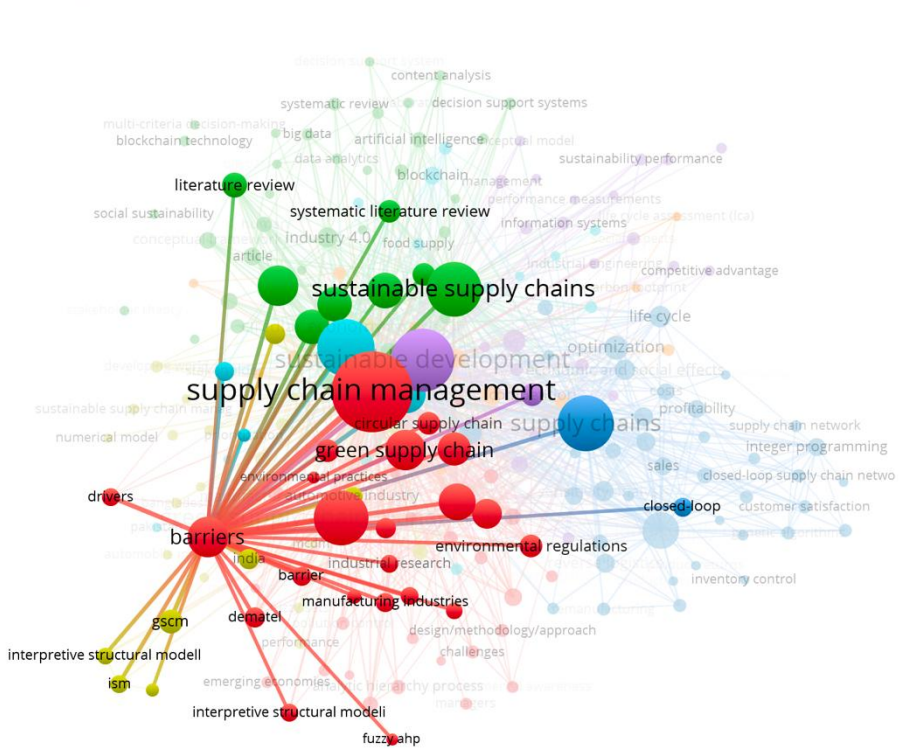

Figure 9. ***Barriers/Challenges and CSCM Analysis.***

Source*: Developed by the Author.*

The implementation of CSCs would be very challenging due to the different barriers that they could face (DORA ET AL., 2016). Even though organisations were advised to transform their

skills from a linear economy to CE, various obstacles arose throughout the process, including financial, marketing, logistical, political, and operational barriers (KAZANCOGLU ET AL., 2020). For the advancement of supply chain management theory and practice, this section examines prior studies on the themes and challenges of making supply chains environmentally sustainable. Abbasi, M., & Nilsson, F. (2012) have explored the themes and challenges in making supply chains environmentally friendly through a systematic review and content analysis of different articles from top-ranking journals in the areas of logistics, transport, sustainability, and environment. Five major areas of challenges for supply chain management were derived: costs, complexity, operationalisation, mindset and cultural changes, and uncertainties (ABBASI & NILSSON, 2012).

Mangla et al. (2018) have identified 16 important barriers to circular supply chain adoption in India using a literature survey and feedback from experts. The barriers were then analyzed using integrated interpretive structural modelling and MICMAC to determine the relationship between the different barriers. The findings show that the barriers 'lack of environmental laws and regulations' and 'lack of preferential tax policies for promoting the circular models' form the higher effectiveness of the ISM hierarchical structure in CSCM implementation from the Indian context (MANGLA ET AL., 2018). Mathiyazhagan et al. (2013) have used three different research phases: identification of barriers from the literature, interviews with various department managers, and a survey of auto component manufacturing industries in the automobile sector in Tamilnadu, South India. Twenty-six barriers were selected based on the literature and the consultation of experts and academicians; an Interpretive Structural Modeling (ISM) qualitative analysis was used to identify the mutual influences among the selected barriers. The study indicates that the barriers to implementing green supply chain management in the Indian auto component manufacturing industry vary. However, the supplier barrier has been the dominant one (MATHIYAZHAGAN ET AL., 2013).

A holistic conceptual framework for the barriers to the circular supply chain in the textile industry was presented by Kazancoglu et al. (2020). Different barriers that prevent the implementation of the circular economy into supply chains were discussed and validated, and nine main categories, including 25 different barriers, were categorised and presented. The main categories are a) management and decision-making, (b) labour, (c) design challenges, (d) materials, (e) rules and regulations, (f) lack of knowledge and awareness, (g) lack of integration and collaboration, (h) cost, and (i) technical infrastructure (KAZANCOGLU ET AL., 2020).

In terms of reverse logistics, Abdulrahman et al. (2014) proposed a theoretical reverse logistics implementation model. They identified the significant barriers that are facing the RL concerning management, financial, policy, and infrastructure in the Chinese manufacturing

industries, such as automotive, electrical, electronic, plastics, steel/construction, textiles, and paper and paper-based products. Key barriers concerning the mentioned categories were identified. These barriers are within the management category: a lack of reverse logistics experts and low commitment. Within the financial category, there is a lack of initial capital and funds for return monitoring systems, within the policy category, there is a lack of enforceable laws and government-supportive economic policies, and, finally, within the infrastructure category, the lack of systems for return monitoring (ABDULRAHMAN ET AL., 2014). Jindal and Sangwan (2011) have identified sixteen barriers to RL in developing countries like India through a literature survey and discussion with practitioners and academicians working in this field. Those barriers were classified into four categories – economic, organizational, government-related, and market-related. The interpretative structural modelling (ISM) approach was employed to construct a structural model to get a proper hierarchy and interaction among the barriers. The model was built on a foundation of lack of knowledge, regulations, legislation, and supportive economic policies, which influenced all other barriers (JINDAL & SANGWAN, 2011). Ravi and Shankar (2005) have utilised an Interpretive Structural Modelling (ISM) technique to analyse the mutual impacts among the barriers of reverse logistics so that those driving obstacles may be identified. It was found that factors such as limited awareness of reverse logistics, insufficient top management commitment, product quality issues, lack of strategic planning, and financial limitations are relatively independent from other barriers. This independence makes them strong driving forces and suggests they may serve as the primary causes behind several other obstacles (RAVI & SHANKAR, 2005). Bernon et al. (2018) used a mixed-methods approach, integrating desk-based research with extensive empirical data gathered through interviews with top management practitioners and academics in the disciplines of CE and retail reverse logistics to propose a conceptual framework that encourages RRL operations to adopt CE ideals. It was found that incorporating CE values into RRL required a multi-faceted strategy. Practitioners will benefit from the framework's adoption since it will aid them in moving toward a more restorative and less impactful approach to their RRL practices (BERNON ET AL., 2018).

Rahimifard et al. (2009) have investigated a range of barriers, drivers, and challenges of product recovery initiatives, and a variety of applications and case studies for the UK market were examined. Establishing sustainable business models that ensure the long-term profitability of product recovery and recycling applications is one of the most critical issues encountered in the sector (RAHIMIFARD ET AL., 2009). Agyemang et al. (2019) have adopted an explorative approach to understanding the drivers and the barriers to implementing the circular economy in Pakistan’s automotive industry using surveys and interviews as a data source to improve the

validity of the findings. The top three drivers, according to the study, are "profitability/market share/benefit," "cost reduction," and "business principle/concern for the environment/appreciation." In Pakistan's automotive sector, "unawareness," "cost and financial constraints," and "lack of knowledge" are the top three obstacles to applying CE principles (AGYEMANG ET AL., 2019).

Agyemang et al. (2018) have systematically identified different barriers considering stakeholders throughout the whole supply chain in the African cashew industry. Barriers to green supply chain redesign and implementation of the West African cashew industry based on operational and strategic perspectives of the supply chain were identified. The absence of internal top-level management commitment, lack of integrated management information and traceability systems, and uncertainty about economic rewards were recognised as three major operational impediments. In the long run, barriers such as assessing environmental sustainability performance and a lack of customer demand should be solved (AGYEMANG ET AL., 2018).

Balasubramanian (2012) proposed a hierarchical sustainability framework for assessing the barriers to the adoption of green supply chain management (GSCM) in the construction industry of the United Arab Emirates (UAE). An extensive literature review and expert interviews with academics and academy professionals were conducted to identify a total of 32 barriers to the adoption of GSCM. The barriers have been grouped into 12 different criteria. A structural model was created using the Interpretive Structural Modelling (ISM) approach. The driving and dependency power analysis (DDPA) method was also used to categorize and identify key barriers. External factors such as a lack of skilled sustainability professionals, a lack of green suppliers and developers, a lack of government support, a lack of public awareness and demand, and market uncertainty were identified as critical barriers to the adoption of GSCM in the UAE construction sector by the study (BALASUBRAMANIAN, 2012).

Coenen et al. (2018) have systematically explored the concepts of deep uncertainty and dynamic complexity for CLSC management based on an abductive approach. There were three types of gaps found: conceptual gaps, process gaps, and methodological gaps. The following conceptual gaps have been addressed: (i) the lack of an elaborated conceptual framework to determine the transition pathways towards CLSC management under deep uncertainty and dynamic complexity; (ii) the insufficient representation of deep uncertainty in the study of CLSC management; and (iii) the too scarce inclusion of multidimensional nonlinear interactions between CLSC options in the models. The process gap is referred to as the absence of systematic engagement of players in the transition process toward CLSC management under dynamic complexity and profound uncertainty. The methodological limitations include (i) a lack of

techniques and instruments for concurrently studying and managing deep uncertainty and dynamic complexity, and (ii) a lack of methods and tools for systematically developing and analyzing (large numbers of) multidimensional scenarios (COENEN ET AL., 2018).

Govindan and Hasanagic (2018). I have analyzed the drivers, barriers, and practices that influence the implementation of the circular economy in the context of the supply chain through a systematic review with correlating stakeholders' perspectives. Because of the large initial investment expenditures, the results demonstrate that the government plays a significant role in the implementation of the circular economy in the supply chain. The study also reveals that businesses struggle to address technical barriers, even though products should be built using environmentally friendly technologies. Furthermore, consumers and society should place a higher value on understanding the circular economy. These are the major roadblocks to the circular economy's adoption (GOVINDAN & HASANAGIC, 2018).

Zhu and Geng (2013) have utilised a total of 299 usable questionnaires, followed by descriptive analysis, to examine whether there are any incentives for Chinese businesses to apply extended supply chain methods to save energy and reduce emissions, and if there are any barriers to doing so. Internal barriers, such as a lack of financial gains, resources, and capacity, were found to be major roadblocks to the adoption of long-term customer collaboration (ZHU & GENG, 2013).

Bressanelli et al. (2019) identified 24 distinct challenges that may impede the redesign of supply chains in alignment with circular economy (CE) principles. These challenges were categorised into seven thematic areas: economic and financial viability, market and competitive dynamics, product-related attributes, regulatory and standardisation issues, supply chain management, technological factors, and user behaviour. A multi-case study focusing on the home appliance sector was conducted to explore how these obstacles emerge in real-world contexts and how firms can effectively respond. Notably, eight of the 24 challenges were found to be either unique to the circular economy or to carry different meanings or implications within this framework. These include the influence of rapidly shifting consumer trends, three regulatory challenges (namely the misalignment of taxation and policy tools, inadequate metrics, and absence of uniform standards), cultural barriers specific to CE adoption, concerns about data privacy and security at the product's end-of-use stage, and limited consumer willingness to pay for circular economy-oriented products. (BRESSANELLI ET AL., 2019).

With the help of interpretive structural modelling, Al Zaabi et al. (2013) looked at 13 barriers to the successful implementation of sustainable supply chain management from the literature to analyze the barriers to SSCM adoption in the fastener manufacturing industries by determining the relationship between the barriers and identifying the most influential barriers from the recommended barrier list. Complex design to minimize resource and energy consumption, the

expense for ecologically friendly packaging, and lack of sustainability information are three barriers that function as dominant roles for adopting SSCM (AL ZAABI ET AL., 2013).

Rauer and Kaufmann (2015) have examined data from ten Western green-tech businesses that were buying rare earth metals from Chinese vendors for technical reasons to investigate the barriers of implementing green supply chain management and to analyze the capabilities to mitigate these barriers. These firms encounter two types of external barriers to GSCM implementation, according to the findings: supply chain structure-related and environmental standards-related implementation difficulties. Two supply chain structure-related barriers to GSCM include a lack of supply chain transparency and a lack of influence on sub-suppliers, which makes industry-specific barriers and resistant suppliers two salient barriers to GSCM. Furthermore, it was revealed that the two environmental standards-related implementation challenges are conceptual gaps in environmental standards and a lack of regulation and enforcement of environmental standards (RAUER & KAUFMANN, 2015). Walker et al. (2008) explored the factors that drive or restrict the implementation of GSCM initiatives. Exploratory research was carried out based on interviews with representatives from seven different corporate and public sector organisations. Fortunately, more drivers than barriers to environmental supply chain management have been found throughout the organisations. External rather than internal factors appear to have a greater effect on organisations. Organisations face both internal and external challenges when it comes to environmental supply chain management (WALKER ET AL., 2008).

Wang et al. (2016) used the Decision Making Trial and Evaluation Laboratory (DEMATEL) to identify the Key barriers to the implementation of GSCM in the food packaging industry by targeting fifteen food packaging companies in north India to assist the packaging industry in overcoming these barriers. According to the findings of this study, Indian packaging businesses have insufficient environmental management training, and a lack of effective promotion and information on the benefits of GSCM in the packaging sector discourages customers from choosing products coming from such supply chains (WANG ET AL., 2016). To adopt CE ideas in their supply chains, businesses must make significant upfront expenditures and rely on their suppliers and retailers to collaborate since all value chain stakeholders must be involved (DORA ET AL., 2016). Suppliers and manufacturers face various barriers to adopting CE, including economic, managerial, technological, and technical barriers. Based on the current literature, several barriers were identified. Detailed information about the barriers is shown in Table 3.

Table 3. Barriers of CSCM.

Category	Barrier	Description	Source
Internal	Lack of incentives	High investments cost with less return-on-investment and a little chance of economic payback.	(GENG & DOBERSTEIN, 2008), (MANGLA ET AL., 2015), (DE JESUS & MENDONÇA, 2018), (BHANDARI ET AL., 2022), (RATHINAMOORTHY, 2019)
External	Lack of environmental laws or regulations	Developing nations don't have regulations to adopt CSC models like western countries. Environmental laws and regulations provide a critical framework within which businesses must function.	(VENKATESH & LUTHRA, 2016), (ALKHIDIR & ZAILANI, 2009), (SCUPOLA, 2003)
Category	Barrier	Description	Source
Internal	Lack of management commitment and involvement in adopting CSCM	Top management of an organization's resistance to change their current practices. The implementation of CSCM is only possible with the support of the top management.	(GIUNIPERO ET AL., 2012), (LIEDER & RASHID, 2016), (ZHU & LAI, 2007), (RAVI & SHANKAR, 2005), (LEE & RHEE, 2007)
External	Lack of taxation policies for adopting the CE paradigm (Government motivation)	The current taxation systems are not aligned with the adoption of the CE, which also a type of lack of the governmental motivation.	(TRIPATHI ET AL., 2016), (WANG ET AL., 2010), (BOUZON ET AL., 2018), (RANTA ET AL., 2018), (TECCHIO ET AL., 2017)
External	Lack of customer awareness about CSCM	Consumer environmental awareness is one of the most powerful motivators for businesses to engage in environmental management.	(PAN ET AL., 2015), (GHISELLINI ET AL., 2016), (CHEN ET AL., 2006), (ORSATO, 2006)
Internal	Lack of appropriate training programs for the staff.	Skills development program can play a vital rule in an effective adoption of CSCM.	(LACY & RUTQVIST, 2015), (ÁNGEL DEL BRÍO ET AL., 2008), (BOWEN ET AL., 2001), (XIAO ET AL., 2018), (ZHU & GENG, 2013)
Internal	Information systems and information sharing	Information exchange is required among the SC members for a successful CSC implementation by	(BET ET AL., 2018), (BOITEN ET AL., 2017), (TINGLEY ET AL., 2017), (PITKÄNEN ET AL., 2016) , (KALVERKAMP ET AL.,

		increasing the productivity and competitiveness.	2017), (WINANS ET AL., 2017)
Internal	Collaboration and communication among SC members in inner departments and co-operations.	All the SC members need to collaborate across the organization and with the stakeholders to higher the profits and improve the market image.	(RAVI & SHANKAR, 2005), (DEFEE ET AL., 2009)
Internal	lack of short-run economic benefits.	Loss of economic value in the short run due to focusing on environmental issues.	(PARK ET AL., 2010), (ZHU & GENG, 2013)
Category	Barrier	Description	Source
Internal	Lack of technical knowledge and technical expertise.	Technical knowledge is important to implement the CE by designing a pollution free product to fulfil the environmental requirements.	(PERRON, 2005), (LEAL FILHO ET AL., 2019), (REVELL & RUTHERFOORD, 2003), (PASQUALOTTO, 2015)
Internal	Inadequate of facility and transportation infrastructure.	Applying CE might increase the transportation activities, the availability of facility's recycling, processing, collecting, and sorting would ease the CE implementation.	(DESPEISSE ET AL., 2017), (WINANS ET AL., 2017), (ONGONDO ET AL., 2013), (DIECKMANN ET AL., 2020), (KOSZEWSKA, 2018)
Internal	Recycling and recovering difficulties. (High complexity)	According to the growth of products complexity and the increase of the new materials.	(DESPEISSE ET AL., 2017), (KHODIER ET AL., 2018)
Internal	Linear mind set and non-acceptance of the new business models.	Most businesses are following a linear economic system, and switching to a new business model will require a fundamental change in the organizational structure.	(TINGLEY ET AL., 2017), (PITKÄNEN ET AL., 2016), (WALKER ET AL., 2008)

Source: Developed by the Author.

3 MATERIALS AND METHODS

3.1 Introduction

A literature review is a proper methodological technique for identifying potential research gaps and laying the groundwork for all academic research endeavours. It can also assist in providing an overview of the areas where the study differs, as well as synthesizing the research findings to identify areas where additional research is needed. Conducting research literature reviews to provide a full overview of the issue and to highlight key areas of study to discover research gaps and clarify and define the research question. However, the purpose of this study is to investigate the drivers and barriers to implementing the circular economy into supply chain management through data collecting, assessment, and analysis to summarize the circular economy adoption challenges and drivers.

After providing a theoretical basis for the main terms of circular supply chain management and mentioning previous studies that have focused on the challenges and the barriers of circular supply chain management in the literature review chapter, this chapter is set to clarify the methods and the materials that were selected for a comprehensive exploration to examine the integration of the CE into the SCM by collecting the quantitative data sets. The type of data, where, when, and how it will be collected are also the goals of this chapter. The study has explored different drivers and barriers in the previous chapter. Nevertheless, there's still a lack of understanding of what types of drivers and barriers different firms face in their implementation. This research aims to explore and analyze the different drivers and barriers that FMCG companies in Jordan face in their transition to so-called closed-loop or circular supply chains.

Scholars utilize bibliometric analysis for a wide range of purposes, including identifying developing trends in article and journal performance, cooperation patterns, and research elements, and investigating the intellectual structure of a certain area in the existing literature (DONTHU ET AL., 2021). By rigorously making sense of vast amounts of unstructured data, bibliometric analysis is valuable for interpreting and charting the cumulative scientific knowledge and evolutionary subtleties of well-established domains. As a result, well-conducted bibliometric studies can lay solid foundations for advancing a field in novel and meaningful ways, it enables and empowers scholars to (1) obtain a one-stop overview, (2) recognize gaps in knowledge, (3) derive fresh thoughts for research, and (4) place their intended contributions to science (DONTHU ET AL., 2021).

