MASTER´S THESIS

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Achieving circularity in supply chain: institutional drivers and barriers of ASKO AS

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Abstracts

Net-zero implementation has become a complex issue for government and industries and the adoption of circularity is a necessary strategy that may lead firms to achieve net-zero. The research aims to explore how a company can achieve circularity in the supply chain through institutional drivers and barriers, relational or collaborative perspectives in supply chain, and how that affects an organization like ASKO in their quest to achieve carbon neutrality in supply chain operations.

The research employed a qualitative method and a case study method to provide an in-depth knowledge of how institutional drivers and barriers affect circularity adoption. Qualitative research is an inductive approach in nature, which means that the research questions, the data collection, and the data analysis are based on a theory or preconceived notions of the researcher. This was conducted by exploring literature and comparing it with existing theories. To increase the internal reliability of the research findings, the thesis relied firstly on official data sources such as company reports, websites, newsletters, and hence the internal reliability of the results can confidently be deemed accurate.

Empirical findings from the study show that the implementation of circularity measures such as intermodality, waste and recycling, green infrastructure, zero-emission vehicles, and green transport has the potential to achieve net-zero. Our findings show that the implementation of circularity measures such as intermodality, waste and recycling, green infrastructure, zero-emission vehicles, and green transport has the potential to achieve net-zero. It was evident from the study that net-zero implementation needs to be guided by institutional, regulatory mechanisms and collaborative strategies with supply chain partners.

The researchers intend to contribute to the existing literature in the field of circular supply chains and net-zero implementation. Based on our findings, we could deduce certain implications from the study to provide suggestions to stakeholders. The government should consider the adoption of circularity as a means of achieving the greenhouse gas emissions target by 2030. This can be achieved by creating an enabling environment to encourage and promote inter-firms' collaborations on circular supply chains and net-zero implementation.

Our study primarily utilized content analysis as the main method of data collection used in answering research questions. However, we recommend that further research should consider using interviews as the data collection method. This would help to understand the similarities and differences between the two methods.

Keywords: tipping point, circular supply chain, net-zero, intermodal transport,

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1. Introduction

This chapter will introduce the concept of circular supply chain and focus on how the adoption of circularity can lead to the achievement of net-zero in supply chain business operations. This will include the background, problem statement, research questions and finally the outline of the thesis.

1.1. Background

The world has witnessed increased industrial production, which has stretched our finite resources to an unprecedented limit and resulted in resource scarcity and ecological disaster (Selwyn, 2021). The current linear systems have resulted in resource inefficiencies, scarcity and waste, depletion of finite resources, increased energy consumption and hence the global quest for a sustainable future (Afshan et al., 2022). According to some scholars the adoption of circular economy principles will help mitigate these challenges. Researchers, policymakers, and businesses from all over the world have recently become interested in the circular economy (Calicchio Berardi & Peregrino de Brito, 2021). According to analyses, achieving the various UN Sustainable Development Goals depends on the circular economy (Schroeder et al., 2019). The core of circularity has not yet been completely followed, despite institutional standards and environmental requirements driving business models (Calicchio Berardi & Peregrino de Brito, 2021; De Angelis, 2018).

The topic of net-zero has drawn interest from businesses, consumers, and governments in recent decades (Hina et al., 2022). Global temperature is said to be rising at an alarming rate and getting to a tipping point, and supply chain companies through their operations contribute to greenhouse gas (GHG) emissions which affect the ecology. In total, they contribute 10–11% of the global energy-related CO2 emissions, of which 85–90% originate from freight transportation and the remaining percentage from terminals and warehousing (McKinnon, 2022). According to the International Transport Forum, freight-related emissions would increase by 118% between 2015 and 2050 if the current policies continue (McKinnon, 2022). It is therefore important for logistics companies to adopt a circular supply chain in order to serve environmentally sustainable products to consumers (Hazen et al., 2021). The study explored how companies strive to achieve circularity in the supply chain, and how that can lead to the attainment of net-zero in business operations. This would be conducted considering the drivers and barriers from institutional and relational theories perspectives. To help answer the question, the research will make use of secondary data from ASKO as a case study.