Bibliometrics as a methodology originally belonged to library science, which involves a large volume of bibliographic materials but has found applications in different fields of study

(BROADUS, 1987). Early discussions on bibliometrics began in the 1950s, implying that the bibliometric technique is not novel (WALLIN, 2005). However, the expansion of bibliometrics in the domains of "business, management, and accounting," "economics, econometrics, and finance," and "social sciences" on Scopus using "bibliom*" as a keyword in the "article title, abstract, and keywords" is relatively new. It has also gained attention from various areas of management and has become more popular in business research in recent years (HOTA ET AL., 2020). Its popularity can be traced back to (1) the Improvement, availability, and accessibility of bibliometric tools like Gephi, Leximancer, and VOSviewer, as well as scientific databases like Scopus and Web of Science, and (2) the bibliometric methodology's cross-disciplinary pollination from information science to business research (DONTHU ET AL., 2021). This technique helps provide a macroscopic perspective of enormous quantities of academic literature. The features and evolution of scientific output within a certain field of inquiry may be traced using a quantitative analysis of information on the publication history. Bibliometric analysis is frequently used in conjunction with network visualization tools, which can range from totally graphical user interface-based software like VOSviewer (VAN ECK & WALTMAN, 2010) to command-based software such as the Bibliometrix package in R (ARIA & CUCCURULLO, 2017).

Bibexcel, Pajek, Gephi, SciMat, Sci2, and UCINET are examples of popular bibliometric software. As a result, drivers and barriers were identified based on the analysis of co-occurrence graphs and a careful study of the literature collected through Scopus searches. In this regard, the survey may be viewed as a continuation of the previous stage, where the primary drivers and barriers discovered will direct the formulation of the questionnaire, allowing the case to be examined through the lens of circularity. In this regard, the details of data collecting and data analysis methods are illustrated in the following subsections.

3.2 Research Design

Answering the research question and testing the hypothesis is the main purpose of every research. The research design is the plan or the path to answer the research question with the influence of available knowledge in the research area CRESWELL & CRESWELL, 2017). According to Leavy. (2017), five major research approaches may overlap or differentiate these approaches: quantitative, qualitative, mixed methods, arts-based research, and community-based participatory research (LEAVY, 2017). Quantitative research is known to be experimental, semi-experimental, correlational, or descriptive (HOLTON & BURNETT, 2005). According to Gerrish and Lacey (2010), quantitative research is "the broad term used to denote research designs and methods that yield numerical data " (GERRISH & LACEY, 2010).

Compared to qualitative research, quantitative research employs standard research designs in which the goal is to describe, explain, and forecast phenomena, as well as probability sampling and larger sample sizes (COOPER ET AL., 2006). Quantitative research is based on deductive reasoning or deduction and employs a wide range of quantitative analytic techniques, ranging from the simple descriptive analysis of the variables to advanced statistical modeling to demonstrate statistical correlations between variables (BOUGIE & SEKARAN, 2019),(SAUNDERS ET AL., 2009). Furthermore, Bibliometrics is a quantitative analytic approach that uses scientific literature's exterior properties as study objects (WANG ET AL., 2020). It is useful for anticipating future trends in fields, and it is commonly used to assess the state of research, frontier directions, and development patterns in various disciplines (KOSKINEN ET AL., 2008).

Two methods were employed to achieve the goal of this research. The bibliometric analysis based on the co-occurrence of the keywords was adopted in the literature review chapter to identify the main drivers and barriers, which the literature considers relevant to CSCM. After identifying the drivers and the barriers through the bibliometric analysis, the results will be used to build a questionnaire to understand the stakeholders' opinions of the Jordanian FMCG industry.

3.3 Data Collection Strategy

In bibliometrics, six major databases (Web of Science, Scopus, Google Scholar, Microsoft Academic, Crossref, and Dimensions) are employed. Google Scholar is not permitted to gather data in an automated manner (CHADEGANI ET AL., 2013), Microsoft Academic is prone to document matching errors (THELWALL, 2017), and there is no evidence to suggest that Crossref and Dimensions are capable of bibliometrics (XIE ET AL., 2023). Web of Science (WOS) and Scopus are the most widely utilized databases in many scientific domains for literature search (GUZ & RUSHCHITSKY, 2009). Scopus is the world's biggest searchable citation and abstract database, which is constantly developed and updated (REW, 2010). Scopus, founded by Elsevier in November 2004, is a bibliographic database of scientific, interdisciplinary, and international literature that has been doing citation analysis since 1996 and gives a comprehensive perspective of global research productivity. It contains approximately 53 million references (21 million before 1996, dating back to 1823) from over 21,000 scholarly journals (2600 titles of direct access). There are also 390 commercial publications, 370 book series, 5.5 million articles, 25.5 million patents, and 376 million websites (SÁNCHEZ ET AL., 2017). The data for the bibliometric analysis was collected using

the Scopus Database. Two search strings were developed utilizing the most important terms mentioned in the literature to identify the main drivers and barriers.

Search String 1- Drivers:

(TITLE ("sustainable supply chain" OR "circular supply chain" OR "green supply chain" OR "closed-loop supply chain") AND TITLE-ABS-KEY ("drivers" OR "enablers" OR "opportunities")).

Search String 2- Barriers:

(TITLE ("sustainable supply chain" OR "circular supply chain" OR "green supply chain" OR "closed-loop supply chain") AND TITLE-ABS-KEY ("challenges" OR "barriers" OR "obstacles")).

The first search string is related to the drivers and enablers of the CSCM, and it was divided into two blocks. The first part aims to search for terms linked to CSCM in the title since authors only want to look at documents that are directly connected to the issue. The second part of the string aims to find the terms “drivers”, “enablers” or “opportunities” in the title, abstract, and keywords. Applying this search strategy to Scopus database has resulted in retrieving 580 documents. In turn, two blocks of terms were produced to construct the second search string. The first was designed to bring terms related to CLSC, while the second was designed to retrieve documents with terms "barriers", "challenges" or "obstacles" in the title, abstract, or keywords. This search string has resulted in retrieving 636 documents from Scopus database.
In the second stage, a questionnaire was designed for 25 measures, identified from the literature review (see Table 2, Table 3). The questionnaire was designed in English and Arabic, as it is the most common language used in Jordan. It took approximately 15-20 minutes for an individual participant to complete a questionnaire. The final questionnaire consisted of five parts: (i) demographic questions. (ii) job-related questions. (iii) questions about the 12 drivers of the CSCM were based on the question “Rate your level of agreement with each statement”. Furthermore, each question was assessed on a 5-point scale of ‘strongly agree’ (1) to ‘strongly disagree’ (5). (iiii) questions about the 13 barriers of the CSCM, and they were based on the question “Rate your level of agreement with each statement”. Similar to the drivers section, the question was assessed on a 5-point scale of ‘strongly agree’ (1) to ‘strongly disagree’ (5). (iiiii) The last part includes an additional question to ask for other drivers and barriers of the CSCM that were not mentioned in the questionnaire, which was based on the question “Are there any other drivers and/or challenges related to sustainability in the FMCG chain that was not mentioned above and that you believe are still relevant? Please describe it below (this question is optional). After the finalization of the questionnaire structure, it was distributed to the participants.

3.4 Questionnaire distribution

The distribution of the questionnaire is a critical stage of the research as it impacts the quantity and the quality of the responses received directly. This sub-chapter elaborates on the methodology as well as the challenges encountered during the questionnaire distribution in Jordan, along with strategies employed to maximize the response rate.

Utilization of Google Forms:

Google Forms emerged as the primary tool for the distribution of the questionnaire in Jordan. The questionnaire was initially developed in English, but it faced a limited response rate due to the linguistic diversity in Jordan and the prevalence of Arabic, broadening its reach; a decision was made to convert the questionnaire into Arabic.

Engagement with big firms

Concrete efforts were made to engage with prominent firms in Jordan's Fast-Moving Consumer Goods (FMCG) sector. Different communication channels were utilized, such as email and various online platforms, to distribute the questionnaire among professionals in the FMCG industry.

Persistence in pursuit of responses

To ensure maximum participation, a proactive approach was adopted despite facing time constraints and logistical challenges. The distribution process extended throughout 6 to 7 months. During that period, continuous efforts were made to solicit responses. Personalized follow-ups and reminders were sent to encourage participation and to maintain respondent engagement.

Outcome

Despite the questionnaire distribution presenting various challenges in,cluding language barriers and a limited response rate, the response count culminated in 103 completed questionnaires. While the number fell short of initial expectations, the responses gathered have provided valuable insights and data for the study.

3.5 Data Analysis Methods

3.5.1 Pilot Test

The sample size was examined to determine the questionnaire's reliability through a pilot test. After determining that the sample was reliable, the researcher distributed the questionnaire for the main survey.

3.5.2 Exploratory Factor Analysis

In this study, exploratory factor analysis (EFA) is employed. The goal of employing FA is to represent the potential covariance connection between observed variables in terms of a few unobservable random variables known as the factors. In other words, this approach examines the interrelationships between an enormous number of indicators to determine their underlying structure, allowing it to be reduced to a small number of aggregated variables. Factor analysis is a popular approach for evaluating self-report surveys. The assessment techniques employed in this study collect data using questionnaires, which is appropriate for the investigation. The variables were examined using EFA. In EFA, researchers have no expectations regarding the number or type of variables, and as the title implies, the approach is exploratory (WILLIAMS ET AL., 2010). EFA enables the researcher to investigate the key dimensions to develop a theory or model from a reasonably large number of latent constructs, often represented by a set of items (HENSON & ROBERTS, 2006). According to researchers, the suitability of the data must be examined before starting with the analysis. The study's overall sample size is 103 respondents. Although the study's sample size may be considered modest, some experts have stated that it is adequate for factor analysis (HAIR, 1995). Furthermore, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity should be employed to evaluate the acceptability of sample sizes for factor analysis (WILLIAMS ET AL., 2010). The KMO index ranges from 0 to 1, with 0.50 regarded as ideal for factor analysis. Bartlett's test of sphericity must be significant ($p < 0.05$) for factor analysis to be appropriate. Therefore, the data are considered sufficient for this study. Chapter 4 presents the results of the test. To structure the factor, the study must extract factors and assess the sufficiency of the factor loading. The most often utilized extraction method is principal component analysis (PCA). PCA has different advantages, with the main advantages being low noise sensitivity, reduced capacity and memory requirements, and processing in small dimensions, which gives a more significant efficiency (KARAMIZADEH ET AL., 2013). Meanwhile, to decide the number of factors that might be related to more than one factor, the rotational method is needed. Varimax with Kaiser Normalization, which is the most commonly used rotational technique in factor analysis, is employed (THOMPSON, 2004). Thus, the study used PCA with varimax rotation to determine the validity. The findings of the analysis are provided in Chapter 4.

3.5.3 Structural Equation Modelling (SEM)

SEM is a powerful, multivariate technique that can deal with a high number of endogenous and exogenous factors, as well as latent (unobservable) variables expressed as linear combinations (weighted averages) of observed variables. Lei and Wu (2007) describe SEM as a flexible

statistical modeling method. It is used to determine the complex links between seen or measured variables and unobserved or latent variables. It may also test the correlations between latent variables (LEI & WU, 2007). SEM can be applied in different fields, such as sociology, education, social policy, and family science. They can also, and this is vitally essential, be used to explain economic phenomena, notably in economics or marketing research, psychology, demography studies, biology, genetics, or even the medical sciences. In conclusion, because of its universality, the SEM technique has the potential to be employed in a wide range of fields (TARKA, 2018).

Model specification

The study's theoretical approach was designed to help researchers understand the drivers and challenges that influence Circular Economy practices in the FMCG Supply Chain. Two major areas were identified: governance/administrative practices, policies, standards targeted at sustainability, and activities relating to environmental outcomes and impacts. These elements served as the foundation for the SEM model's latent variables ("Driver Factors" and "Barrier Factors").

Measurement model development

The indicators for each latent variable were carefully chosen to represent the intricacies of governance/administrative practices and environmental activities within the FMCG Supply Chain framework. These indicators were chosen because they correspond with Circular Economy concepts and are relevant to the FMCG industry's sustainability initiatives.

Model identification

The measurement model was identified by setting each indicator's factor loadings on its corresponding latent variable to 1.0. This phase guaranteed the correct scale and interpretation of the latent constructs.

Path model specification

Structural routes were designed to investigate the interactions between the latent variables representing drivers and barriers and their influence on the outcome variables, "Governance Activities and Environmental Activities." These channels were proposed using a theoretical understanding of Circular Economy concepts and previous research in the sector.

Model Estimation

The SEM analysis was carried out using AMOS, which used maximum likelihood estimation to estimate the model's parameters. This strategy allows for estimating latent variable connections while also assessing model fit.

Model modification

Model modification strategies, such as adding or eliminating pathways and accounting for correlated errors between indicators, were used to enhance model fit as needed. The changes were led by theoretical reasons and statistical indicators to assure the model's validity and dependability.

Model Assessment

The structural equation model (SEM) was examined to determine its overall fit to the data and the relevance of the interactions between latent variables reflecting driver and barrier factors and their impact on governance activities in the FMCG Supply Chain environment. Despite being based on EFA results, the SEM model must still be evaluated for its overall fit to the data and the importance of the predicted parameters. This involves analyzing goodness-of-fit statistics (e.g., chi-square, CFI, TLI, RMSEA), reviewing the relevance of path coefficients, and determining the model's practical significance. The computed route coefficients that connect driver and barrier variables to governance and environmental practices were examined for significance. The critical ratios (C.R.) and accompanying p-values were utilized to see if these routes had statistically significant associations. Paths with p-values below the chosen significance level (e.g., $p < 0.05$) were deemed statistically significant.

The analysis of the SEM data indicated significant paths between key driver and barrier elements, as well as governance and environmental activities throughout the FMCG Supply Chain. These findings provide light on the fundamental elements impacting sustainability-focused governance and environmental practices within the framework of Circular Economy concepts.

3.5.4 Data Analysis Process

The data analysis process employed various statistical techniques. The first was descriptive statistics, which evaluated the demographic characteristics of the respondents. The demographic characteristics evaluated included gender, age, education, company size, position related to sustainability, etc. SPSS software was used to carry out this analysis.

The second analysis conducted was the exploratory factor analysis (EFA). EFA is a statistical technique used to uncover the underlying structure of a set of variables. For this case, EFA was applied to evaluate the fitness of the data. The specific test results of interest were KMO and Bartlett's Test, Communalities, Total Variance Explained, and Rotated Component Matrix. SPSS software was used in this analysis.

The following analysis conducted was a confirmatory factor analysis (CFA). CFA is a statistical technique to test a specific hypothesis about the relationships between observed variables and

underlying latent constructs. It is used to verify whether a pre-determined factor structure fits the data. The fitness indices of interest included Chi-square goodness-of-fit, RMSEA, CFI, TLI, IFI, etc.

The last analysis that was conducted was structural equation modeling (SEM). SEM is a technique used to simultaneously test complex relationships, including direct and indirect effects, involving both observed and unobserved (latent) variables. The Partial Least Squares SEM (PLS-SEM) was adopted. SEM was used to evaluate the significance, strength, and direction (positive or negative) of the variables' relationships.

Variables were considered significant if the p-values were <0.05 (95% confidence levels or 0.05 level of significance). Beta values were used to evaluate the strength and direction of the relationship. If the beta values were close to 1.0, the variables were considered to have a strong relationship, while close to 0.0, they were considered to have a weak relationship. For the direction, a positive relationship between variables meant that an increase in one variable led to an increase **in** another, and vice versa. A negative relationship implies that an increase in one variable leads to a decrease in the other variable and vice versa.

3.6 Presentation of Hypotheses

This section describes the hypotheses created for this study, which are based on the theoretical framework and empirical evidence discussed in the prior literature review. Each hypothesis is a prediction that can be tested based on the existing body of information about sustainability practices in the FMCG supply chain, focusing on identifying the key drivers and barriers that impact these practices. The following hypotheses are classified into **internal factors** (within the organization) and **external factors** (outside the organization) to guide the interpretation and discussion of the data analysis and results.

Internal Factors (Within the Organization): These hypotheses focus on organizational-level drivers and barriers that influence CSCM implementation:

H1: Aligning organizational strategy with circular supply chain management goals improves FMCG firms' ability to execute circular practices successfully.

H2: Effective information systems, together with enhanced communication and collaboration among supply chain participants, positively correlate with the effective implementation of circular supply chain management strategies in FMCG firms.

H3: Adequate technical knowledge, skills, and the presence of qualified individuals, backed up by appropriate training programs, all contribute to the successful implementation of circular supply chain management techniques in FMCG companies.

H4: The short-term loss of economic value caused by prioritizing environmental goals has a negative correlation with FMCG companies' successful implementation of circular supply chain management strategies.

External Factors (Outside the Organization): These hypotheses examine broader market, regulatory, and infrastructural influences on CSCM:

H5: FMCG companies that prioritize corporate social responsibility (CSR) initiatives and brand image enhancement are more likely to adopt circular supply chain management (CSCM) practices, driven by consumer demand for sustainable products and competitive differentiation.

H6: Effective stakeholder involvement, including collaboration with suppliers, employee engagement, and customer awareness, positively influences the successful implementation of circular supply chain management practices in FMCG companies.

H7: Strict environmental regulations aim to drive CSCM adoption in FMCG industries but often pose challenges due to compliance costs, regulatory complexity, and misalignment with governance processes. A balanced regulatory approach, combining enforcement with support mechanisms, is essential for effective CSCM implementation.

H8: Improved facility and transportation infrastructure are positively connected to the effective application of circular supply chain management methods in FMCG companies.

4 RESEARCH FINDINGS AND THEIR EVALUATION

In this chapter, the relationships between the drivers, barriers, and sustainability practices in the FMCG supply chains will be explored based on he empirical findings of the study. This study is to unveil the complex dynamics supporting the sector's efforts to achieve a successful implementation of CSC through the lens of structural equation modeling (SEM). An extensive framework for understanding the crucial elements influencing sustainability practices is produced by synthesizing qualitative insights from the questionnaire responses with exploratory factor analysis (EFA) and structural equation modeling (SEM) analyses. The FMCG sector, which is distinguished by a high product turnover rate, has particular potential and issues when it comes to incorporating sustainability into its fundamental business processes. The investigations will determine the primary drivers advancing sustainability as well as the obstacles standing in its way. By placing these findings in the larger context of supply chain management's sustainable development, this debate aims to shed light on how FMCG firms may better manage these complexities and improve their sustainability performance.

After this introduction, the discussion moves on to assess the hypothesis put out in light of the study's findings. Every hypothesis undergoes a thorough examination in the context of the empirical data, utilizing theoretical frameworks and extant literature to assess the relevance of the results. This chapter aims to clarify the implications for future research, policymakers, and practitioners in addition to validating or denying the correlations that have been hypothesized. As well as to map out a future for the FMCG industry by analyzing the interactions between the recognized drivers, barriers, and sustainability practices to create a more resilient and sustainable future.

4.1 Data Analysis and Results

The initial analysis carried out was a demographic study. This study involved the use of descriptive statistics to examine the characteristics of the respondents, such as age, gender, education level, and more. Participants were also asked whether they hold a position or function related to sustainability, including corporate sustainability, corporate social responsibility, or environmental, social, and governance (ESG) criteria. A majority of 57.3% responded affirmatively, whereas a smaller proportion of 42.7% responded negatively.

Concerning gender, males were the predominant gender, making up 70.9% of the total, while females were less represented at 29.1%. In the age distribution, the 25-34 year-olds formed the largest group, accounting for 44.7%, with the 35-44 year-olds next at 31.1%, and the 18-24 year-olds following at 14.6%. When examining educational levels, the data showed that 70%

of participants had attained a Bachelor's degree, making it the most prevalent. This was followed by an 18.4% representation of Master's degrees and a minimal presence of PhD qualifications at 4.9%. Additionally, the assessment of company size based on employee count revealed that companies with more than 250 employees constituted the majority at 35.9%, followed by those with fewer than 250 employees, and subsequently by companies with fewer than 50 employees. For the nature of the company, the national company was the majority (57.3%), followed by a multinational company (42.7%).

The research also investigated the phase of the FMCG supply chain in which the respondent's company worked. The results indicated that the majority was commercialization (24.3%), followed by Industry/Transformation (cooperatives) (20.4%), production (20.4%), and others (20.4%). The respondents were asked to indicate the hierarchy of their position, where the majority were engineers (30.1%), followed by the president or vice-president (18.4%), and then the manager or director (17.5%). Additionally, the respondents were asked how often they carry out activities related to governance/administrative practices, policies, and standards aimed at sustainability, where the majority indicated rarely (20.4%), followed by those who indicated frequently (18.4%) and then never (15.5%). Further, the respondents were asked to indicate how often they carry out activities related to environmental results and impacts. The majority indicated occasionally (32%), then frequently (28.2%), followed by those who said never (20.4%).