ASKO, a supply chain and logistics firm based in Norway, is moving from a linear system to a circular supply chain. The transitioning process is attributed to the company's future objectives, and social goals as well as regulatory pressures by the Norwegian Circular Economy Policy which is aligned to that of the European Union. The European circular economy action plan aims to promote the transition of European economic activities towards a more circular economy (Commission & others, 2015). Collaborative relationships between partners in the chain were among the many barriers to a circular economy that need to be better investigated (Calicchio Berardi & Peregrino de Brito, 2021).

1.2. Motivation

We were both admitted to study Global Management at Nord University in the 2021 academic year. During our studies, our perspectives on the circular economy and sustainability have been immensed. The courses heightened global challenges associated with resource scarcity and depletion, energy management, sustainability, and the need to take a holistic and pragmatic step to mitigate the problems through the adoption of circular economy principles. We also believe that incorporating circularity into logistics and supply chain activities would help reduce sustainability challenges such as waste and recycling, GHG emissions, and end-of-product-life by companies among others. We found out that ASKO, which is a distribution and supply chain company, is working on how to achieve sustainability and net-zero by reducing environmental pollution and adopting sustainable technologies in their supply chain and logistics activities. We therefore decided to do our dissertation on how logistics and supply chain companies could achieve net-zero in the supply chain by adopting circularity. It has been confirmed by numerous studies that research in circular supply chain and net-zero are limited (Hazen et al., 2021; Kannan et al., 2022; Khalifa et al., 2022; Zhang, et al., 2022).

As part of our motivation, we believe that research in this area would be interesting and add to existing studies in the field of circular supply chain. Furthermore, we were motivated by how supply chain partners intend to collaborate and adopt seamless and effective circular principles to help stem environmental challenges. It is known that logistics activities are a major contributor to greenhouse gases through emissions from vehicles and hence, its impact on the global emission target. Again, we were motivated by how institutional, regulatory, collaborative, and relational boundaries affect supply chain organizational thinking and the quest to adopt circularity in logistics or supply chain operations.

1.3. Research gap

While circular economy (CE) is not an entirely new idea, it has lately gained traction among academics, policymakers, and businesses globally (Kumar et al., 2019). Most manufacturing companies have adopted green initiatives in their production processes to stem the rate of resource use which is finite. Firms have found ingenious ways to incorporate unused, waste, degraded products or materials back into the production system to create new products (Lozano et al., 2021). Resources loops can be closed by recycling, which closes the loop between post-use and creates a circular flow, or by resource efficiency, which aims to use fewer resources per product. These are just a few of the strategies that circular companies have adopted (Bocken et al., 2016). However, the adoption of circular supply chain by supply chain companies has not been researched extensively. According to Farooque et al., (2019) investigations are urgently needed on how industrial sector-specific context affects the drivers and barriers of circular supply chain. Therefore, our research aims to understand the drivers and barriers faced by ASKO in adopting circularity in its supply chain operations taking into consideration the institutional and relational-view theories perspectives.

1.4. Statement of the Problem

The issue of circularity is becoming more popular among academics, business people, and legislators as a substitute model that reduces emissions, waste, and resource depletion. (Geissdoerfer et al., 2020). However, there may be possible implementation challenges for companies in the logistics and supply chain sectors. Businesses that are rebuilding their supply chains for the circular economy confront a number of obstacles (Bressanelli et al., 2019). This research explored firms' adoption of circularity and how that can lead to net-zero from the perspective of institutional drivers and barriers. Circularity implementation enables companies to gain a competitive advantage (Kaipainen & Aarikka-Stenroos, 2022; Nayal et al., 2022; Rattalino, 2018).

This research further explored how circularity adoption could lead to a decrease in net-zero emissions in logistics and supply chain operations. As opined by Mishra et al., (2022) circular economy adoption is a potential solution for decarbonization. Based on prevailing policies, the International Transport Forum projected in 2019 that freight-related emissions would increase by 118% between 2015 and 2050 (McKinnon, 2022). Lastly, this research sought to explore the collaborations in the adoption of circularity in supply chain from a relational viewpoint. The development of a circular economy has been found to require collaboration within the supply chain (Farooque, Zhang, Thürer, et al., 2019; Cordova-Pizarro et al., 2020). Combining the internal resources of supply chain, partners can generate complementarities that improve the fit of solutions to a circular economy (Calicchio Berardi & Peregrino de Brito, 2021). In other words, this is how supply chain participants plan to work toward achieving net-zero emissions. The essence of circularity has not yet been fully pursued, despite institutional guidelines and environmental criteria guiding business models (Calicchio Berardi & Peregrino de Brito, 2021; De Angelis, 2018).