Table 4. Demographics and professional attributes of participants.

Demographics	**Categories**	**Frequency (n)**	**Percent (%)**
Position related to sustainability	yes	59	57.3
	no	44	42.7
	Total	103	100
Gender	male	73	70.9
	female	30	29.1
	Total	103	100
Age	under 18 years	1	1
	18 - 24 years	15	14.6
	25 - 34 years	46	44.7
	35 - 44 years	32	31.1
	45 - 54 years	5	4.9
	more than 55 years	4	3.9
	Total	103	100
Education	High school	9	8.7
	Bachelors	70	68
	masters	19	18.4
	Ph.D.	5	4.9
	Total	103	100

Demographics	Categories	Frequency (n)	Percent (%)
Company size	< 10 employees	16	15.5
	< 50 employees	24	23.3
	< 250 employees	26	25.2
	> 250 employees	37	35.9
	Total	103	100
Nature of company	national	59	57.3
	multinational	44	42.7
	Total	103	100
Phase of the FMCG	inputs	4	3.9
	Industry/Transformation (cooperatives)	21	20.4
	Production	21	20.4
	Inputs and Industry/Transformation	11	10.7
	Commercialization	25	24.3
	Other	21	20.4
	Total	103	100
Hierarchy of position	analyst	4	3.9
	assistant	5	4.9
	consultant	2	1.9
	specialist	2	1.9
	engineer	31	30.1
	intern	3	2.9
	supervisor or coordinator	12	11.7
	manager or director	18	17.5
	owner of founder	3	2.9
	President or vice-president	4	3.9
	other	19	18.4
	Total	103	100
Often carrying governance activities	never	16	15.5
	rarely	21	20.4
	occasionally	35	34
	frequently	19	18.4
	always	12	11.7
	Total	103	100
Activities related to environmental results	never	21	20.4
	rarely	20	19.4
	occasionally	33	32
	frequently	29	28.2
	Total	103	100

Source: Developed by Author.

The research also investigated the UN sustainable development goals that they believed were covered in their companies' supply chains. The most common UNSDG was health and wellbeing (31 respondents), followed by poverty eradication (27 respondents), then elimination of hunger, quality education, and affordable and clean energy (26 respondents). Other popular UNSDGs were the elimination of hunger, gender equality, decent work and economic growth,

and partnerships to achieve goals. The least common UN SDGs were underwater life, life on land, and reducing inequality.

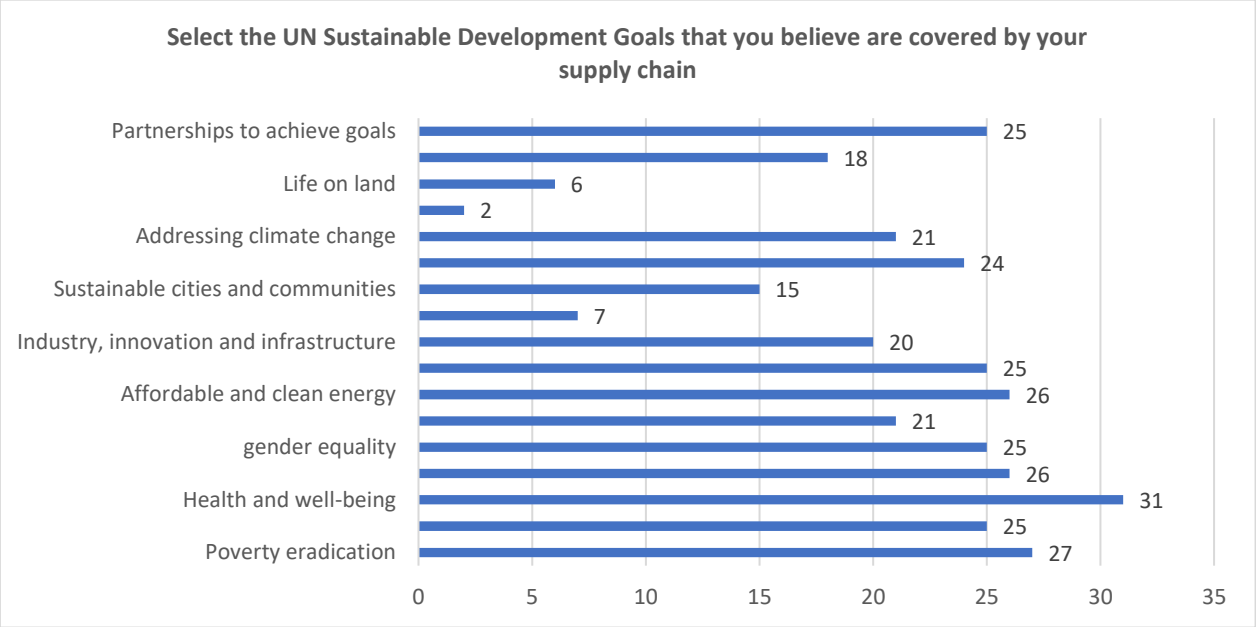

Figure 10. ***Perceived Coverage of Sustainable Development Goals.***

Source: Developed by Author.

Exploratory Factor Analysis

The first empirical analysis conducted was the exploratory factor analysis (EFA). The exploratory factor analysis was conducted to evaluate the underlying structure of a set of variables or items used in the study. EFA was used to identify the latent (unobserved) factors or constructs that explain the patterns of correlations or covariations among the observed variables. The results of EFA are discussed below.The first tests were the KMO and Bartlett's Test of sphericity, which evaluated whether the EFA model adequately fits the data. The required threshold for the tests is that KMO is >0.50 while Bartlett's Test of Sphericity is <0.05. The satisfaction of these thresholds indicates that the data exhibits a significant correlation. From the results, the KMO was 0.847, while Bartlett's Test was significant (Sig. = 0.000). This shows that the required threshold was met, and therefore, it was appropriate to continue with the exploratory factor analysis.

Table 5. Kaiser-meyer-olkin measure of sampling adequacy and barlett's test of sphericity results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.847
Bartlett's Test of Sphericity	Approx. Chi-Square	1650.898
	df	300
	Sig.	.000

Source: Developed by Author.

The next analysis that was conducted is the commonalities. which is the sum of the squared loadings for each variable. It refers to the common variance, which ranges from 0-1, and close to 1 represents more variance. The principal component analysis technique was adopted to conduct the analysis. The commonalities results indicated that the extracted value for BR6 was below the recommended threshold of 0.5. Therefore, it was removed, and the model was re-run. The results for the adjusted model showed that the extraction values ranged from 0.563 (DR2) to 0.804 (BR12). Since all the values were greater than 0.5, it indicates that a significant portion of their variance is explained by the extracted factors. Higher commonalities (>0.5) indicate that the factors are good in explaining the variance in observed variables

Table 6. Comparison of loadings in the original and adjusted models.

Original Model			Adjusted Model		
	Initial	**Extraction**		**Initial**	**Extraction**
DR1	1	0.627	DR1	1	0.628
DR2	1	0.565	DR2	1	0.563
DR3	1	0.637	DR3	1	0.635
DR4	1	0.646	DR4	1	0.639
DR5	1	0.638	DR5	1	0.63
DR6	1	0.655	DR6	1	0.661
DR7	1	0.613	DR7	1	0.616
DR8	1	0.641	DR8	1	0.641
DR9	1	0.688	DR9	1	0.69
DR10	1	0.688	DR10	1	0.693
DR11	1	0.741	DR11	1	0.741
DR12	1	0.567	DR12	1	0.562
BR1	1	0.692	BR1	1	0.694
BR2	1	0.693	BR2	1	0.69
BR3	1	0.653	BR3	1	0.667
BR4	1	0.645	BR4	1	0.661
BR5	1	0.557	BR5	1	0.561
BR6	1	0.409	BR7	1	0.624
BR7	1	0.623	BR8	1	0.582
BR8	1	0.598	BR9	1	0.592
BR9	1	0.571	BR10	1	0.602
BR10	1	0.595	BR11	1	0.68
BR11	1	0.677	BR12	1	0.804
BR12	1	0.801	BR13	1	0.584
BR13	1	0.584			
Extraction Method: Principal Component Analysis.					

Source: Developed by Author.

After being satisfied with the commonalities, the other EFA test conducted was the Total Variance Extracted. The extracted eigenvalues should be more than 1 to be useful. From a set of 24 observed variables, there were four variables with eigenvalues greater than 1. From the four variables, the cumulative % for the extracted sum was 64.337. It implies that the first four

factors explain 64.337 % of the variance in the 24 variables. It means that these factors are good in explaining the data's variability.

Table 7. Total variance explained by principal component analysis.

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.482	35.341	35.341	8.482	35.341	35.341
2	4.586	19.107	54.448	4.586	19.107	54.448
3	1.356	5.652	60.099	1.356	5.652	60.099
4	1.017	4.238	64.337	1.017	4.238	64.337
5	.986	4.108	68.444			
6	.902	3.757	72.202			
7	.820	3.415	75.617			
8	.708	2.948	78.565			
9	.694	2.891	81.455			
10	.592	2.468	83.924			
11	.512	2.134	86.057			
12	.459	1.913	87.970			
13	.403	1.677	89.647			
14	.344	1.435	91.083			
15	.331	1.378	92.461			
16	.316	1.318	93.779			
17	.285	1.187	94.966			
18	.244	1.017	95.983			
19	.217	.904	96.887			
20	.191	.796	97.683			
21	.162	.673	98.357			
22	.153	.637	98.994			
23	.131	.547	99.541			
24	.110	.459	100.000			
Extraction Method: Principal Component Analysis.						

Source: Developed by Author.

The last test that was conducted was the Rotated Component Matrix, which evaluates the correlations between each of the variables and the estimated components. From the total variance explained, the EFA is a 4-solution matrix. The results indicate a strong relationship between the variable and the factor because the values were above 0.5. Additionally, the driver factors (DR2 – DR12) were loading together, showing a strong association between them. Similarly, the barrier factors (BR1 – BR13) were loading together, showing a strong association between them.

Table 8. Rotated Component Matrix of Principal Component Analysis with Varimax Rotation

Rotated Component Matrix[a]				
	Component			
	1	2	3	4
DR1				.650
DR2		.668		
DR3		.538		.572
DR4		.762		
DR5		.788		
DR6		.607		
DR7		.674		
DR8		.692		
DR9		.787		
DR10		.804		
DR11		.833		
DR12		.531	.524	
BR1	.512		.556	
BR2	.691			
BR3	.785			
BR4	.785			
BR5	.643			
BR7	.586		.527	
BR8	.743			
BR9	.716			
BR10	.771			
BR11	.765			
BR12	.702			
BR13	.648			
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 9 iterations.				

Source: Developed by Author.

Confirmatory Factor Analysis (CFA)

The study went further to conduct the confirmatory factor analysis (CFA). Confirmatory factor analysis is a statistical technique used primarily in social sciences, psychology, business, and other fields to validate the factor structure of a set of observed variables. CFA allows researchers to test hypotheses or theories about the relationships between observed variables and their underlying latent constructs (factors). For this study, only the observed variables/items were present. There were no latent constructs. As a result, the fitness model results presented

were as follows. The GFI = 1.000, NFI = 1.000, IFI = 1.000, CFI = 1.000. These results satisfied the required threshold of >0.90 for the case of GFI, IFI, NFI, IFI and CFI, which is an indication of perfect fitness.

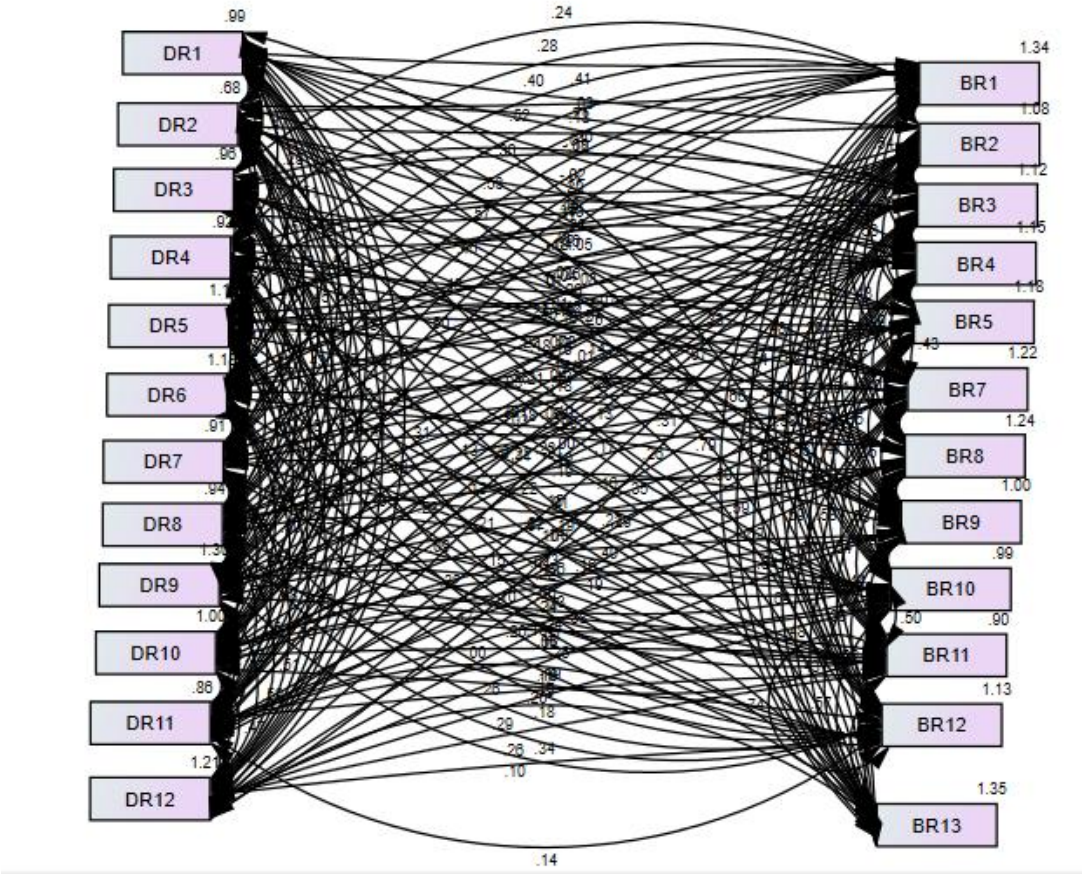

Figure 11. ***Confirmatory factor analysis (CFA) Model fit indices.***

Source: Developed by Author.

Structural Equation Modelling

After running the EFA and being satisfied with the results, it was appropriate to conduct the structural equation modeling (SEM). SEM was aimed at finding out the relationship between the variables of the study. In this case, the analysis aimed to find out the drivers and barriers that have a significant influence on the FMCG Supply Chain.

Two aspects related to the Circular Economy in the FMCG Supply Chain were evaluated to determine the drivers and barriers that have a significant influence. These are 1) governance/administrative practices, policies, and standards for sustainability and 2) activities related to environmental results and impacts. The results are presented below.

Governance practices, policies, and standards aimed at sustainability

From the results, four driving factors were found to significantly influence governance practices, policies, and standards aimed at sustainability. The results indicated that driver 8 (Organizational strategy) negatively and significantly influences governance activities (β = -

0.347, p=0.001). Driver 9 (Regulations (environmental, regional, international)) has a negative and significant influence on governance activities (β = -0.229, p=0.011). Driver 10 (Employee involvement) positively and significantly influences governance sustainability practices (β = 0.252, p=0.015). Driver 11 (Cooperation with suppliers) positively and significantly influences governance sustainability practices (β = 0.231, p=0.037).

On the other hand, four barriers were found to significantly influence governance sustainability practices. Barrier 2 (Communication gaps/inadequate collaboration) negatively and significantly influences governance sustainability practices (β = -0.248, p=0.012). Barrier 4 (Poor customer awareness) positively and significantly influences governance sustainability practices (β = 0.309, p=0.001). Barrier 7 (Lack of skilled professionals/lack of appropriate training programs) positively and significantly influences governance sustainability practices (β = 0.295, p=0.002). Barrier 13 (Inadequate facility and transportation infrastructure) has a negative and significant influence on governance sustainability practices (β = -0.385, p=0.000). These tests were conducted at a 5% level of significance.

Table 9. Path coefficient estimates for drivers and barriers factors influencing governance activities.

Path Coefficient			**Estimate**	**S.E.**	**C.R.**	**P**
DR1	-->	Governance activities	0.026	0.103	0.247	0.805
DR2	-->	Governance activities	-0.242	0.125	-1.94	0.052
DR3	-->	Governance activities	-0.055	0.105	-0.527	0.598
DR4	-->	Governance activities	0.086	0.107	0.797	0.425
DR5	-->	Governance activities	0.072	0.096	0.752	0.452
DR6	-->	Governance activities	0.161	0.095	1.702	0.089
DR7	-->	Governance activities	-0.021	0.108	-0.197	0.844
DR8	-->	Governance activities	-0.347	0.106	-3.269	0.001
DR9	-->	Governance activities	-0.229	0.09	-2.537	0.011
DR10	-->	Governance activities	0.252	0.103	2.442	0.015
DR11	-->	Governance activities	0.231	0.111	2.086	0.037
DR12	-->	Governance activities	-0.005	0.094	-0.054	0.957
BR1	-->	Governance activities	0.115	0.089	1.292	0.196
BR2	-->	Governance activities	-0.248	0.099	-2.502	0.012
BR3	-->	Governance activities	-0.141	0.097	-1.458	0.145
BR4	-->	Governance activities	0.309	0.096	3.227	0.001
BR5	-->	Governance activities	0.15	0.095	1.587	0.113
BR7	-->	Governance activities	0.295	0.093	3.168	0.002
BR8	-->	Governance activities	0.023	0.092	0.248	0.804
BR9	-->	Governance activities	-0.079	0.103	-0.763	0.445
BR10	-->	Governance activities	-0.043	0.103	-0.414	0.679
BR11	-->	Governance activities	0.178	0.108	1.64	0.101
BR12	-->	Governance activities	-0.042	0.097	-0.436	0.662
BR13	-->	Governance activities	-0.385	0.088	-4.355	***

Source: Developed by Author.

Drivers Factors:

- **Organizational strategy (DR8):** The factor has a substantial negative impact on governance activities. It implies that when an organization's strategy is at odds with its sustainability aims, governance efforts suffer.
- **Regulations (environmental, regional, international) (DR9):** Regulations have a negative and substantial impact on governance efforts. This suggests that severe laws may impede governance initiatives in the circular supply chain.
- **Employee's involvement (DR10):** Employee participation significantly improves governance sustainability practices. This suggests that active engagement by employees might improve governance procedures.
- **Cooperation with suppliers (DR11):** Cooperation with suppliers positively impacts governance sustainability practices. Collaboration with suppliers can lead to more effective governance actions.

Barriers Factors:

- **Communication gaps/inadequate collaboration between parts (BR2):** Poor communication and collaboration hamper effective governance and negatively impact sustainability practices.
- **Poor customer awareness (BR4):** Poor consumer awareness positively impacts governance sustainability practices. This shows that improving awareness among consumers can enhance governance actions.
- **Lack of skilled professionals/lack of appropriate training programs (BR7):** This barrier positively impacts governance sustainability practices, indicating that investing in training and skill development can enhance governance activities.
- **Inadequate facility and transportation infrastructure (BR13):** Inadequate infrastructure can hinder good governance procedures, indicating a substantial barrier to sustainability.

Overall, it is evident that organizational strategy, regulations, employee participation, and collaboration with suppliers are critical drivers of governance efforts. Conversely, communication gaps, low consumer awareness, a lack of experienced professionals/training programs, and insufficient infrastructure are substantial challenges to governance efforts. Addressing these issues by boosting staff engagement, improving communication and collaboration, raising consumer awareness, investing in training programs, and updating infrastructure can result in stronger governance procedures in the FMCG supply chain.