1.5. Research questions

The purpose of the research is to identify how circularity is achieved in supply chain operations. As opined by (Sharmina et al., 2023) circularity adoption and implementation leads to the achievement of net-zero. The research examines the institutional, regulatory drivers and barriers, relational or collaborative perspectives on supply chain partners and how that affects organizations like ASKO in their quest to achieve carbon neutrality in their logistics and supply chain operations.

1. *What are the measures to achieve net-zero by adopting circularity in the supply chain?*
2. *What institutional drivers and barriers affect circularity adoption.?*
3. *What are the opportunities for supply chain collaboration in adopting circularity?*

We will answer the research question based on the following**.**

1. *To understand the measures in adopting circularity in supply chain operations.*
2. *To understand how institutional drivers and barriers affect circularity implementation.*
3. *To explore the collaborations in achieving net-zero in supply chain.*

1.6. Outline of the thesis

The following outline seeks to inform readers what to expect in each chapter of the research.

Chapter one is the introduction and background relating to the question. Next is the motivation, the research gap that prompted the need to conduct the study, and the problem statement. Ending this chapter is the research questions to answer the main question of achieving net-zero in supply chain with a focus on institutional drivers and barriers of the case area.

Chapter two presents the theoretical framework, provide a review of selected theories selected for the study. These are institutional theory that deal with isomorphic drivers that affects a company’s net-zero implementation while relational-view theory postulates a firm’s collaborations with partners and how they impact on the achievement of net-zero. Part of the chapter also tackles some previous work done by people who matter in the topic of discussion. (i.e., the empirical evidence).

Chapter three introduces an overview of the research method, the research philosophy, the approach, case study, and the study design including research administration and preparation before data collection. The chapter ends with validity, reliability, as well as ethical considerations.

Chapter four discusses the empirical findings. Results of data collection from documents reviewed were analysed and findings were organized according to the theoretical framework on institutional and relational-view theories to answer the question.

Chapter five provides a detailed analysis and discussion of the result from the study after comparing them with the empirical findings and theoretical frameworks.

Chapter six is the last chapter which provides a summary for the entire study. Highlights on major findings, conclusion, recommendations, limitations, and suggestions for further studies.

2. Theoretical Framework

This chapter presents the theoretical framework which provides an analysis of empirical findings on how firms can achieve net-zero in supply chain. As stated by Mengist et al., (2020) An essential first step in managing insightful research is locating appropriate secondary sources. Firstly, we define key terms in the question including, circular economy, net-zero, and supply chain. Secondly, we describe some of the measures adopted by supply chain firms in achieving net-zero in the supply chain. Thirdly, we describe Supply chain collaboration and net-zero implementation. Additionally, we describe the drivers and barriers that affect circularity adoption. Furthermore, we will describe how institutional theory is used to explain the isomorphic pressures that affect circularity implementation in supply chain. Finally, we describe how relational-view theory creates synergistic effects in supply chain collaborations. Based on the construct relating to the literature, a conceptual framework is developed to connect the theories that helped to answer the research questions. In reference to the construct, we describe how institutional and relational-view theories can be used to achieve net-zero by firms that adopt circularity in supply chain. Lastly, we summarize the chapter with a research model.

2.1. Circular economy

Due to its perceived operationalization of the much-discussed sustainable development paradigm, the circular economy concept has piqued the interest of both scholars and practitioners (Ghisellini et al., 2016; Murray et al., 2017). According to Ellen MacArthur Foundation (2013) circular economy is defined as

‘‘*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’’.*

According to Kirchherr et al., (2017), ‘‘circular economy is an economic system that is based on business models that replace the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production or 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), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations’’.

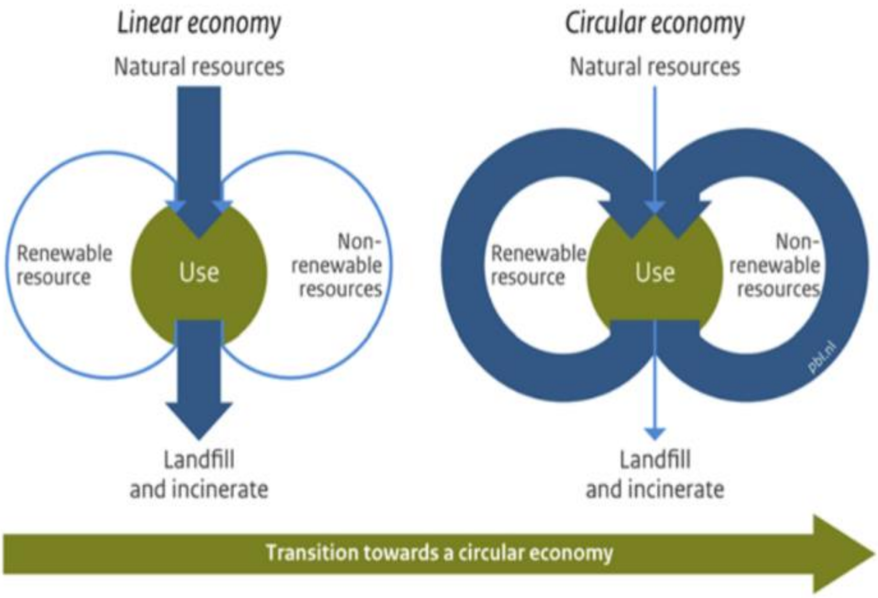


Figure 1: Linear Economy verses Circular Economy

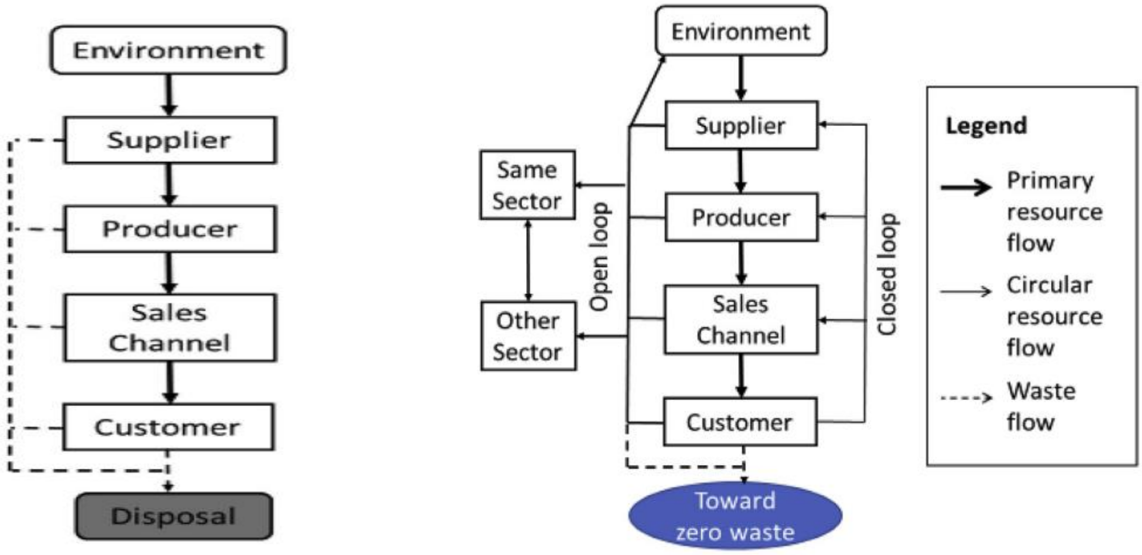
Source : (Sillanpaa & Ncibi, 2019)

A linear economy is based on the ‘take, make and dispose’ linear approach while circular economy is a closed-loop scheme (i.e., both are symbolized by bold arrows) (Sillanpaa & Ncibi, 2019). Linear economy is a straightforward ‘production-consumption-disposal’ structure, where resources are extracted, and manufactured into products, which are used and then incinerated or landfilled. Thus, it limits the initiative to minimize the production and consumption of waste or valorize them. On the other hand, circular economy is based on a dynamic, resilient and more efficient ‘‘production-consumption-recycling/recovering’’ structure, where resources are recirculating with the same process of a network of processes, so that the output of one is the input of another, thus retaining the value of the products or their part (Sillanpaa & Ncibi, 2019)

By reducing material input, increasing usability, and minimizing waste generation, a circular economy decouples economic growth from resource use (Lakatos et al., 2021).