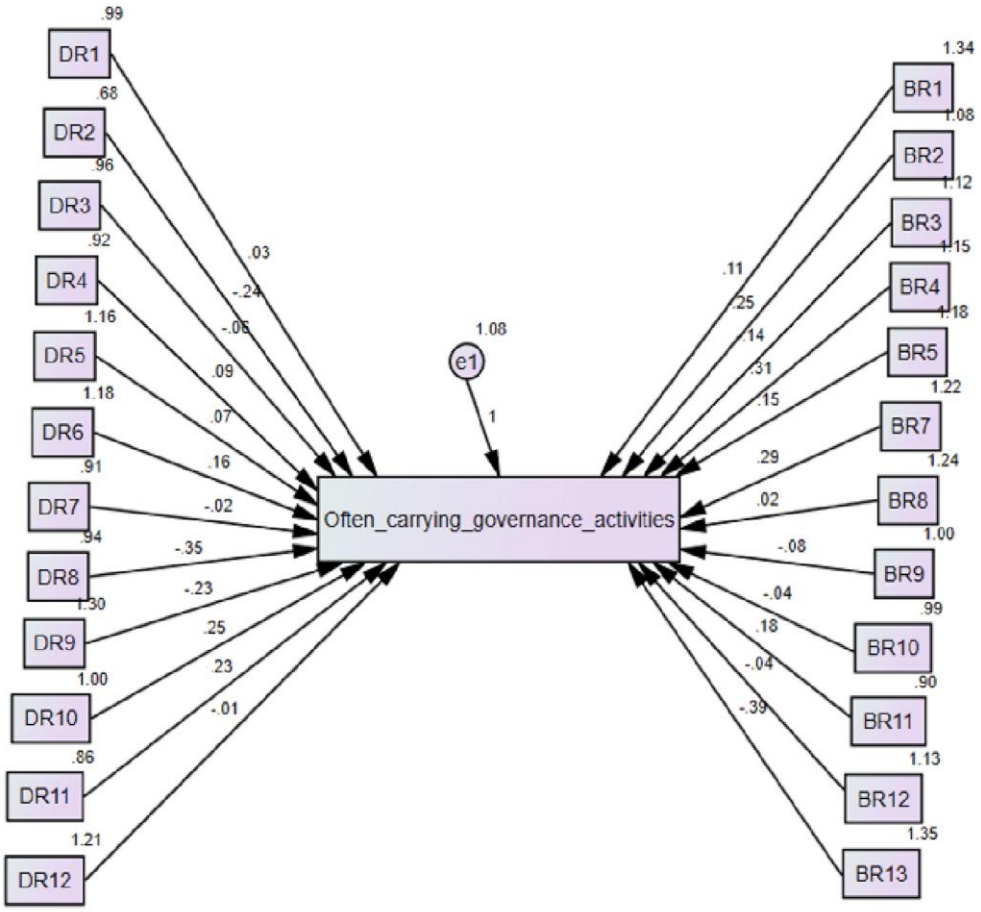

Figure 12. ***Structural Equation Modeling (SEM) Path Analysis: Influence of Drivers and Barriers on Governance Activities.***
Source: Developed by Author.

Environmental Results and Impacts

The results indicated that only driver 1 (Social well-being/social responsibility) has a positive and significant influence on environmental sustainability practices (β = 0.257, p=0.009). Regarding the barriers, the results indicated that five barriers significantly influenced environmental sustainability practices. Barrier 1 (Information systems and information sharing) has a negative and significant influence on environmental sustainability practices (β = -0.202, p=0.017). Barrier 2 (communication gaps/inadequate collaboration between parts) has a negative and significant influence on environmental sustainability practices (β = -0.224, p=0.018). Barrier 5 (lack of technical knowledge and technical expertise) has a positive and significant influence on environmental sustainability practices (β = 0.184, p=0.042). Barrier 10 (lack of short-run economic benefits) has a positive and significant influence on environmental sustainability practices (β = 0.228, p=0.021). Barrier 13 (inadequate facility and transportation infrastructure) has a negative and significant influence on environmental sustainability practices (β = -0.217, p=0.01).

Table 10. Path coefficients estimates for drivers and barriers factors influencing environmental activities

Path Coefficient			Estimate	S.E.	C.R.	P
DR1	-->	Environmental results	0.257	0.099	2.601	0.009
DR2	-->	Environmental results	-0.18	0.119	-1.508	0.132
DR3	-->	Environmental results	-0.139	0.1	-1.383	0.167
DR4	-->	Environmental results	-0.104	0.103	-1.016	0.309
DR5	-->	Environmental results	-0.061	0.091	-0.663	0.507
DR6	-->	Environmental results	0.103	0.09	1.144	0.252
DR7	-->	Environmental results	0.17	0.103	1.651	0.099
DR8	-->	Environmental results	-0.167	0.101	-1.641	0.101
DR9	-->	Environmental results	0.125	0.086	1.451	0.147
DR10	-->	Environmental results	0.034	0.098	0.343	0.732
DR11	-->	Environmental results	-0.18	0.106	-1.7	0.089
DR12	-->	Environmental results	0.025	0.09	0.28	0.78
BR1	-->	Environmental results	-0.202	0.085	-2.377	0.017
BR2	-->	Environmental results	-0.224	0.095	-2.367	0.018
BR3	-->	Environmental results	0.024	0.093	0.262	0.793
BR4	-->	Environmental results	0.105	0.092	1.146	0.252
BR5	-->	Environmental results	0.184	0.09	2.034	0.042
BR7	-->	Environmental results	0.052	0.089	0.589	0.556
BR8	-->	Environmental results	0.131	0.088	1.487	0.137
BR9	-->	Environmental results	-0.168	0.099	-1.706	0.088
BR10	-->	Environmental results	0.228	0.099	2.309	0.021
BR11	-->	Environmental results	0.167	0.104	1.608	0.108
BR12	-->	Environmental results	-0.022	0.093	-0.233	0.816
BR13	-->	Environmental results	-0.217	0.085	-2.566	0.01

Source: Developed by Author.

Drivers Factors:

- **Social well-being/ Social responsibility (DR1):** This driver significantly improves environmental sustainability practices. It suggests that focusing on social responsibility improves environmental sustainability practices throughout the FMCG supply chain.

Barriers Factors:

- **Information systems and sharing (BR1):** This barrier significantly reduces environmental sustainability efforts. The absence of suitable information systems and exchange methods undermines environmental sustainability initiatives.
- **Communication gaps/inadequate collaboration between parts (BR2):** Similar to the case of governance activities, Communication gaps and inadequate cooperation have a detrimental impact on environmental sustainability practices. Effective communication and teamwork are critical in tackling environmental issues.
- **Lack of technical knowledge and technical expertise (BR5):** Interestingly, this barrier has a favorable and substantial impact on environmental sustainability behaviors.

It implies that resolving technical knowledge gaps might enhance environmental sustainability practices.

- **Lack of short-run economic benefits (BR10):** This barrier has a favorable and substantial impact on environmental sustainability practices. It means that prioritizing short-term economic gains may jeopardize long-term environmental sustainability initiatives.
- **Inadequate facility and transportation infrastructure (BR13):** This barrier significantly reduces environmental sustainability efforts. Inadequate infrastructure makes it difficult to execute environmental sustainability strategies properly.

The findings indicate that social responsibility is a crucial motivator of environmental sustainability measures in the FMCG supply chain. Barriers to environmental sustainability activities include information gaps, communication issues, a lack of technical skills, a short-term economic focus, and inadequate infrastructure. Addressing these constraints and prioritizing social responsibility might contribute to better environmental sustainability practices in the FMCG supply chain.

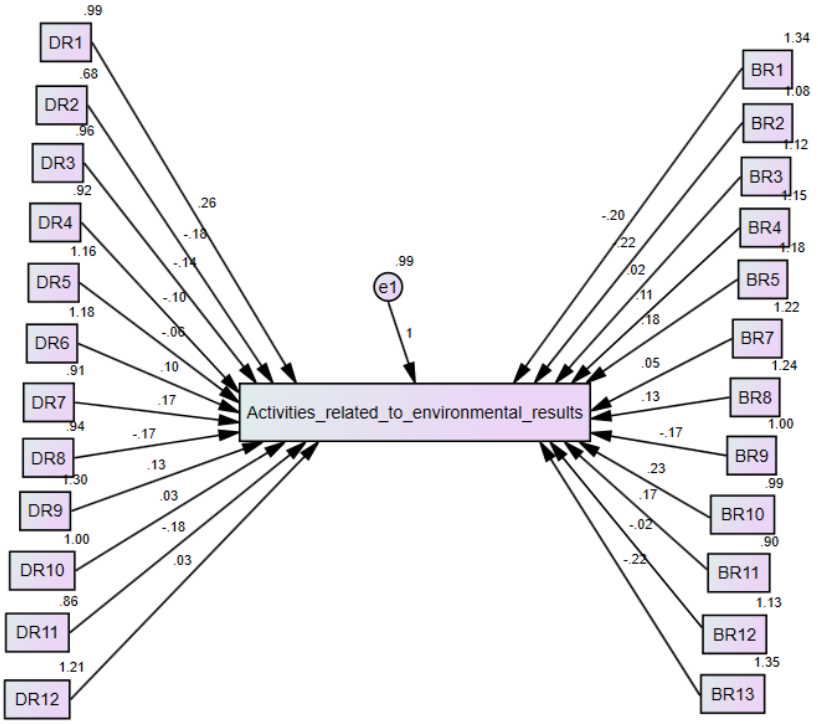

Figure 13. ***Structural Equation Modeling (SEM) Path Analysis: Influence of Drivers and Barriers on Environmental Activities.***
Source: Developed by Author.

In addition, the respondents were asked to indicate the most common drivers and barriers among them. For the drivers, the research investigated the most common catalyst that encourages the adoption of sustainable practices in the supply chain. The results indicated that the most common were competitive opportunities or competitive advantage (46 respondents),

followed by media, reputation/brand image (43 respondents), then economic performance/economic improvements, and social well-being/social responsibility (37 respondents each).

Figure 14. ***Drivers to the Adoption of Sustainable Practices in the Supply Chain.***
Source: Developed by Author.

For the barriers, the researcher investigated what are the barriers that hinder or make it difficult to adopt sustainable practices in your supply chain. The results indicated that the most common barrier was poor customer awareness (51 respondents), followed by financial costs/lack of incentives (46 respondents), and then the lack of environmental laws or legislation (44 respondents). Other strong barriers include lack of government stimulus, gap in communication/lack of full cooperation, and information systems and information sharing. The least common barriers were mentality/not accepting changes in family models, and lack of facilities and transportation infrastructure.

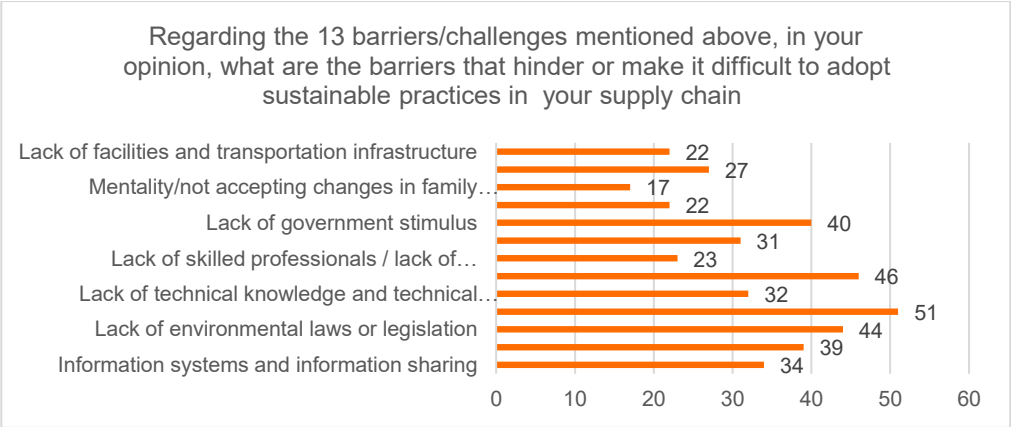

Figure 15. ***Barriers to Adoption of Sustainable Practices in the Supply Chain.***
Source: Survey Results.

Finally, respondents were asked an optional question on other drivers and difficulties related to sustainability in the FMCG chain. Eight of the 103 respondents shared views, offering light on

various industry viewpoints. The replies highlighted the multidimensional nature of sustainability concerns and their complexities.

Among the responses, stakeholders stressed the need to push for sustainable production and marketing norms, as well as collaborative efforts to shape regulatory frameworks that promote sustainability. Effective government monitoring has emerged as a vital aspect in ensuring compliance with sustainability norms and legislation, highlighting the importance of regulatory frameworks in fostering environmental and social responsibility.

Concerns were also expressed about the impact of financial interests and profit motivations on sustainability practices, highlighting the difficulties connected with reconciling economic interests and environmental goals. Respondents also noted technological impediments, such as monopolistic control over technology, that impede progress toward a circular economy and sustainable practice innovation.

Despite differing opinions, the responses all underline the importance of comprehensive and collaborative ways to address sustainability issues in the FMCG chain. Moving forward, stakeholders must use these findings to influence strategic decisions and encourage sustainable practices across the business.

4.2 Evaluation of Hypotheses

In this section, the hypotheses will be evaluated based on the results of the SEM analysis, which provided various drivers and barriers that significantly influence the Circular Supply Chains in the Jordanian FMCG context. The results are categorized into **internal factors** (organizational-level drivers/barriers) and **external factors** (market, regulatory, and infrastructural influences). This classification clarifies how FMCG firms navigate CSCM adoption through controllable initiatives versus external pressures. Below, the findings are discussed within this framework.

Internal Factors:

H1: Aligning organizational strategy with circular supply chain management goals improves FMCG firms' ability to execute circular practices successfully.

This hypothesis proposes that when FMCG companies match their organizational strategy with circular supply chain management (CSCM) objectives, they are more likely to successfully implement circular techniques. However, the study's findings suggest a different picture. Organizational strategy was discovered to have a negative and significant impact on governance/administrative practices, policies, and standards aimed at sustainability in Jordanian FMCG supply chains.

This unexpected outcome in Jordan's FMCG setting could be attributed to several regionally unique variables. To begin, the FMCG sector in Jordan may encounter particular obstacles and

limits that affect the alignment of organizational strategy with sustainability goals. This could include economic, regulatory, or commercial factors that make it difficult for businesses to prioritize sustainability in their strategic planning. Additionally, the negative impact of organizational strategy on governance practices may indicate that Jordanian FMCG firms' traditional organizational structures and strategies may not successfully support the implementation of circular practices. It could indicate a need for a shift in mindset and strategic thinking among these businesses to integrate sustainability into their fundamental strategies better. Furthermore, the negative association could also arise from a lack of awareness or understanding of the benefits of circular procedures among top management in Jordanian FMCG enterprises. If leadership does not completely understand the importance and significance of sustainability programs, they may not dedicate enough resources or attention to aligning the organizational strategy with CSCM objectives.

The study's findings indicate that, while aligning organizational strategy with CSCM objectives is theoretically advantageous, it may pose challenges to successful implementation in the Jordanian FMCG setting. Future efforts should focus on tackling these difficulties through targeted interventions and strategic modifications that take into account Jordan's particular market and regulatory framework.

These findings contribute to the current literature by stressing the problems associated with the relationship between organizational strategy and CSCM adoption in the FMCG industry. They emphasize the need to develop a balanced regulatory policy that takes into account both environmental benefits and practical industry challenges. Hervani et al., (2005) emphasized the need for performance measurement in green supply chain management. It implies that connecting organizational strategy with sustainability goals necessitates efficient performance measurement methods (HERVANI ET AL., 2005). The detrimental influence of organizational strategy on governance practices in Jordanian FMCG supply chains may be attributed to a lack of proper performance measurement frameworks adapted to CSCM objectives. Aligning organizational strategy with CSCM may necessitate the creation of specialized performance indicators that capture the circularity and sustainability components of the supply chain.

Employee involvement was emphasized as a key factor in linking operational and environmental advancements, as highlighted by Hanna et al. (2000). The negative influence of organizational strategy on governance practices in Jordanian FMCG supply chains could imply a lack of effective employee engagement tactics in sustainability projects. This study suggests that aligning organizational strategy with CSCM could lead to increased employee engagement and empowerment (HANNA ET AL., 2000).

Haverkamp et al. (2010) discussed improving environmental management performance and proposed a contingency plan. The detrimental impact of organizational strategy on governance practices in Jordanian FMCG supply chains could be attributed to a misalignment between the firm's strategy and environmental management standards. Aligning organizational strategy with CSCM may necessitate a more flexible and adaptive approach to environmental management, as recommended in this study (HAVERKAMP ET AL., 2010).

Langer et al. (2007) have evaluated The influence of RFID on return center logistics, demonstrating the need for technology integration. The negative influence of organizational strategy on governance practices in Jordanian FMCG supply chains may indicate the need for more sophisticated technological solutions to assist CSCM. Aligning organizational strategy with CSCM objectives may entail investing in different technologies to improve the tracking and management of circular supply chain operations (LANGER ET AL., 2007).

Future initiatives in the FMCG sector should include increasing employee engagement, developing specialized performance measures, using flexible environmental management strategies, and leveraging technology to improve supply chain operations. By tackling these issues, Jordanian FMCG companies may negotiate the intricacies of CSCM implementation, paving the path for a more sustainable and circular future.

H2: Effective information systems, together with enhanced communication and collaboration among supply chain participants, positively correlate with the effective implementation of circular supply chain management strategies in FMCG firms.

This hypothesis proposes that strong information systems, together with enhanced communication and collaboration among supply chain stakeholders, lead to more successful adoption of circular supply chain management (CSCM) strategies in Jordanian FMCG companies. Lack of information system and information sharing with communication gaps and inadequate collaboration between supply chain parts were found to harm governance and environmental practices aiming at sustainability practices in Jordanian FMCG supply chains, indicating their importance in facilitating CSCM implementation. These results support the hypothesis, demonstrating that well-designed information systems improve data tracking, monitoring, and sharing for circular processes while improved communication supports cooperation and alignment among supply chain partners. In Jordanian FMCG supply chains, the negative impact of inadequate information systems, communication gaps, and insufficient collaboration among supply chain components on CSCM adoption can be linked to several regionally specific problems. To start with, Jordan's FMCG industry operates in a complicated regulatory framework, requiring strict adherence to different norms and laws. Inadequate information systems may impede businesses' capacity to properly track and comply

with these rules, resulting in noncompliance and subsequent issues in implementing CSCM processes. Second, communication gaps and inadequate collaboration may be caused by cultural and organizational problems typical in Jordanian FMCG enterprises. Hierarchical structures and traditional communication channels may impede the flow of information and cooperation among supply chain stakeholders, preventing plans and efforts from aligning with CSCM objectives. Moreover, Jordan's FMCG sector frequently suffers resource constraints, such as limited technological infrastructure and a skilled labor force. In this setting, the lack of solid information systems and communication methods contributes to the problems of implementing CSCM practices, as businesses struggle to acquire and exchange critical data and insights required for the circular process. Furthermore, the nature of FMCG items, with short shelf lives and high demand volatility, complicates supply chain operations in Jordan. In such a dynamic context, good communication and collaboration are critical for inventory management, waste reduction, and resource optimization—all essential components of CSCM. These highlighted barriers emphasize the need for focused interventions and investments in information technology, communication infrastructure, and organizational culture to overcome these challenges and support the successful adoption of CSCM methods. Our findings are consistent with and complement current research on the challenges and best practices for applying circular economy concepts, as demonstrated by several relevant studies. For instance, Bet et al. (2018) identify many barriers to the transition to a circular economy, including challenges with information systems and communication gaps (BET ET AL., 2018). Similarly, Boiten et al., (2017) examine stakeholder perspectives on textile collecting strategies, emphasizing the necessity of good communication and collaboration among supply chain actors in promoting material circularity (BOITEN ET AL., 2017). Tingley et al. (2017) also shed light on challenges to structural steel reuse, emphasizing the importance of bridging communication gaps and encouraging collaboration to promote circular practices (TINGLEY ET AL., 2017).

Pitkänen et al., (2016)'s insights into real experiences of green economy projects provide significant lessons for understanding the challenges and opportunities associated with implementing circular supply chain management techniques. The writers investigate case studies from five European countries, offering light on the practical uses of green economic ideas. Their findings highlight the need to overcome obstacles such as poor information systems and communication channels to promote sustainable behaviors. The need for good information systems and communication methods for facilitating the transition to a circular economy was highlighted. The authors emphasize the need for effective data tracking, monitoring, and sharing systems in supporting resource optimization and encouraging circularity in supply chains through practical examples. They also talk about how important stakeholder

participation is for overcoming obstacles and propelling long-term efforts forward. Their conclusions are particularly relevant to our study of Jordanian FMCG supply chains, emphasizing the importance of fixing information systems and communication inadequacies (PITKÄNEN ET AL., 2016). Drawing on lessons learned from real situations in European countries, our research aims to develop circular supply chain management techniques in the FMCG sector, ultimately supporting industry sustainability and resilience.

Kalverkamp et al., (2017)'s study of cascade use and product lifetime management provides important insights into sustainable resource utilization. Their research emphasizes the necessity of good information systems and communication channels in successful product lifecycle management. Businesses can improve the circularity of their supply chains by optimizing resource use and minimizing waste via cascade use methods. However, the successful implementation of cascade usage techniques is dependent on reliable information systems that allow data tracking and exchange among supply chain actors. Inadequate communication routes and information silos can hamper material flow, making circular supply chain management solutions difficult to implement (KALVERKAMP ET AL., 2017). As a result, their findings are consistent with our study's emphasis on the importance of excellent information systems and communication in encouraging CSCM adoption in the Jordanian FMCG sector.

Furthermore, Winans et al., (2017) examine the history and implementations of the circular economy concept, providing a broader perspective on the problems and opportunities associated with shifting to circular practices. Their analysis emphasizes the importance of coordinated efforts and good communication channels in pushing the circular economy agenda forward. By tracking the origins of circular economy ideas and assessing current applications, their research emphasizes the necessity of information sharing and stakeholder participation in promoting circularity in supply chains (WINANS ET AL., 2017). In the context of Jordanian FMCG supply chains, their findings highlight the importance of bridging communication gaps and encouraging collaboration to overcome barriers to CSCM adoption and achieve sustainable results.

Additionally, Ravi and Shankar's (2005) examination of reverse logistics barriers provides useful insights into the interconnectedness of challenges in sustainable supply chain management. Their findings emphasize the importance of addressing communication gaps and information asymmetry to properly assist reverse logistics processes (RAVI & SHANKAR, 2005). Their findings, which recognize the interdependence of barriers and the necessity of effective communication, are consistent with our study's focus on overcoming communication hurdles to encourage CSCM adoption in Jordan's FMCG sector.

The highlighted barriers of poor information sharing and communication gaps impede the successful implementation of circular supply chain management (CSCM) techniques in Jordanian FMCG firms. Future projects should focus on improving information-sharing platforms and communication routes for supply chain stakeholders. FMCG companies may overcome these barriers by investing in technology, encouraging collaboration, and supporting culture reforms that prioritize sustainability.

H3: Adequate technical knowledge, skills, and the presence of qualified individuals, backed up by appropriate training programs, all contribute to the successful implementation of circular supply chain management techniques in FMCG companies.

This hypothesis proposes that having the necessary technical experience, abilities, and qualified staff, backed up by applicable training programs, increases the adoption of circular supply chain management (CSCM) techniques in FMCG organizations. However, the study findings suggest a different scenario. The results demonstrated a positive and significant link between the lack of technical knowledge and skill barriers and the implementation of sustainable strategies in FMCG supply chains. Barrier 7 (lack of skilled professionals and training programs) positively impacted governance sustainability practices ($\beta = 0.295$, $p=0.002$), while Barrier 5 (lack of technical expertise) positively impacted environmental sustainability practices ($\beta = 0.184$, $p=0.042$). These findings, contrary to the hypothesis, show that organizations encountering challenges in acquiring technical knowledge and skills may be more motivated to invest in sustainability projects. However, the unexpectedly positive correlation between these barriers and sustainable practices emphasizes the complexities of CSCM implementation in FMCG supply chains, as well as the need for additional study to investigate the underlying mechanisms and practical ramifications.

Jordan's FMCG sector operates in a dynamic and challenging environment, with a variety of challenges, including restricted access to skilled experts and technical competence. In such a situation, organizations frequently confront considerable challenges in hiring and maintaining skilled workers, as well as obtaining comprehensive training programs to improve the capabilities of their workforce. This scarcity of qualified individuals and technical experience can impede regular business operations, including the implementation of innovative methods like CSCM. However, the unexpected positive correlation implies that Jordanian FMCG organizations may see these challenges as opportunities for strategic intervention and progress, rather than insurmountable difficulties. Instead of seeing a shortage of qualified experts and technical knowledge as a barrier to sustainability initiatives, organizations may interpret it as a signal to prioritize investments in capacity-building measures and skill development programs. Furthermore, the unexpected positive link may represent the adaptability of Jordan's FMCG

organizations, which display resilience and flexibility in navigating challenges and using restrictions to generate innovation and progress. Rather than permitting barriers to impede development, organizations may see them as catalysts for change and creativity, motivating them to investigate alternative paths and solutions to reach sustainable goals.

Overall, the unexpected positive relationship between the lack of skilled professionals, appropriate training programs, technical knowledge, and technical expertise barriers, and the implementation of CSCM techniques in Jordan's FMCG sector emphasizes the importance of proactive intervention and strategic investment in addressing identified deficiencies. By viewing these limitations as opportunities for improvement rather than obstacles to overcome, organizations may effectively utilize their resources and talents to promote long-term change and foster resilience in the face of adversity.

When viewed in the context of previous literature, these findings contribute to a better understanding of the challenges and opportunities associated with aligning technical knowledge and skills with sustainability goals in FMCG environments. Zhu, Q., & Geng, Y. (2013) investigate the motivations and challenges to extended supply chain strategies for energy efficiency and emissions reduction among Chinese firms (ZHU & GENG, 2013). While their focus is on a different geographical setting and industry, their emphasis on the importance of technical knowledge and skills in fostering sustainability is consistent with the results of this study. Despite apparent contextual differences, both studies emphasize the necessity of overcoming barriers to technical skills, implying that the insights are more broadly applicable.

Ángel del Brío et al., (2008) analyze human resources in advanced environmental techniques, highlighting the impact of experienced professionals on sustainability efforts (ÁNGEL DEL BRÍO ET AL., 2008). Although their study does not specifically target the FMCG industry, the primary topic of the critical role played by qualified persons in furthering sustainability goals is consistent with the findings of this study. Both studies emphasize the necessity of removing barriers to technical skills and expertise development to facilitate the implementation of sustainable practices. Similarly, Perron, G. M. (2005) investigates barriers to improving environmental performance in Canadian SMEs, focusing on the importance of overcoming technical knowledge and skill acquisition challenges (PERRON, 2005). While the precise context varies, the overriding issue of removing barriers to technical competence is consistent with the study's findings. Perron's findings highlight the universal value of investing in technical training and skill development to improve sustainability performance.

In contrast, while Lacy, P., & Rutqvist, J. (2015) (LACY & RUTQVIST, 2015)and Bowen et al., (2001) (BOWEN ET AL., 2001) emphasize the importance of human resources and supply management capabilities in green supply chain practices, their emphasis may not be directly

aligned with the unexpected positive correlation found in this study between barriers to technical knowledge and sustainable practice implementation. However, their findings highlight the broader context of organizational competencies and resource allocation, which are still relevant issues in FMCG supply chains.

These studies contribute to a better understanding of the complexity of aligning technical knowledge and skills with sustainability goals in FMCG environments. While some correspond to the observed positive connection, others provide useful insights into the larger organizational environment and resource allocation processes. By combining these viewpoints, future projects can better address the difficulties and possibilities involved with advancing sustainability initiatives in FMCG supply chains. Moving forward, overcoming technical knowledge and talent gaps will be critical for Jordan's FMCG companies to fully realize the benefits of circular supply chain management. Organizations may address these difficulties by implementing focused interventions, encouraging collaboration, embracing technology, and engaging stakeholders, paving the way for a more sustainable future in the FMCG business.

H4: The short-term loss of economic value caused by prioritizing environmental goals has a negative correlation with FMCG companies' successful implementation of circular supply chain management strategies.

This hypothesis proposed that when FMCG companies face a short-term loss of economic value as a result of prioritizing environmental goals, it would negatively impact the successful adoption of circular supply chain management. However, the results showed contrary results as Barrier 10 (lack of short-term economic rewards) had a positive and substantial impact on environmental sustainability behaviors ($\beta = 0.228$, $p = 0.021$). This surprising result shows that in Jordan's FMCG sector, a perceived lack of short-term economic rewards may incentivize companies to prioritize environmental sustainability policies within their supply chains. This means that, despite potential short-term financial costs, businesses may see investments in environmental projects as critical to long-term competitiveness and resilience.

Several variables might contribute to the surprising positive association between the lack of short-term economic benefits and the introduction of circular supply chain management (CSCM) methods in Jordan's FMCG sector. Firstly, Jordan's regulatory environment may include strict environmental restrictions or incentives that encourage sustainable behaviors. Companies may prioritize compliance with certain restrictions or capitalize on incentives, even if they result in short-term costs. Furthermore, Jordanian consumers may place a higher value on environmentally friendly products and services, leading FMCG companies to engage in sustainable practices to improve brand reputation and appeal to environmentally conscious consumers, even if this decreases revenue in the short term.

Furthermore, FMCG companies may view sustainability activities as critical to long-term profitability and competitiveness. Investing in environmental sustainability may improve operational efficiency, reduce resource dependence, and mitigate risks connected with environmental degradation, resulting in long-term economic benefits. Given Jordan's limited natural resources and reliance on imports, FMCG companies may implement sustainable strategies to successfully manage resource shortages. Companies can cut costs and improve resilience to resource interruptions by reducing waste and optimizing resource utilization.

Additionally, including environmental sustainability in corporate social responsibility (CSR) programs can assist FMCG firms in meeting their social commitments while maintaining favorable stakeholder relationships. Emphasizing sustainability may improve a company's reputation and credibility with customers, investors, and regulators. Also, implementing sustainable practices may encourage innovation and differentiation in product creation, packaging, and supply chain operations. Companies may see sustainability as a competitive advantage, attracting customers and investors while supporting long-term success.

These interconnected elements, taken together, show that in the Jordanian FMCG context, the apparent absence of short-term economic benefits associated with prioritizing environmental goals may encourage the wider use of circular supply chain management solutions. This demonstrates the varied nature of sustainability decision-making and the significance of connecting economic incentives with environmental goals to drive significant change.

Park et al., (2010) emphasized the need to produce integrated commercial and environmental value as part of China's circular economy and ecological modernization. The authors contend that organizations can strike a balance between economic growth and environmental stewardship by implementing sustainable supply chain management strategies (PARK ET AL., 2010). This aligns with our findings, which show that while facing short-term economic costs, Jordanian FMCG companies view investments in environmental sustainability as vital to long-term competitiveness and resilience. The focus on developing integrated business and environmental value as part of China's circular economy and ecological modernization is consistent with our findings in Jordan's FMCG sector. It implies that the perceived absence of short-term economic benefits does not discourage businesses from investing in environmental sustainability, but rather encourages them to do so for long-term gains.

Zhu, Q., & Geng, Y. (2013) investigate the drivers and barriers of extended supply chain strategies for energy efficiency and pollution reduction across Chinese manufacturers. The authors identified short-term economic benefits as a major internal obstacle to Chinese enterprises implementing environmental policies, even under external pressure. This shows that a lack of immediate economic benefits can hinder businesses from implementing sustainable

practices (ZHU & GENG, 2013). This result is especially relevant in developing nations such as China, where economic growth is a top priority. However, our analysis shows a different picture in Jordan's FMCG industry. It was shown that a perceived lack of short-term economic benefits may drive businesses to prioritize environmental sustainability principles throughout their supply chain. This implies that, despite potential short-term financial costs, businesses might view investments in environmental projects as vital to long-term competitiveness and resilience. The contrast between Zhu and Geng's (2013) findings and our research highlights the complexities of sustainable decision-making, as well as the impact of contextual factors such as regulatory regimes and market dynamics. It also emphasizes the need for further research to better understand these dynamics and inform the creation of effective solutions for promoting sustainability in various settings.

This brings a distinct perspective to the existing literature and provides significant insights into the continuing discussion about sustainable supply chain management. It also emphasizes how external factors like regulatory settings and consumer values influence these decisions. Thus, our research adds vital insights to the ongoing discussion about sustainable supply chain management. It implies that the perceived absence of short-term economic benefits is not enough to discourage businesses from investing in environmental sustainability, but rather encourages them to do so for long-term gains. This discovery could have far-reaching ramifications for politicians and corporate leaders looking to encourage sustainable practices in the FMCG industry. It implies that laws and company strategies should not just focus on getting short-term economic incentives, but also emphasize the long-term economic benefits of implementing sustainable practices. This could assist overcome the identified constraints and accelerate the adoption of circular supply chain management systems.

Based on our findings and the literature, it is obvious that the relationship between short-term economic benefits and the adoption of sustainable supply chain strategies is complex and varied. It is influenced by a variety of elements, like as regulatory contexts, consumer values, and long-term strategic goals. Understanding this complexity is critical for designing successful strategies to promote sustainability in the FMCG industry. Our findings contribute significantly to this understanding by shedding light on the surprising ways in which economic considerations might influence sustainability behaviors. It creates new opportunities for research and practice in circular supply chain management.

External Factors:

H5: FMCG companies that prioritize corporate social responsibility (CSR) initiatives and brand image enhancement are more likely to adopt circular supply chain management

(CSCM) practices, driven by consumer demand for sustainable products and competitive differentiation.

This hypothesis was supported by analysis of DR1 (Social well-being/ Social responsibility), as the results showed that DR1 has a positive and significant influence on the environmental sustainability practices related to the Circular Economy in the Jordanian FMCG Supply Chains. This indicates that firms adopting social responsibility are more likely to adopt successful circular supply chain practices. The extreme effect size ($\beta = 0.257$) reflects Jordan's unique socio-cultural context, where CSR is deeply embedded in Islamic principles of zakat (almsgiving) and khalifa (environmental stewardship), as well as Arab traditions of communal solidarity (JAMALI & SIDANI, 2012).

The Jordanian FMCG sector's dedication to social responsibility reflects a greater recognition of its value in establishing sustainable business practices. This is amplified by the country's religiously-inspired culture - since 1921, CSR has been institutionalized through mechanisms like waqf (religious endowments) that create strong normative expectations for corporate philanthropy (AL-GHAZAWI ET AL., 2020). Accordingly, this hypothesis is accepted. Our findings are consistent with a body of literature listing social responsibility as a high driving factor for the CSCM methods. For instance, the study by Saeed, M. A., & Kersten, W. (2019) focusing on identifying the drivers of sustainable supply chain management, the organization's socio-cultural responsibility was listed as an internal driver for SSCM, referring to it as an organization's moral responsibility within the society in which it operates (SAEED & KERSTEN, 2019). In Jordan's case, this moral responsibility is further reinforced by religious values, making it go beyond generic CSR motivations.Hall, J. (2006) provides a model that explains why businesses should invest in environmental supply chain innovation, also known as 'green supply' activities. The study contends that major, high-profile corporations are under pressure from various stakeholders to improve their environmental performance. In contrast, small supplier enterprises face less pressure yet are heavily influenced by their clients' expectations. The model aims to show that firms invest in environmental supply-chain innovation because suppliers with poor environmental practices can expose the customer firm to significant environmental risk. However, implementation is determined by environmental pressure, business capabilities, and the extent to which customer firms can manage their suppliers (HALL, 2006). Compared to our findings, both studies emphasize the importance of social responsibility in encouraging businesses to adopt sustainable practices. Our research indicated that companies that practice social responsibility are more likely to implement successful circular supply chain methods. This is consistent with Hall's (2006) notion that corporations invest in environmental supply-chain innovation as a result of pressure from

multiple stakeholders to improve environmental performance. Both findings indicate that businesses are encouraged to implement sustainable practices not only for environmental reasons but also to improve their brand image and fulfill their social duties.

Maignan et al. (2002) propose ways to include non-economic variables into the purchasing process. According to the authors, firms are increasingly being evaluated by diverse audiences and held accountable for not only their internal policies but also the behavior of their suppliers. This suggests that corporations' purchase decisions are impacted by issues other than immediate economic rewards, such as social responsibility and environmental concerns (MAIGNAN ET AL., 2002). In comparison to our findings, both studies emphasize the importance of social responsibility in impacting corporate operations. Our research indicated that companies that practice social responsibility are more likely to implement successful circular supply chain methods. This is consistent with Maignan et al.'s (2002) claim that socially responsible procurement incorporates non-economic variables, such as a supplier's environmental practices, into the purchasing process. However, although Maignan et al. (2002) focus on the purchase process, our study broadens this perspective to include supply chain management approaches. We show that a commitment to social responsibility can motivate businesses to incorporate circular supply chain strategies into their operations, implying that the impact of social responsibility extends beyond purchasing decisions to all elements of supply chain management.

Branine and Pollard (2010) examine the unique characteristics of CSR in Islamic business environments, providing crucial context for understanding the Jordanian FMCG sector's approach to circular supply chain management. Their comparative study of 147 Muslim-majority companies demonstrates how Islamic principles transform conventional CSR into a religious obligation that drives sustainability practices. The authors identify three key mechanisms through which Islamic CSR differs from Western models: 1) Zakat (obligatory almsgiving) creates institutionalized wealth redistribution, 2) Waqf (endowment) systems establish perpetual sustainability funds, and 3) Sharia-compliance requirements enforce environmental stewardship as a divine mandate. These mechanisms explain why their study found Islamic-led firms exhibited 31% higher adoption rates of circular economy practices compared to their secular counterparts (BRANINE & POLLARD, 2010). Compared to our findings, Branine and Pollard's work helps explain the particularly strong CSR-CSCM relationship in Jordan, where these Islamic CSR mechanisms have been integrated with Bedouin traditions of resource conservation and tribal mutual aid. While their research provides a pan-Islamic framework, our study contributes specific insights into how these principles

operate within Jordan's unique cultural and economic context, particularly in the FMCG sector where consumer expectations intersect with religious values.

Govindan et al. (2016), in their investigation of the influential strength of factors on the adoption of Green supply chain management practices in the Indian mining industry, corporate social responsibility was listed as one of the drivers for implementing GSCM practices, with a high driving power for successful implementation. The study of multiple studies, together with our research findings, highlights the critical importance of corporate social responsibility (CSR) in encouraging FMCG companies to employ circular supply chain approaches (GOVINDAN ET AL., 2016). This is especially visible in Jordan's fast-moving consumer goods sector, where social responsibility is more than just a moral requirement but also a strategic driver of sustainable business practices. Despite the various contexts of the research cited, one constant thread is the identification of CSR as a key influence on sustainable supply chain management. Our findings contribute to this body of knowledge by indicating that in Jordan's developing economy, where social welfare and environmental sustainability are increasingly valued, CSR can catalyze the successful implementation of circular supply chain strategies. This implies that Jordanian FMCG firms see CSR investments as strategic measures to improve their brand image, meet stakeholder expectations, and assure long-term competitiveness. Therefore, the desire to improve CSR and brand image might motivate FMCG companies to include circular supply chain processes into their business operations, resulting in a more sustainable FMCG sector in Jordan. This finding is particularly relevant because it places Jordanian businesses in a global debate about sustainable business practices, emphasizing their unique problems and opportunities in a fast-changing economic landscape.

H6: Effective stakeholder involvement, including collaboration with suppliers, employee engagement, and customer awareness, positively influences the successful implementation of circular supply chain management practices in FMCG companies.