2.2. Circular supply chain

In some literature, the term circular supply chain refers to the integration of the circular economy into supply chain management (Farooque et al., 2019; Kumar et al., 2021). Nevertheless, a thorough definition of a circular supply chain is lacking (Farooque et al., 2019). The following are proposed definitions of circular supply chain. Geissdoefer et al., (2018) used the term circular supply chain which comprises the configuration and coordination of supply chain to close, narrow, slow, intensify and dematerialize resource loops. Murray et al., (2017) defines the circular supply chain as an industrial concept that permits the flow of materials, energy, people, and information in a closed cycle so that environmental protection, economic development, and the environment are all balanced.



(A) Linear supply chain (B) Circular supply chain

Figure 2: An illustration of the differences between linear supply chain and circular supply chain

Source: Adopted from Farooque et al.,(2019)

Figure 2 contrasts the linear supply chain (A) with circular supply chain (B). A linear supply chain extracts resources from the geosphere and the biosphere and disposes of end-of-life products, packaging materials, and wastes from multiple supply chain stages. The unwanted materials are landfilled (Farooque et al., 2019). A circular supply chain goes further by recovering value from waste by collaborating with other organizations within the industrial sector (open loop, same sector), or with different industrial sectors (open loop, cross-sector) (Weetman, 2016). A circular supply chain will generate zero waste because it is designed to systematically restore and regenerate resources in the industrial and natural ecosystem in which it is embedded (Farooque et al., 2019) thus, a potential solution to decarbonization (Mishra et al., 2022).

Farooque et al., (2019) opines that the application of circular thinking to the management of the supply chain and the surrounding industrial and natural ecosystems is another definition of circular supply chain management. In other words, it involves all parties included in a product or service lifecycle, such as manufacturers of parts and products, service providers, customers, and users, in the systematic restoration of technical materials and regeneration of biological materials toward a zero-waste vision through system-wide innovation in business models and supply chain functions from product/service design to end-of-life and waste management. (Farooque et al., 2019).

2.3. Net-zero

Net-zero means that any CO_2 emissions must be balanced by an identical uptake of CO_2 (Azevedo et al., 2021). Net-zero emissions, or "net-zero," are attained when all emissions caused by human activity are balanced by removing carbon from the atmosphere through a process known as carbon removal (Levin et al., 2019). Carbon dioxide has exceeded a record high stage, posing a deluge of climate-induced challenges and fast-tracking global warming (Khan et al., 2020). An approach to circular supply chain management can help control the increase in carbon emissions that has been seen since industrialization (Sarkis et al., 2011); as the need to strengthen the circular supply chain stems from the fact that numerous sectors' excessive logistical operations have been the main cause of the rise in carbon emissions (Singh et al., 2022).

2.4. Achieving net-zero in supply chain

According to stern and Valero (2021), prioritizing the creation of circular supply chain procedures will help achieve net-zero with a swift and drastic structural shift. Because supply chain partners are dispersed, the rate of carbon emission during direct supply chain operations may be low in various industries, but it is multiplied by ten by suppliers (Singh et al., 2022); and increase GHG emissions in freight transportation could partly be blamed on the adoption of linear supply chain (Singh et al., 2022). The decarbonization process is essential in circular supply chains because it has been observed that the upstream supply chain's carbon footprint increases dramatically (McKinnon, 2010); and carbon dioxide mitigation problems have induced the importance of maritime and rail transport since these transport modes play an important role in reducing carbon footprints (Chen et al., 2020). Mutlu et al., (2017) stated that, to be competitive in the transport sector, distribution companies should be more flexible, favoring multimodal choices such as a combination of road, sea, rail, and air. Compared to unimodal transport, intermodal freight transport generally has better environmental performances, as it has been recommended as a suitable option to decarbonization in freight transport (Kaack et al., 2018); and multimodal shift in transport is meant to reduce GHG emissions, road congestion and enhance transport movement (Okyere et al., 2019).