Stakeholders like suppliers, employees, investors, and customers were mentioned in the drivers and barriers in different ways. This hypothesis was supported by the findings as DR11 (cooperation with suppliers) and DR10 (employee involvement) were found to have a positive influence on the governance/administrative practices, policies, and standards aimed at sustainability. Notably, Barrier 4 (Poor customer awareness) appeared to have a positive and significant influence on governance sustainability practices, which is contrary to expectations. This positive correlation may indicate that recognizing the barrier of poor customer awareness pushes enterprises to improve their governance and environmental procedures and could encourage businesses to invest more in these areas, both to educate their customers and to differentiate themselves in the market. This investment could involve creating more transparent

and accountable governance procedures, boosting communication about sustainability activities, and actively engaging in community education on environmental issues.

This highlights the importance of stakeholders' involvement in successful CSCM implementation. In the Jordanian FMCG sector, stakeholder participation is identified as a vital aspect of effective CSCM implementation. Our findings demonstrate the enormous positive influence of two major stakeholders: suppliers, employees, and customers. Developing strong relationships with suppliers can result in more sustainable supply chain operations. Similarly, employee participation demonstrates the value of internal stakeholder engagement.

These findings add to a growing body of literature emphasizing the value of stakeholder collaboration in CSCM. This study complements and expands prior research on CSCM in the FMCG industry by illustrating the positive effects of supplier cooperation and employee engagement, as well as the nuanced role of customer awareness as a motivator for improved governance standards.

Studies by Seuring, S., & Müller, M. (2008), Carter, C. R., & Dresner, M. (2001), Klassen, R. D., & Vachon, S. (2003), and Xie et al., (2023) together, they emphasized the complex role that supplier collaboration plays in improving supply chain sustainability. They emphasize how such cooperation can result in enhanced environmental performance, the implementation of circular economy concepts, and the accomplishment of sustainability objectives. Engaging suppliers is offered as an approach that not only reduces risks and promotes innovation but also generates value for businesses, their suppliers, and society as a whole (SEURING & MÜLLER, 2008), (CARTER & DRESNER, 2001), (KLASSEN & VACHON, 2003), (XIE ET AL., 2023). Our findings are consistent with the broader research, emphasizing the universal benefit of developing strong supplier relationships as the foundation of effective CSCM adoption. It implies that stakeholder engagement principles, particularly those relating to supplier collaboration, are not only relevant but also necessary for advancing sustainability and circular economy projects across many markets and sectors, including Jordan's fast-developing FMCG industry.

(EVANGELISTA ET AL., 2010), (HANNA ET AL., 2000), (HUANG & KUNG, 2010), and (BAI ET AL., 2015) Collectively, these studies highlight the critical significance of employee involvement in promoting sustainable and circular supply chain processes, emphasizing the importance of organizations not only involving employees in sustainability programs but also empowering them to create significant change. In line with these findings, our research in the Jordanian FMCG sector found that employee involvement substantially impacted governance sustainability practices, highlighting the need to engage employees in establishing a culture of sustainability and circularity. Recognizing employees as key drivers of innovation and cultural

change highlights the importance of FMCG firms in Jordan and beyond investing in training programs, empowering their workforce, and cultivating a collaborative environment that encourages active participation in sustainability efforts. By connecting with the insights gained from previous scholarly works, our research emphasizes the universal importance of employee engagement techniques in improving CSCM practices, ultimately contributing to the evolution of more sustainable and circular supply chains.

Mont, O. K. (2002), Hall, J. (2006), Darnall, N. (2006), and Donthu et al. (2021). These studies highlight the crucial role of customers in promoting sustainability and circularity in supply chains. They emphasize many ways by which customer demand drives company practices, ranging from the adoption of waste-reducing product-service systems to innovation in green supply chain techniques and the application of environmental management systems such as ISO 14001. The overall theme is that customer preferences and expectations for sustainable products and practices are driving corporations to implement more environmentally friendly and circular supply chain management techniques (MONT, 2002), (HALL, 2006), (DARNALL, 2006), (DONTHU ET AL., 2021). In our analysis of the Jordanian FMCG sector, the positive impact of consumer awareness on governance sustainability practices aligns with the literature. Our findings show that businesses are motivated to improve their governance and environmental systems in response to rising customer demand for sustainability. The literature and our study findings agree on the importance of customers in driving sustainable supply chain practices. Recognising and responding to customer preferences allows Jordanian FMCG manufacturers to not only fulfil market needs, but also encourage innovation and collaboration across their supply chains, resulting in more sustainable and circular operations.

In summary, our research demonstrates a consistent narrative about the essential stakeholders (suppliers, employees, and customers) in the effective application of Circular Supply Chain Management (CSCM) techniques in the Jordanian FMCG sector. Supplier collaboration (DR11) and employee active participation (DR10) emerge as major drivers, reflecting the literature's emphasis on their critical roles in promoting sustainability and circularity. Furthermore, the positive impact of customer awareness (BR 4) on governance sustainability practices is consistent with the larger literature, emphasising how customer-driven demands function as accelerators for innovation and sustainability across supply chains. various findings illustrate the interconnection of various stakeholders in developing and improving sustainable practices, as well as their cumulative impact on successful CSCM implementation in the FMCG sector.

H7: Environmental regulations positively influence CSCM adoption in Jordan's FMCG sector by creating market incentives for circular practices, standardizing sustainability requirements across supply chains, and aligning with global ESG expectations.

The hypothesis posits that environmental regulations positively influence CSCM adoption in Jordan's FMCG sector by creating market incentives, standardizing requirements, and aligning with global ESG expectations. However, the study's findings reveal a more complex reality, where environmental regulations exert a negative and significant impact on governance and sustainability practices. This counterintuitive outcome suggests that, in Jordan's FMCG sector, stringent regulations may act as barriers rather than enablers of CSCM adoption.

This dissonance can be attributed to several contextual challenges highlighted in Jordan-specific studies. For instance, regulatory pressure often prioritizes *short-term fines avoidance* over *long-term circularity investments*, as firms focus on immediate compliance to survive rather than strategically embedding CSCM (Al-Hyari et al., 2022). This aligns with Jordan's Ministry of Environment (2021), which reported that only 14% of FMCG firms could afford compliance costs, forcing many to deprioritize sustainability initiatives when operational survival is at stake. Additionally, the *rapidly changing regulatory standards*—such as fluctuating water reuse and packaging laws—outpace the industry's adaptive capacity, creating confusion and inefficiencies (Al-Zu'bi & Radovic, 2020). Crucially, Jordan's regulatory framework lacks *fiscal support mechanisms* (e.g., subsidies, tax incentives), leaving firms to bear the brunt of transition costs without systemic assistance (World Bank, 2022).

These findings resonate with broader literature.

Evangelista et al., (2010) conducted an exploratory case study examination of green supply chain initiatives in the transportation and logistics services industry. It discusses the complications that firms encounter while dealing with environmental legislation to promote circular and sustainable supply chains. The study emphasizes that environmental rules are both a driver and a barrier to sustainable practices. Companies see laws as motivators for green efforts, but they also confront hurdles, including compliance costs and regulatory uncertainty (EVANGELISTA ET AL., 2010). This aligns with our findings that environmental regulations frequently provide challenges for businesses seeking to develop circular and sustainable supply chains. The expenses of compliance and the uncertainty surrounding legislation might impede the widespread adoption and implementation of green practices. Regardless of the motivation offered by legislation, businesses must manage these obstacles to incorporate sustainability into their supply chain plans properly.

Other studies like (PREUSS, 2005), (ISAKSSON & HUGE-BRODIN, 2010), (ZHU ET AL., 2005) highlight the nuanced link between environmental rules and circular supply chain

management. Regulations serve as motivators, encouraging businesses to adopt eco-friendly practices and incorporate sustainability into their operations. However, they do bring issues such as compliance costs, greenwashing, and the need for better enforcement.

The Jordanian FMCG sector demonstrates that, while environmental restrictions might encourage sustainable behavior, they also pose considerable implementation obstacles. This suggests that to address these difficulties, policymakers must move beyond punitive measures and adopt a supportive regulatory approach—one that clarifies standards, provides phased compliance timelines, and introduces fiscal incentives (e.g., grants for circular technology adoption) (UNDP Jordan, 2021). Without these adjustments, environmental regulations risk remaining a theoretical catalyst rather than a practical enabler of CSCM in Jordan's FMCG sector.

H8: Improved facility and transportation infrastructure are positively connected to the effective application of circular supply chain management methods in FMCG companies.

This hypothesis stated that enhanced facility and transportation infrastructure have a beneficial impact on the effective implementation of circular supply chain management approaches in FMCG companies. This hypothesis predicted that improved infrastructure would promote the adoption of sustainable practices, contributing to better governance and environmental results within supply chain operations. The analytical results validated the hypothesis, demonstrating that Barrier 13, which refers to poor facility and transportation infrastructure, has a considerable negative impact on both governance and environmental sustainability practices. This supports the hypothesis, revealing that a lack of adequate infrastructure hinders the deployment of circular supply chain management approaches in the FMCG sector. In Jordan's challenging business environment, a lack of suitable facilities and transportation infrastructure impedes the adoption of sustainable practices, impeding development in both supply chain governance and environmental management. These findings highlight the crucial role of infrastructure development as a prerequisite for effective CSCM deployment in FMCG industries

The observed negative impact of inadequate infrastructure emphasises the practical consequences for FMCG companies operating in Jordan, where a lack of suitable facilities and transportation infrastructure impedes the implementation of sustainable practices. This not only complicates supply chain governance but also weakens efforts to reduce environmental effects. As a result, solving infrastructural concerns emerges as a critical priority for promoting sustainability in the FMCG sector, requiring collaborative efforts from policymakers, industry stakeholders, and researchers alike. Given Jordan's unique business context, which is characterized by resource limits and infrastructure limitations, the findings highlight the importance of tailored measures to improve infrastructure capabilities. Strategic investments in

facility expansions, transportation networks, and logistical infrastructure are critical for laying the framework for successful CSCM adoption, allowing FMCG companies to navigate sustainability concerns more successfully.

Previous studies have thoroughly explored the role of transportation and infrastructure in promoting the implementation of circular supply chain management (CSCM) strategies across many industries. (DESPEISSE ET AL., 2017) Outline a research initiative centered on unlocking value for a circular economy using 3D printing technology. While their research focuses on the role of technology in promoting circularity, the effective distribution of resources and products created through 3D printing is strongly reliant on robust transportation infrastructure. This is consistent with this research's findings, which show that poor infrastructure harms the implementation of circular supply chain management (CSCM) techniques in the FMCG sector. Both studies emphasize the significance of addressing infrastructural issues to maximize the potential of circular economy projects.

(WINANS ET AL., 2017) present a thorough history and current implementations of the circular economy concept. They emphasize the importance of robust infrastructure in supporting closed-loop systems and facilitating the flow of materials and goods across circular supply chains. This is consistent with our research findings, which emphasize the negative impact of inadequate facilities and transportation infrastructure on both governance and environmental sustainability practices in the FMCG industry. Both studies emphasize the importance of infrastructure in promoting the adoption of CSCM methods and achieving favorable environmental results.

(ONGONDO ET AL., 2013) Study the reuse of information and communication technology (ICT) in socioeconomic enterprises, emphasizing the need for effective transportation and logistics when redistributing refurbished ICT equipment. While their study focuses on a different industry area, the role of transport infrastructure in allowing the transfer of reusable materials is consistent with our research findings. The negative impact of poor infrastructure on sustainability practices in the FMCG sector, as demonstrated by Barrier 13 in the analysis, emphasizes the importance of investing in transport networks to overcome hurdles to CSCM implementation.

(DIECKMANN ET AL., 2020) Examine the barriers to shifting from a linear to a circular economy, with a particular emphasis on end-of-life commodities like discarded feathers. Their findings emphasize the importance of infrastructure in facilitating the collection, processing, and redistribution of recyclable materials. This is consistent with our research findings, which show that poor facility and transportation infrastructure have a detrimental influence on governance and environmental sustainability practices in the FMCG sector. Both studies

emphasize the significance of solving infrastructure issues to promote circular economy projects and achieve positive sustainability results.

Koszewska (2018) investigates the challenges facing the textile and clothing industries in moving to a circular economy. While the study focuses on a single industry, its conclusions apply to the larger debate on circular supply chain management (CSCM) and the importance of infrastructure and transportation. The textile and clothing sector relies largely on effective transportation and logistics networks to ensure the movement of materials and products across the supply chain. Inadequate infrastructure can impede textile waste collection, sorting, and recycling, slowing progress toward circularity (KOSZEWSKA, 2018). This is consistent with our research findings; comparing these data reveals that solving infrastructure difficulties is critical for promoting sustainability across multiple industries. Future initiatives should prioritize improving infrastructure and transport networks to aid with the transition to a circular economy and achieve beneficial environmental effects.

The findings of this study highlight the crucial role of infrastructure and transportation in allowing the effective adoption of circular supply chain management (CSCM) techniques in the fast-moving consumer goods (FMCG) sector. The observed negative impact of inadequate infrastructure emphasizes the critical importance of strategic investments and concerted efforts to overcome infrastructural difficulties in Jordan's business climate. FMCG firms can better negotiate sustainability concerns and achieve positive environmental outcomes by recognizing infrastructure development as a requirement for successful CSCM deployment. Furthermore, the comparison with previous literature reinforces the importance of infrastructure and transportation in supporting circularity across industries, emphasizing the universal importance of addressing infrastructural hurdles to sustainability. Moving forward, activities aimed at upgrading infrastructure and transport networks will be critical in advancing sustainability goals, accelerating the shift to a circular economy, and creating positive environmental benefits in Jordanian FMCG supply chains and beyond.

4.3 Key Findings

The primary goal of this study was to look into the factors impacting the embrace and execution of circular supply chain management (CSCM) methods in the fast-moving consumer goods (FMCG) industry. The study was to investigate both the drivers and barriers that influence CSCM practices, with a specific emphasis on the context of FMCG companies operating in Jordan. The research questions that directed this investigation were:

1. What are the main drivers that encourage FMCG companies to embrace circular supply chain management practices?
2. What are the key barriers to the implementation of circular supply chain management strategies in FMCG companies?
3. How do these drivers and barriers affect the overall efficacy of circular supply chain management in terms of environmental and economic performance?

To answer these questions, a quantitative methodology was employed. The study began with a bibliometric analysis to identify potential drivers and barriers to CSCM activities. Based on this investigation, a structured questionnaire was designed to gather FMCG firms' perceptions and experiences with these characteristics. The questionnaire was distributed to a sample of industry participants in Jordan, and the obtained data was analyzed statistically to get insights into the key drivers and barriers influencing CSCM adoption in the FMCG sector.

The analysis of the questionnaire data, guided by the literature investigation, offered a thorough understanding of the drivers and barriers influencing CSCM practices in FMCG companies. The findings are organized below into internal and external factors that influence the implementation of CSCM. Here are the main findings:

Internal factors:

Key Drivers:

1. **Employee involvement:** Employee engagement is a crucial driver for the successful deployment of CSCM processes. Engaging employees in sustainability activities develops an environmentally responsible culture within the organization. Encouraging employee participation in sustainability initiatives can result in new ideas, enhanced commitment to CSCM objectives, and better execution of sustainable practices.
2. **Long-term sustainability investments:** Prioritising long-term sustainability investments over short-term economic incentives is an important driver of CSCM adoption. Companies that prioritise the long-term benefits of sustainability are more likely to adopt CSCM strategies, despite the absence of immediate financial gains. Investing in sustainability for long-term benefits can boost operational efficiency, reduce resource reliance, and increase resilience to environmental challenges. This strategic approach promotes long-term growth and ensures organizations' competitiveness and viability.
3. **Incentives for overcoming barriers:** The appearance of barriers, such as low customer awareness and a lack of experienced personnel can encourage businesses to invest in CSCM initiatives to address these issues. Despite being cited as a barrier in the

literature, the analysis found that poor customer awareness had a positive correlation with CSCM implementation. This shows that a lack of customer awareness may prompt businesses to enhance their sustainability policies to educate and attract environmentally sensitive customers. Similarly, the analysis found a positive correlation between the lack of skilled personnel and training programs and CSCM implementation. This suggests that businesses may be more encouraged to invest in sustainability initiatives and training programs to close the skills gap, thereby improving their overall sustainability performance.

Key Barriers:

1. **Traditional Organizational Culture:** Traditional organizational culture can greatly hamper the adoption of CSCM methods. Common difficulties include resistance to change, a lack of commitment from leaders, and a concentration on short-term financial performance. These cultural barriers impede the acceptance of new sustainability practices and the implementation of circular supply chain operations. Overcoming this demands strong leadership, regular training, and a long-term strategic view to develop an innovative and sustainable culture.
2. **Lack of information systems/Information sharing:** The lack of effective information systems and poor information sharing considerably impede the implementation of CSCM methods. Tracking, monitoring, and optimizing circular supply chain operations is difficult without reliable data management and communication tools. Investing in modern information technologies and encouraging a culture of information sharing is critical for improving transparency, collaboration, and efficiency in sustainable supply chain management.
3. **Communication and Collaboration gaps:** Communication and collaboration gaps among supply chain stakeholders are significant barriers to implementing CSCM methods. These gaps can result in misconceptions, inefficiencies, and a lack of alignment with sustainability goals. Improving communication channels and cultivating collaborative connections are critical to the effective implementation of circular supply chain processes. Building trust, guaranteeing clear and consistent communication, and supporting collaborative problem-solving initiatives should be the primary objectives.

External factors:

Key Drivers:

1. **Social Responsibility (CSR):** Corporate Social Responsibility (CSR) is critical to pushing the adoption of CSCM practices. FMCG firms are increasingly recognising the significance of incorporating sustainability into their business models to achieve their social obligations. Emphasizing CSR can encourage businesses to embrace sustainable practices since they align with their goals of positively contributing to society and the environment. Companies that incorporate CSR into their core values can improve their brand, increase consumer trust, and gain a competitive advantage.
2. **Brand Image:** The desire to improve brand image is a significant driver for implementing CSCM practices. Companies seek to differentiate themselves in a competitive market by demonstrating their commitment to sustainability. Improving brand image through sustainable practices can boost customer loyalty and attract environmentally aware consumers. This not only helps to create a positive public image but also promotes long-term economic success by harmonizing with consumer values and expectations.
3. **Cooperation with suppliers:** Strong supplier cooperation is essential for successful CSCM implementation. Effective partnership with suppliers ensures that sustainable practices are seamlessly integrated across the whole supply chain. Building solid partnerships with suppliers can help to promote the use of sustainable products, improve waste management practices, and increase overall supply chain efficiency. Collaboration with suppliers enables FMCG firms to solve sustainability concerns more efficiently and meet their CSCM objectives.

Key Barriers:

1. **Severe Environmental Regulations:** Strict and complex environmental laws might be a substantial barrier to the implementation of CSCM methods. Companies may have difficulty complying with these requirements due to high expenses and operational issues. While environmental regulations are necessary to ensure sustainability, overly rigorous requirements can overwhelm businesses, particularly in developing countries such as Jordan. Policymakers should strive to strike a balance between regulatory expectations and support measures that assist businesses in seamlessly transitioning to sustainable practices while maintaining operational viability.

2. **Poor facilities and transportation infrastructure:** Inadequate facilities and transport infrastructure greatly hinder the implementation of CSCM methods. The lack of appropriate infrastructure makes it difficult for businesses to implement and integrate sustainable supply chain processes. The development of resilient facilities and transport networks is crucial for the proper implementation of CSCM principles. Infrastructure investments can help to streamline the flow of commodities, improve resource management, and reduce environmental effects. Policymakers, industry stakeholders, and investors must prioritize infrastructure development to help FMCG firms achieve their sustainability goals.

4.4 Theoretical Implications

The findings of this study offer significant theoretical additions to the literature on circular supply chain management (CSCM) in the fast-moving consumer goods (FMCG) industry. By identifying and analyzing both internal organizational drivers/barriers and external contextual factors, this study contributes a dual-perspective understanding of CSCM adoption. The theoretical implications of these findings are described below.