The provision of green infrastructure such as EV charging and battery replacement points, and shoreside facilities aids in net-zero transition (Copeland et al., 2018). According to Borbujo et al., (2021) the provision of renewable infrastructure are important factor in realizing green transition.

An estimated 1.3 billion tons of food are lost or wasted annually worldwide, posing an ecological, economic, and social challenge (Amicarelli et al., 2021). As stated by Bibra et. al., (2022) food waste accounts for 10% of GHG emissions (more than the entire aviation industry). Food thrown away accounts for 2.8 billion tons while 828 million people go to bed hungry everyday (Bibra et al., 2022); and the food supply chain is more difficult to manage than other supply chains because of its perishability, lengthy lead times for food product production, seasonality in production and consumption, and variability in product quality and yield (Cagliano et al., 2016).

Another net-zero mitigation measure is that, reusing and recycling materials can help reduce emissions in a circular supply chain (Zhang et al., 2022). Reducing waste and emissions in the supply chain can be achieved by incorporating end-of-life thinking into product design (Burke et al., 2021). To achieve net-zero objectives, firms will require a firm-wide alteration and supply chain network operations (Zhang et al., 2022). Gong et al., (2018) assert that to implement circular supply chain, it is important for firms to have knowledge on how to reduce and offset emissions as businesses will need to coordinate both internal and external resources. The role of consumers in greenhouse gas abatement has been strong in the last decades (de Almeida et al., 2023). Consumer pressure on businesses to address climate change has increased dramatically in recent years (Yang et al., 2023); and encouraging businesses to set net-zero goals in accordance with the Paris Agreement and IPCC reports (Asif et al., 2023). Additionally, consumers are pressuring businesses to commit to net-zero carbon emissions (Erb et al., 2022).

2.5. Drivers for achieving circularity and net-zero in supply chain

Transportation, home combustion, and industrial processes are the main causes of the reported increase in GHGs emissions (Bi et al., 2011). Thirty per cent (30%) of all greenhouse gas emissions worldwide in 2010 came from industrial sources (Miller et al., 2021). A net-zero will be developed with the help of the shift from conventional supply chain operations to a circular supply system, which will encourage a balance between the rate of carbon emission and reduction (Allen et al., 2021). As asserted by Schroeder et al., (2019) the development of circular economy is closely related to a net-zero emission target.

The following drivers were considered among the many drivers for the research. The considered drivers and barriers are in line with the research area and the chosen theories.

2.5.1. Government policies and regulations:

Government is a key stakeholder in managing carbon emission-related issues (Kumar et al., 2023); and policy and regulatory barriers are one of the key concerns in adopting low carbon operations (Micheli and Mantella 2018). It is the goal of the United Nations (UN) to ensure sustainable development for a healthy society, environment, and economy (Agrawal et al., 2023). A low-emission economy is being shifted by various governments from their linear traditional economy to ensure sustainable production and consumption in order to guarantee the implementation of the SDGs (Tumilar et al., 2020). As stated by Kannan et al., (2022), companies are encouraged to adopt sustainable strategies that will reduce GHG emissions in their supply chains through government pressures for an improved ecological balance. Therefore, it is necessary that government and regulatory authorities implement carbon control policies and specific regulations to motivate the industry to implement low-carbon operations in their organizations (Bush et al., 2017).

One of the most important practices that needs to be implemented in the supply chain is the implementation of decarbonization policies (Labanca et al., 2020). To promote decarbonization, an effective institutional-level framework is critical to low carbon operation adoption (Chen et al., 2021). Luo et al., (2017) opined that such a framework can assist businesses in creating adaptive and responsive capacities to manage potential hurdles and implement policies in pursuit of low-carbon operations. According to Liu and Song (2017), tax breaks, financial aid, and incentive programs are crucial economic tools for achieving the low-carbon goal. Zhou et al., (2016) also point out how governments manage taxes and give businesses the right tax breaks.