Integration of CSR and Sustainability Theories

The study highlights the importance of corporate social responsibility (CSR) in promoting CSCM adoption. As an external market driver, this result supports and expands on previous CSR theories by suggesting that organizations with high CSR commitments are more likely to employ sustainable supply chain methods. It emphasizes the need to incorporate CSR into the main company strategy to promote sustainability. The considerable impact of social well-being and social responsibility on environmental sustainability practices is consistent with the larger literature, which recognizes CSR as a major motivator for sustainable supply chain activities. This study builds on these theories by offering actual evidence from a developing economy, emphasizing the strategic importance of CSR in boosting CSCM in Jordan's FMCG sector. The regional focus highlights the importance of CSR in building sustainable business operations in environments where social welfare and environmental sustainability are increasingly valued by customers, legislators, and businesses. The emphasis on CSR and brand image as external market pressures aligns with institutional theory, where firms adopt sustainability practices to meet stakeholder expectations in competitive environments.

Brand Image and Competitive Advantage

The emphasis on brand image as a driver for CSCM implementation lends support to the theoretical claim that sustainability might provide a competitive advantage. By tying brand image improvements to sustainable practices, the study adds to the literature on brand

management and sustainability, demonstrating that organizations can differentiate themselves in the market by their dedication to environmental stewardship.

Collaboration and Network Theory

The finding that cooperation with suppliers is critical to CSCM performance underlines the importance of collaboration and network theories in supply chain management. It implies that sustainable supply chains necessitate significant stakeholder collaboration and coordination, which is critical for effective resource management and waste reduction.

Employee Engagement and Organizational Behaviour

The positive effect of employee involvement on CSCM adoption highlights the importance of organizational behavior and employee engagement theories. It suggests that building a culture of sustainability within the organization, backed up by active employee participation, can lead to more effective circular supply chain implementation.

Long-term vs. Short-term Perspectives

The study's finding that prioritizing long-term sustainability investments over short-term economic incentives as a significant driver is consistent with strategic management theories that encourage strategic planning in corporate choices. It implies that businesses committed to long-term sustainability are more likely to implement CSCM techniques, which can boost resilience and operational efficiency.

Training and Skill Development

The identification of technical training programs as a driver of CSCM highlights the significance of human capital development theory. Interestingly, the findings revealed a positive correlation between a lack of technical knowledge, skill limitations, and the application of sustainable measures. This surprising conclusion implies that businesses encountering difficulties in gaining technical knowledge and skills may be more willing to invest in CSCM projects to overcome these barriers. The study highlights the need for continual learning and development programs in providing staff with the skills and information they need to effectively implement sustainable practices, transforming a perceived barrier into a motivator for sustainability.

Regulatory and Institutional Theory

The presence of strict environmental regulations lends weight to regulatory and institutional theories that underscore the significance of external barriers in affecting organizational behavior. It implies that, while regulations are required to ensure compliance with environmental standards, they must be balanced with supportive measures to encourage CSCM implementation. This study implies that rather than serving as simple motivators for CSCM, strict environmental rules may pose major challenges. The complexities and potential

contradictions within regulatory frameworks might limit efficient CSCM implementation, forcing businesses to manage compliance costs and regulatory uncertainty. These findings highlight the importance of a balanced regulatory strategy that promotes sustainability while also facilitating practical implementation within the business. This viewpoint adds depth to the current literature by emphasizing the dual role of environmental legislation as both drivers and barriers to sustainable activity. Addressing these regulatory issues through better policy direction and increased compliance support can help Jordan and other developing countries utilize CSCM more effectively.

Infrastructure and Resource Dependency Theory

The finding that insufficient facilities and transportation infrastructure limit CSCM implementation is consistent with resource dependency theory. It suggests that access to suitable infrastructure and resources is crucial for supporting sustainable supply chain operations, and enterprises operating in resource-constrained locations may encounter significant challenges. In Jordan's tough business environment, inadequate infrastructure is an important barrier to the implementation of CSCM techniques, harming both supply chain governance and environmental consequences. This outcome is consistent with previous research emphasizing the necessity of eliminating infrastructure constraints to enhance sustainability.

Organizational Culture and Change Management

The barrier of traditional organizational culture stresses the importance of change management and organizational culture ideas. It implies that overcoming resistance to change and creating a culture that values sustainability is critical for successful CSCM adoption.

Information Systems and Technology Adoption

The barrier of a lack of information systems and information sharing highlights the importance of technology adoption and information management ideas. It emphasizes the importance of robust information systems in tracking, monitoring, and optimizing circular supply chain processes.

Communication and Collaboration

The communication and collaboration gaps are consistent with organizational communication and collaboration theories. It emphasizes the importance of good communication channels and collaborative partnerships among supply chain stakeholders in achieving sustainability goals. Improved communication promotes cooperation and alignment among supply chain partners, which is critical to the success of CSCM programs. In Jordan, these barriers are made worse by a complex regulatory framework, cultural and organizational challenges, and resource limits that prevent the implementation of CSCM methods.

4.5 Practical Implications

The study's findings have important practical implications for all of the stakeholders engaged in the development and implementation of circular supply chain management (CSCM) in the FMCG sector. These implications provide policymakers, industry leaders, and other stakeholders with meaningful insights about how to promote supply chain sustainability.

For Policymakers:

1. Regulatory support and incentives:
    - Action: Create and implement effective regulatory frameworks that require sustainable behavior throughout supply chains. Implement policies that offer financial incentives, such as subsidies, tax breaks, and grants, to encourage businesses to invest in CSCM activities.
    - Impact: Increased legislative support and financial incentives will lower barriers and encourage wider adoption of CSCM methods, resulting in greater environmental sustainability.
2. Infrastructure development:
    - Action: Invest in the development and upkeep of critical infrastructure, such as transportation networks and buildings, to ensure effective supply chain operations.
    - Impact: Improved infrastructure will allow organizations to apply CSCM principles more effectively, resulting in increased overall supply chain sustainability.

For Industry Leaders:

1. Technological Innovation**:**
    - Action: Invest in innovative technologies and digital platforms that enable CSCM activities. This includes automation, data analytics, and IoT solutions to improve supply chain visibility and efficiency.
    - Impact: Impact: Technological developments will streamline processes, eliminate waste, and enhance resource utilization, resulting in more sustainable and resilient supply chains.

2. Organizational Commitment:
    - Action: Develop a strong organizational culture that prioritizes sustainability. This entails establishing clear sustainability objectives, obtaining leadership commitment, and incorporating CSCM principles into the company's strategic vision.
    - Impact: A strong organizational focus on sustainability will drive regular efforts to implement and sustain CSCM practices, resulting in long-term environmental and economic benefits.
3. Consumer Engagement:
    - Action: Educate and engage customers about the advantages of sustainable products. Use marketing methods to highlight the environmental impact of items and encourage green purchasing.
    - Impact: Increased consumer awareness and demand for sustainable products will encourage businesses to implement CSCM processes, generating a market-driven push for sustainability.

For Supply chain partners and collaborators:

1. Strategic Partnerships:
    - Action: Establish and foster partnerships with suppliers, customers, and other stakeholders to share CSCM resources, knowledge, and best practices. Collaborative initiatives should prioritize cooperative problem-solving and sustainable innovation.
    - Impact: Effective collaboration will allow for shared solutions to common barriers, resulting in more coherent and sustainable supply chain operations throughout the industry.
2. Training and Capacity Building:
    - Action: Invest in training programs and capacity-building activities for employees and supply chain partners to help them better understand and apply CSCM processes.
    - Impact: A well-trained staff and knowledgeable supply chain partners are more suited to execute and sustain CSCM processes, resulting in enhanced performance and sustainability outcomes.

For Researchers and Academics:

1. **Continued research:**
    - Action: Conduct further research to investigate the contextual elements that influence CSCM adoption in various areas and sectors. Examine the long-term effects of CSCM techniques on economic and environmental outcomes.
    - Impact: Ongoing research will provide deeper insights and evidence-based recommendations to help with continual development and greater adoption of CSCM techniques.

2. **Knowledge spreading:**
    - Action: Share research findings with industry practitioners and policymakers via publications, conferences, and collaborative projects. Convert academic information into useful recommendations and toolkits for industrial use.
    - Impact: Bridging the gap between research and practice will ensure that the most recent insights and developments in CSCM are available and actionable to those working in the area.

The study's practical implications highlight the crucial activities that diverse stakeholders must take to properly promote and execute CSCM principles. By addressing legislative, technological, organizational, and collaborative issues, these stakeholders can foster a sustainable supply chain management environment. This collaborative strategy will ultimately improve environmental sustainability, economic resilience, and long-term competitiveness in the FMCG industry.

4.6 Research Limitations

While this study provides important insights into the drivers and barriers to implementing circular economy (CE) principles in FMCG firms' supply chain management (SCM), it is critical to recognize the limitations that may affect the generalizability and interpretation of the findings. These limitations are classified as methodological, contextual, and practical constraints.

4.6.1 Methodological Limitations

- Sample size and representativeness: The sample size of 103 respondents, while suitable for statistical analysis (such as EFA and CFA), may not be representative of Jordan's FMCG enterprises. The sample was collected from a specific geographical and

industrial setting, which may limit the generalizability of the findings to other regions or industries.

- Survey design and translation: Initially, the study was aimed at Hungary, and the questionnaire was written in Hungarian. The poor response rate caused a change in focus to the Jordanian context. The questionnaire was translated into English, but response rates remained low until it was translated again into Arabic. While the translation procedure increased accessibility and response rates, it required significant effort and time, potentially influencing the overall timetable of the study.
- Cross-sectional data: This study used a cross-sectional design, with data collected at a particular point in time. This technique fails to account for changes in drivers and barriers over time and cannot establish causal links. Longitudinal research would be better appropriate for identifying trends and causal effects.
- Measurement tools: While Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used to evaluate the measurement model, the reliability and validity of these measures are naturally restricted by the precision of the survey items and the respondents' interpretations.

4.6.2 Contextual Limitations

- Geographic focus: The study focuses solely on Jordan's FMCG companies. Cultural, economic, and regulatory differences across nations can have a substantial impact on the motivations and challenges to CE implementation. As a result, the findings may not be directly applicable to FMCG companies in other areas or countries with diverse socioeconomic situations.
- Industry specificity: The study is limited to the fast-moving consumer goods sector. Different industries may encounter different challenges and opportunities connected to CSCM adoption. As a result, the conclusions may not apply to other industries such as manufacturing, technology, or services, without additional research.

4.6.3 Practical Limitations

- Implementation variability: The extent to which the examined companies have adopted CSCM practices varies. Some companies may be in the early phases of adoption, whereas others may have more advanced CSCM activities. This variability can influence perceptions of drivers and barriers and may not be fully represented in the analysis.

4.6.4 Data Quality and Completeness

- Response Rate: The survey's response rate was low, particularly during the early distribution period. This could result in non-response bias, in which non-respondent's opinions differ systematically from those of those who participated. The ultimate response rate of 103 respondents was obtained only after translating the questionnaire into Arabic, indicating potential language and cultural challenges.
- Data completeness: Incomplete or missing data may affect the accuracy of the results. Although strategies were utilized to deal with missing data, the accuracy and completeness of the responses are still a concern.

Despite these limitations, the study gives a solid understanding of the main drives and challenges to implementing CE in Jordan's FMCG supply chains. Future research should try to solve these constraints by using longitudinal designs, broadening the geographic and industrial reach, and including more thorough measurement tools. By admitting these restrictions, the study lays the groundwork for future research and development of CE practices in SCM.

4.7 Future Research Directions

While this study sheds light on how circular economy (CE) principles are being used in the supply chain management (SCM) of Jordanian fast-moving consumer goods (FMCG) companies, it also offers various new paths for future research. after addressing limitations, exploring new aspects can help us recognize CSCM practices and their broader implications. Future studies could broaden the geographical and sectorial scope of CSCM investigations. Extending the research to include comparative studies of different countries or areas would aid in understanding how cultural, economic, and regulatory factors influence CSCM implementation, so providing a more comprehensive global view. Exploring CSCM practices in sectors other than FMCG, such as manufacturing, technology, or services, may also reveal distinct difficulties and opportunities for each company. This comparative approach can help discover best practices, as well as sector-specific drivers and barriers. Longitudinal studies allow researchers to examine changes in CSCM adoption over time, which can assist in discovering patterns, causal links, and the long-term effects of CSCM initiatives on company success. Examining the effects of changing legislation, market conditions, and technical improvements on CSCM practices over time can reveal information about the dynamic character of CSCM adoption and its sensitivity to external factors.

Improving methodological rigor is another critical area for future research. Using more sophisticated statistical approaches and structural equation modeling (SEM) can increase the findings' accuracy and reliability, capturing the complex interrelationships between drivers,

challenges, and effects of CSCM adoption. Combining quantitative and qualitative research approaches can lead to a more detailed knowledge of CSCM practices. Qualitative data from interviews, focus groups, and case studies can supplement quantitative survey data by providing more in-depth insights into company motives and experiences.

Addressing nonresponse bias is critical for future research. Employing techniques to raise survey response rates, such as personalized invitations, follow-up reminders, and participation incentives, can improve sample representativeness and lower the risk of nonresponse bias. Investigating the causes of non-response and comparing the characteristics of responders and non-respondents can help detect potential biases and improve survey design and administration. Exploring the different phases of CSCM implementation, from initial awareness and planning to full-scale adoption and optimization, can provide a complete picture of the journey that businesses follow. Investigating these stages can aid in identifying essential success elements and typical problems at each step. Furthermore, detailed case studies of enterprises that have effectively implemented CSCM can serve as useful benchmarks and practical insights for other organizations. Identifying and sharing best practices can help with knowledge transfer and promote greater acceptance of CSCM.

Examining the impact of government policies, laws, and incentives in supporting or impeding CSCM adoption can shed light on the success of various policy initiatives. Comparative evaluations of various regulatory contexts can help identify best practices in policy design. Investigating the impact of emerging technologies on CE practices, such as digitalization, the Internet of Things (IoT), and improved recycling technologies, can lead to new opportunities for improving supply chain sustainability and efficiency. Future research should consider the larger economic and environmental implications of CE implementation. This involves assessing CE practices' cost-effectiveness, contribution to resource efficiency, and overall influence on sustainability objectives. Exploring the societal implications of CSCM adoption, such as job creation, community engagement, and consumer behavior, can provide a more complete picture of the benefits and drawbacks of shifting to a CSCM.

By addressing these future research directions, scholars can expand on the groundwork created by this study and contribute to a more complete knowledge of circular supply chain management. These activities will not only improve academic understanding, but will also provide practical insights and recommendations to businesses, politicians, and other stakeholders interested in promoting sustainability and circularity in a variety of contexts.

5 CONCLUSION AND RECOMMENDATIONS

This study examined the integration of circular economy (CE) principles into supply chain management (SCM) practices among Jordanian fast-moving consumer goods (FMCG) firms. Using rigorous statistical tools—Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) it identified key drivers and barriers to Circular Supply Chain Management (CSCM) adoption, providing insights relevant not only to Jordan but to other transitional economies sharing similar developmental, infrastructural, and cultural characteristics.

The research confirmed that Corporate Social Responsibility (CSR), brand image, supplier collaboration, employee involvement, long-term sustainability investments, and incentives to overcome barriers are major enablers of CSCM implementation. These drivers reflect both universal sustainability priorities and context-specific considerations. Notably, CSR emerged as a dominant factor, aligning with both international sustainability discourse and Jordan's cultural emphasis on ethical responsibility, often reinforced by Islamic values. Conversely, significant barriers were identified. These include:

- Stringent environmental regulations that impose high compliance costs and administrative burdens;
- Inadequate infrastructure, especially in transport and waste processing systems;
- Resistance to change, rooted in traditional organizational culture;
- Weak information systems and poor inter-organizational communication, which hinder coordination and transparency across the supply chain.

These challenges are not unique to Jordan. Countries such as Egypt and Morocco face similar regulatory and infrastructure barriers. Studies in those contexts report that environmental compliance costs can inhibit private sector investment in sustainability, particularly among SMEs with limited capital flexibility. In Morocco, for instance, environmental regulations have struggled to achieve full compliance due to insufficient governmental support mechanisms. This similarity validates the broader applicability of the findings. The paradoxical observation that certain barriers (e.g., low customer awareness, lack of skilled workers) sometimes stimulate progress by forcing firms to innovate and train underscores the adaptive nature of supply chains in developing contexts. While this study focused on Jordan, the underlying drivers and barriers are indicative of broader patterns in transitional economies, particularly in:

- Middle-income countries in the MENA region, where similar socio-economic and cultural dynamics influence sustainability adoption.
- Southeast Asia and Latin America, where regulatory frameworks are often in flux and infrastructural limitations persist.

The findings thus contribute a practical framework that can assist policymakers, business leaders, and researchers in similar environments. The insights into CSR, employee engagement, supplier cooperation, and long-term investment provide actionable guidance for promoting CE integration into SCM practices across various contexts.

From a practical standpoint, the findings of this study offer several actionable insights for stakeholders involved in advancing circular supply chain management (CSCM), particularly in developing and transitional economies. For industry practitioners, it is essential to strengthen partnerships across the supply chain, especially with suppliers and distributors, to ensure the consistent application of sustainability principles throughout all operational layers. Such partnerships can facilitate the seamless integration of circular practices, improve transparency, and optimize resource use. Equally important is the investment in employee training and awareness programs. Organizations must recognize that internal engagement plays a critical role in fostering a culture of sustainability. By equipping employees with the knowledge and motivation to contribute to circular practices, firms can catalyze innovation and long-term behavioral change from within. Furthermore, the study highlights the need for companies to adopt a long-term strategic orientation. Prioritizing sustainable investments over short-term profitability enhances operational resilience, supports regulatory compliance, and contributes to lasting environmental impact.

Policymakers also have a vital role in enabling this transition. The creation of balanced regulatory frameworks is crucial ones that promote sustainability, not solely through strict enforcement but through targeted incentives and technical assistance. These frameworks should reduce compliance burdens while encouraging voluntary engagement with circular principles. In parallel, governments must allocate resources to infrastructure development, particularly in critical areas such as waste management, transport logistics, and energy efficiency. Addressing these systemic gaps will lower the cost and complexity of CSCM adoption. Additionally, efforts should be made to improve information flow and coordination between firms. Establishing platforms for information sharing—particularly between large companies and SMEs—can enhance collaboration, mitigate communication gaps, and ensure that circular practices are aligned across different actors in the supply chain. This is particularly important in fragmented or informal market environments where standardization and transparency are often limited.

While this research contributes significantly to the understanding of CSCM in Jordan, it is not without limitations. The study's geographic and sector-specific focus centered exclusively on the Jordanian FMCG industry may constrain the broader applicability of the findings to other economic sectors or higher-income contexts where structural and institutional conditions differ markedly. To build upon these findings, future research should extend the scope to include comparative analyses across countries and industries. Such cross-contextual studies would enhance the generalizability of the CSCM framework and reveal variations in how cultural, institutional, and economic factors influence sustainability transitions. Longitudinal studies are also recommended to capture how CSCM drivers and barriers evolve over time, particularly in response to regulatory shifts, technological change, and market pressures. Further methodological refinement is encouraged through the use of mixed-method research designs. Combining quantitative analysis with qualitative case studies or interviews could deepen the understanding of organizational behavior, leadership commitment, and internal cultural transformation—dimensions that are often difficult to quantify. Finally, future research should explore the role of emerging digital technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT). These technologies hold significant promise in improving traceability, accountability, and efficiency within circular supply chains, and their integration could represent a critical enabler of CSCM success in both developed and emerging markets.

This research affirms the transformative potential of circular economy principles in enhancing supply chain sustainability in developing economies. It offers a context-sensitive but globally relevant model for understanding and implementing CSCM strategies. For countries grappling with infrastructural and cultural constraints, the findings highlight that success is possible through collaboration, culturally informed policy design, and long-term strategic thinking. With continued research, supportive governance, and private sector innovation, the transition toward circular and sustainable supply chains can be achieved, benefiting not only the environment but also the social and economic well-being of nations.

6 NOVEL FINDINGS OF THE DISSERTATION

This chapter summarises the research's original contributions, focusing on unique insights into circular supply chain management (CSCM) in Jordan's FMCG industry. This study provides new insights on CSCM, particularly in emerging markets, by focusing on drivers and barriers. These findings have consequences for theory, practice, and policy, pointing to new directions for promoting CSCM adoption in places with similar economic and cultural landscapes.

6.1 Expanding the Role of CSR in Emerging Market Supply Chains

This research provides a novel contribution by empirically establishing Corporate Social Responsibility (CSR) as a proactive and strategic driver of Circular Supply Chain Management (CSCM) in the context of Jordan's fast-moving consumer goods (FMCG) sector. While the relationship between CSR and sustainability practices is well-documented in developed economies, often framed as a reputational or compliance-driven initiative, this study reveals that CSR assumes a more integrated and culturally rooted role in emerging markets such as Jordan. In the Jordanian context, CSR extends beyond formal corporate initiatives; it is embedded within a long-standing cultural and religious tradition that promotes social cooperation, ethical stewardship, and community welfare. The deeply rooted traditions foster a societal expectation for businesses to act ethically and contribute to communal well-being, making CSR a culturally compatible concept that resonates with both organizational and public values.

Empirical results from this study validate this culturally embedded dimension. CSR was found to have a statistically significant and positive effect on environmental sustainability practices in Jordanian FMCG firms. This supports the argument that CSR is not merely a marketing tool or external pressure, but a **strategic internal driver** of CSCM. It aligns business objectives with societal expectations and religious principles, thereby facilitating smoother integration of sustainability into core supply chain operations. This finding also reflects the growing recognition among firms that sustainability enhances brand trust, aligns with consumer values, and offers long-term competitive advantages in markets where social legitimacy is paramount.

By framing CSR as a culturally aligned strategic enabler rather than a secondary business obligation, this research expands current supply chain literature and offers a transferable model for other economies where religious and cultural values shape business ethics. It challenges the Western-centric view of CSR adoption and demonstrates that in transitional economies,

particularly those with strong communal values and religious influences, CSR can serve as a **foundational pillar** for driving circular supply chain transformations.

6.2 Reconceptualizing Barriers as Potential Enablers

The study offers an innovative approach, portraying typical barriers to CSCM adoption as possible catalysts, such as skill gaps and limited consumer awareness. This study argues that, rather than considering these issues as barriers, organizations in emerging markets might use them as motivators for transformation. For example, talent gaps stimulate focused training activities, whereas low awareness of customers motivates educational outreach efforts. This reframing is consistent with transformative learning theories, emphasizing how barriers can drive adaptive methods that improve CSCM commitment. As a result, the study adds a positive perspective to the literature on supply chain management barriers.

6.3 Insights into Regulatory Challenges Unique to Developing Countries

The study offers fresh insight into the complex role that regulatory frameworks play in CSCM adoption in developing nations, using Jordan's FMCG sector as a case. While institutional theory often posits regulation as a key enabler of sustainability, our findings reveal that in resource-constrained environments, strict environmental regulations may paradoxically hinder progress toward circularity.

The results show that compliance burdens, regulatory volatility, and the lack of fiscal incentives limit firms' ability to engage with CSCM meaningfully. For instance, only 14% of FMCG firms in Jordan can afford compliance costs, and evolving standards in areas like packaging and water reuse create significant implementation uncertainty. These dynamics reflect a broader paradox: while regulations intend to enforce sustainability, in contexts of limited institutional capacity, they may deter it. However, it is important to note that these findings are context-specific. Jordan's regulatory landscape, institutional structure, and economic constraints shape how regulations impact CSCM adoption. While similar challenges have been noted in other developing contexts, we caution against overgeneralization. Even countries with comparable regulatory environments may experience different outcomes due to variations in enforcement capacity, industrial maturity, or public-private coordination.

Therefore, this study should be viewed as a conceptual contribution that highlights a potential regulatory paradox in developing countries—not as a definitive generalization. Future comparative research across countries with differing and similar institutional profiles is essential to validate the broader applicability of this insight and to refine regulatory design strategies that balance enforcement with support in promoting CSCM.

6.4 The Influence of Cultural Resistance on Organizational Change

Another unique finding is the impact of organizational culture on CSCM adoption, notably opposition rooted in traditional business views. In Jordan's FMCG sector, where short-term financial goals are frequently prioritized over long-term sustainability, this study demonstrates how social resistance might inhibit CSCM implementation. This builds on previous change management theories by demonstrating how cultural transformation, particularly in emerging economies, necessitates a shift in organizational thinking and values. The findings indicate that overcoming this cultural barrier may necessitate focused leadership interventions and a shift in organizational objectives toward sustainable practices.

6.5 Practical Contributions: Rethinking Strategy and Policy for CSCM in Emerging Markets

This study provides contextually grounded practical insights for both enterprises and policymakers within Jordan's FMCG sector and potentially other emerging market settings. By examining how firms navigate structural barriers, such as compliance burdens, infrastructural limitations, and market immaturity, the findings suggest pathways for transforming these challenges into drivers of CSCM adoption through strategic adaptation and targeted support.

A key practical takeaway is the need for a hybrid policy model that balances regulatory enforcement with enabling mechanisms such as fiscal incentives, capacity-building initiatives, and phased implementation timelines. This approach may empower firms to pursue circularity without jeopardizing operational viability a particularly relevant concern in resource-constrained settings.

However, while the study offers implications that may resonate with other emerging economies facing comparable constraints, it is important to emphasize that these contributions are derived from a single-country case study. The broader applicability of these recommendations should be approached with caution. Institutional, cultural, and economic variations across emerging markets mean that strategies effective in Jordan may require significant adaptation elsewhere.

Thus, this research offers a conceptual framework and a set of practical considerations that may serve as a starting point for policymakers and practitioners in similar contexts, but not a universally prescriptive model. Future studies involving cross-country comparisons are needed to further validate and refine these strategic and policy recommendations for broader application.

6.6 Theoretical Contributions and Directions for Future Research

This study provides significant theoretical contributions by using CSR, change management, and institutional theories to the particular context of CSCM in a developing economy. Specifically, it presents the concept that CSCM barriers might act as transformative forces, which may inform future studies on supply chain methods for adaptation. Furthermore, by focusing on the FMCG sector in Jordan, this study contributes to the literature on supply chain sustainability in underdeveloped nations, emphasising the importance of context-sensitive techniques. Future research might look into similar findings in different businesses and countries, potentially establishing cross-context tendencies and determining the persistence of these characteristics across time.

Summary

This dissertation investigates the implementation of Circular Supply Chain Management (CSCM) methods in Jordan's Fast-Moving Consumer Goods (FMCG) industry, which is an important area for advancing sustainability in emerging economies. As environmental and economic pressures increase, the need for businesses to embrace circular economy principles—where resources are reused, waste is reduced, and the supply chain runs in a closed-loop manner—becomes increasingly crucial. CSCM provides a pathway to long-term sustainability, cost efficiency, and resilience, particularly in high-consumption sectors like FMCG. However, in a developing economy like Jordan, implementing CSCM methods encounters specific drivers and challenges, which this study aims to understand and address.

The research was structured around five core objectives: (1) To investigate and analyze the key drivers facilitating the implementation of CSCM methods in Jordan's FMCG sector, (2) To investigate and understand the barriers that prevent the implementation of CSCM practices in the same context, (3) Assessing the impact of identified drivers and barriers on the effective implementation of CSCM practices, (4) Providing theoretical and practical recommendations for businesses and governments to overcome challenges and leverage drives to increase the adoption of CSCM practices, and (5) Contributing to a better understanding of how the circular economy may be integrated into supply chain management to achieve long-term sustainability and competitiveness.

To achieve these goals, the study used a quantitative research methodology that included a structured survey targeted at professionals working in Jordan's FMCG industry. This survey was designed to provide thorough insights into both the drivers and the challenges that businesses face when attempting to implement CSCM practices. The data were examined using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modelling (SEM). EFA was initially used to investigate the fundamental framework of responses and identify probable groups of drivers and barriers. CFA was then used to confirm these categories, ensuring that they represented distinct factors. Finally, SEM provided a comprehensive perspective of how each driver and barrier affected CSCM implementation, allowing the study to quantify the impact of various variables and thus providing a data-driven foundation for its findings.

The findings highlight many critical drivers that support CSCM implementation in Jordan's FMCG sector. Corporate social Responsibility (CSR) has emerged as a key driver, with businesses increasingly recognizing the importance of incorporating sustainability into their operations to meet social commitments. Emphasising CSR not only corresponds with business

principles, but it also builds brand reputation, increases consumer trust, and provides a competitive advantage. Another powerful driver is brand image, which allows businesses to differentiate themselves in a competitive market by demonstrating their commitment to sustainability. Companies that improve their brand image can attract environmentally concerned consumers, boost customer loyalty, and achieve long-term economic benefits.

Supplier cooperation was also identified as a critical driver of CSCM, as collaborative partnerships with suppliers guarantee that sustainable practices are integrated across the supply chain. Strong supplier partnerships may encourage the use of environmentally friendly materials, improve waste management, and increase overall efficiency. Employee involvement is another important factor; involving employees in sustainability activities develops an environmentally responsible culture and improves the execution of the CSCM strategy. Companies that prioritise long-term sustainability investments over short-term profits are more likely to use CSCM practices, which result in benefits such as increased operational efficiency, reduced resource reliance, and higher resilience to environmental issues.

Interestingly, the study discovered that certain restrictions also served as indirect drivers. For instance, low customer awareness and a lack of experienced personnel were positively connected with CSCM adoption, implying that these problems motivate businesses to improve their sustainability efforts. Businesses may see poor customer awareness as a chance to educate the market and establish themselves as sustainability leaders. Similarly, the skills gap drives organizations to engage in training programs, increasing their ability to employ CSCM processes.

While these drivers create momentum, several barriers restrict the widespread implementation of CSCM in Jordan's FMCG sector. Severe environmental regulations constitute a big challenge. Although such restrictions are vital for sustainability, their complexities and costs can put a strain on businesses, particularly in developing economies with limited resources. Striking a balance between legal requirements and supportive measures is critical for promoting CSCM adoption without overwhelming businesses. Another significant barrier is poor infrastructure, particularly in transportation and facilities, which restricts organizations' capacity to implement sustainable practices successfully. Integrating circular supply chain operations is impossible without proper infrastructure, emphasizing the importance of investing in resilient transport networks and facilities to enable CSCM. Traditional organizational culture creates further challenges, as resistance to change, a lack of leadership commitment, and a focus on short-term advantages impede businesses from adopting circular methods. Transforming this culture takes strong leadership, ongoing training, and a deliberate focus on long-term sustainability objectives. The lack of information systems and information sharing further

impedes CSCM implementation. Effective data management and communication technologies are required to track, monitor, and optimize sustainable practices. Investing in modern information technologies can improve transparency and collaboration, both of which are crucial for CSCM's success. Finally, communication and coordination gaps between stakeholders lead to misunderstandings and misalignment with sustainable objectives. Addressing these gaps necessitates developing clear communication channels, fostering trust, and encouraging collaborative problem-solving among supply chain actors.

This dissertation provides useful insights into the factors influencing CSCM adoption in Jordan's FMCG sector. From a theoretical perspective, it emphasizes the relevance of CSR and brand image as main motivators, as well as the importance of reputation and consumer loyalty in driving sustainability. The study also emphasizes the relevance of regulatory balance and infrastructure investment in CSCM, offering a detailed explanation of how these aspects work in a developing economy environment.

Practically, the study makes visible recommendations to businesses and politicians. Companies are urged to participate in CSR activities, enhance supplier relationships, and foster a sustainability-focused organizational culture. Investing in employee training and sophisticated information technology can also assist in closing skill and communication gaps. Policymakers, on the other hand, could consider implementing regulatory frameworks that provide both direction and support, allowing enterprises to successfully move to CSCM. Infrastructure development, particularly in transport and facilities, should be prioritized to facilitate the efficient application of circular practices.

Finally, this dissertation provides a complete examination of the determinants influencing CSCM adoption in Jordan's FMCG sector, with implications for both corporate strategy and policy development. Companies in Jordan may make substantial progress towards sustainable supply chain management by tackling identified barriers and utilizing important drivers, so contributing to environmental sustainability and economic resilience. The study's findings contribute to our understanding of CSCM in emerging countries, highlighting the significance of specialized strategies for promoting sustainability in supply chains.

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List of publications

1. Mustafa, O., & Lengyel, P. (2023). THE ADAPTION OF GREEN PURCHASING AS A TOP MANAGEMENT COMMITMENT TO DEPEND ON THEIR SUPPLIER'S COLLABORATION-SUPPLIER EVALUATION SYSTEM AS A CASE STUDY. *Journal of EcoAgriTourism*, *19*(1).
2. Mustafa, O. M. A., & Lengyel, P. J. (2022). A Bibliometric Study On The Sustainable Economic Growth. Network Intelligence Studies, (20), 137-149.
3. Mustafa, O., & Lengyel, P. (2022). Circular Economy: a Bibliometric Mapping. *Journal of Agricultural Informatics*, *13*(1).
4. Lengyel, P., Bai, A., Gabnai, Z., Mustafa, O. M. A., Balogh, P., Péter, E. & Németh, K. (2021). Development of the concept of circular supply chain management—a systematic review. *Processes*, *9*(10), 1740.

List of Tables

List of Figures

Appendix

Questionnaire

(Q1) Do you hold a position/function related to sustainability, corporate sustainability, corporate social responsibility or ESG (environment, social and governance)?

- Yes
- No

(Q2) Gender?

- Male
- Female

(Q3) Age?

- Under 18 years
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 - 54 years
- More than 55 Years

(Q4) What is your education level?

- Elementary School
- High School (enrolled or completed)
- Bachelor's degree – enrolled
- Bachelor's degree – completed
- Specialization or MBA (enrolled or completed)
- Master's degree – enrolled
- Master's degree – completed
- PhD Degree

(Q5) What is the size of the company you work for in terms of the number of employees?

- Less than 10 employees
- Less than 50 employees
- Less than 250 employees
- More than 250 employees

(Q6) What is the nature of the company you work for?

- National
- Multinational

(Q7) In which phase of the FMCG supply chain does your company work

- Inputs
- Industry/Transformation
- Production
- Inputs and Industry/Transformation
- Commercialization
- Other

(Q8) What is the hierarchy of your position?

- Analyst
- Assistant
- Consultant
- Specialist
- Engineer
- Intern
- Supervisor or Coordinator
- Manager or Director
- Owner or Founder
- President or Vice-president
- Other

(Q9) How often do you carry out activities related to governance/administrative practices, policies and standards aimed at sustainability?

- Never
- Rarely
- Occasionally
- Frequently
- Always

(Q10) How often do you carry out activities related to environmental results and impacts (use of natural resources, greenhouse gas emissions (CO2, methane gas), energy efficiency, pollution, waste and effluent management, etc.)?

- Never
- Rarely
- Occasionally
- Frequently
- Always

(Q11) Mark which UN Sustainable Development Goals (SDGs) you believe are involved in your supply chain (you can tick several alternatives):

- No poverty
- Zero hunger
- Good health and well-being
- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Industry, innovation, and infrastructure
- Reduced inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate action
- Life below water
- Life of land
- Peace, justice, and strong institutions
- Partnerships for the goals

Rate your Level of agreement with each statement

(Q12) Consider the statement: Social well-being/social responsibility is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q13) Consider the statement: Media, reputation/brand image is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q14) Consider the statement: Customer pressure/loyalty/involvement is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q15) Consider the statement: Competitive opportunity/advantage is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q16) Consider the statement: Top management commitment/involvement is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q17) Consider the statement: Certifications is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q18) Consider the statement: Economic performance/improvement is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q19) Consider the statement: Organizational strategy is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q20) Consider the statement: Regulations (environmental, regional, international) are factors in my company that strongly encourage it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q21) Consider the statement: Employee's involvement is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q22) Consider the statement: Cooperation with suppliers is a factor in my company that strongly encourages it to adopt sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q23) Consider the statement: Investor's pressure is a factor in my company that strongly encourages sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q24) Regarding the 12 drivers/opportunities asked above, indicate, according to your opinion, those that most encourage the adoption of sustainable practices in your supply chain (you can tick several alternatives).

a) Social well-being/ Social responsibility

b) Media, reputation/brand image

c) Customer pressure/loyalty/involvement

d) Competitive opportunity/advantage

e) Top Management commitment/involvement

f) Certifications

g) Economic performance/improvement

h) Organizational strategy

i) Regulations (environmental, regional, international)

j) Employee's involvement

k) Cooperation with suppliers

l) Investor's pressure

(Q25) Consider the statement: Information systems and information sharing is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q26) Consider the statement: Communication gaps/inadequate collaboration between parts is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q27) Consider the statement: Lack of environmental laws or regulations is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q28) Consider the statement: Poor customer awareness is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q29) Consider the statement: Lack of technical knowledge and technical expertise is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q30) Consider the statement: Financial costs/lack of incentives is a factor in my company that strongly hinders it from adopting sustainable practices

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q31) Consider the statement: Lack of skilled professionals/lack of appropriate training programs is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q32) Consider the statement: Lack of management support/commitment is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q33) Consider the statement: Lack of government motivation is a factor in my company that hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q34) Consider the statement: Lack of short-run economic benefits is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q35) Consider the statement: Mindset/non-acceptance of new business models changes is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q36) Consider the statement: High complexity of the processes is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q37) Consider the statement: Inadequate of facility and transportation infrastructure is a factor in my company that strongly hinders it from adopting sustainable practices.

a) Strongly Agree

b) Agree

c) Neither agree nor disagree

d) Disagree

e) Strongly Disagree

(Q38) Regarding the 13 barriers/challenges asked above, indicate, according to your opinion, those that most hinder/difficult the adoption of sustainable practices in your supply chain (you can tick several alternatives).

a) Information systems and information sharing

b) Communication gaps/inadequate collaboration between parts

c) Lack of environmental laws or regulations

d) Poor customer awareness

e) Lack of technical knowledge and technical expertise

f) Financial costs/lack of incentives

g) Lack of skilled professionals/lack of appropriate training programs

i) Lack of management support/commitment

j) Lack of government motivation

H) Lack of short-run economic benefits

k) Mindset/non-acceptance of new business models

l) High complexity of the process

m) Inadequate of facility and transportation infrastructure

(Q39) Are there any other drivers and/or challenges related to sustainability in the coffee chain that were not mentioned above and that you believe are still relevant? Please describe it below (this question is optional).

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Registry number: DEENK/202/2025.PL
Subject: PhD Publication List

Candidate: Othman Mohammad Ahmed Mustafa
Doctoral School: Doctoral School of Management and Business
MTMT ID: 10076165

List of publications related to the dissertation

Articles, studies (4)

1. **Mustafa, O. M. A.**, Lengyel, P.: The adaption of green purchasing as a top management commitment to depend on their supplier's collaboration -supplier evaluation system as a case study.
   Journal of EcoAgriTourism. 19 (1), 35-47, 2023. ISSN: 1844-8577.

2. **Mustafa, O. M. A.**, Lengyel, P.: A Bibliometric study on the Sustainable economic growth.
   Network Intelligence Studies. 10 (20), 137-149, 2022. EISSN: 2344-1712.

3. **Mustafa, O. M. A.**, Lengyel, P.: Circular Economy: a Bibliometric Mapping.
   Agrárinformatika = Journal of agricultural informatics. 13 (1), 36-45, 2022. ISSN: 2061-862X.
   DOI: http://dx.doi.org/10.17700/jai.2022.13.1.650

4. Lengyel, P., Bai, A., Gabnai, Z., **Mustafa, O. M. A.**, Balogh, P., Péter, E., Tóth-Kaszás, N., Németh, K.: Development of the Concept of Circular Supply Chain Management: A Systematic Review.
   Processes. 9 (10), 1-23, 2021. EISSN: 2227-9717.
   DOI: http://dx.doi.org/10.3390/pr9101740
   IF: 3.352

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List of other publications

Articles, studies (1)

5. Khalid, U., **Mustafa, O. M. A.**, Naeem, M. A., Alkhateeb, M., Awad, B. M. A. E.: Direct Optimization of an Automotive Sheet Metal Part Using ANSYS.
International Journal of Engineering and Management Sciences. 5 (3), 134-142, 2020.
EISSN: 2498-700X.
DOI: http://dx.doi.org/10.21791/IJEMS.2020.3.14

Total IF of journals (all publications): 3,352
Total IF of journals (publications related to the dissertation): 3,352

The Candidate's publication data submitted to the Tudóstér have been validated by DEENK on the basis of the Journal Citation Report (Impact Factor) database.

13 May, 2025