2.5.2. Economic and social sustainability

Rosati and Faria (2019) have confirmed that net-zero has become increasingly important for businesses attempting to gain a competitive edge. Besides the positive effects of efficiency gains associated with a company's operations, the implementation of low-carbon operations can lead to new capabilities that have a direct impact on financial performance (Boiral et al., 2012). Liu and Song (2017) suggested tax rebates or subsidies and incentive mechanism are important economic mechanisms to attain the low carbon mission. Organizations can participate in the net-zero economy while maintaining profitability by promoting appropriate practices (Hickel & Kallis, 2020; Rockström et al., 2017). As stated by Shahbaz et al (2020), the adoption of net-zero helps in business processes, and innovations as well as identify and capitalize on new market opportunities. One of the things that is thought to contribute to economic advancement is the comprehensive implementation of circular supply chain strategies. (Khan et al., 2021).

According to Zaid et al., (2018) incorporating environmentally sustainable practices is essential to the fundamentals of green supply chain management. These guidelines must be followed when sourcing materials, designing products, choosing materials, manufacturing, and delivering goods (Singh et al., 2022). A reduction of 1.5°C global temperature will have a positive impact on biodiversity and ecosystems (Guilyardi et al., 2018). In the context of climate change, the major emissions reductions required, the development and deployment of low-carbon energy technologies, and the implementation of adaptation measures all require some degree of citizen involvement, from the granting of policy mandates to active behavioral change (Capstick et al., 2015). It is necessary to inform customers about the necessity of net-zero supply chain management (Singh et al., 2022). According to Alam et al., (2014) in order to gain community support, it is imperative that job positions be created for local communities; and to expand customer base, Jiang and Tian (2018) recommended using educational and practical marketing strategies. As stated by Singh et al., (2022) these strategies are critical to expanding your customer base and making a good first impression.

2.5.3. Organizational competencies

Bottcher and Müller (2015) introduced the term ‘low-carbon operations’ (LCO) defined as ‘integrating carbon efficiency into the planning, execution and control of business processes to obtain competitive advantage’. To ensure net-zero economy practices in supply chain management, an organization's internal infrastructure and the management team's support are crucial (Farooque et al., 2022). As opined by Lacovidou et al., (2021) internally, the implementation of low-carbon operations may lead to new competencies, resources and capabilities, which manifest in a company’s culture, technology, structure and human resources and in turn provide manifold positive contributions to economic performance. Attia (2016) further stated that the creation of longer-lasting products will inevitably result from supply chain management practices that reduce carbon footprint.

2.5.4. Technology

Fully decarbonizing the global economy will require technological innovation in addition to the creation and execution of appropriate policies that will encourage profitable investment in greener manufacturing techniques and hasten the reduction of carbon emissions (Rissman et al., 2020). Supply chain technological innovation is essential to a company's ability to achieve net-zero and to cut greenhouse gas emissions (Lee et al., 2018). Ball and Lunt (2020) suggested that lean tools and techniques can help the industry reduce waste and improve operational efficiencies in adopting low-carbon operations. Further studies conducted by Tasleem et al., (2019) conducted empirical research to examine the effect of technological innovation on a company's sustainable performance and made recommendations for technological advancement for corporate sustainability performance. Quarton and Samsatli (2021) asserts that evidence from research shows the integration of emerging technological solutions are crucial in abating decarbonization. In order to address the issues brought about by climate change, the expanding waste crisis, the depletion of natural resources, and other issues related to global warming, policymakers around the world are primarily focused on advancing technological advancements that will enable the achievement of circularity and net-zero (Lee et al., 2017), and Okorie et al., (2023) discussed the role of digital technologies in achieving a net-zero economy.

2.6. Barriers affecting circularity adoption in supply chain

The researchers considered the following barriers due to the research area and the chosen theories. Given how difficult it is for large organizations to manage their global supply chains, decarbonization may encounter significant obstacles. (Labanca et al., 2020).

2.6.1. Lack of government policy framework

Governments have challenges reducing carbon emissions-related issues in manufacturing because of the wider use of natural resources in developing countries (Kannan et al., 2022). Chien et al., (2021) also confirms that there is lack of political will and ideological limitations that affects carbon emission reduction legislations. Bureaucratic impediments, documentation challenges, and fragmented tax regimes disincentivizes firms to adopt carbon neutrality programs (Kannan et al., 2022); and lack of inclusion of companies by government on regulatory policies (Li et al., 2021). Lack of training among the employees on regulatory policies prevents decision-makers from implementation (García-Quevedo et al., 2020). As opined by Kannan et (2022), to achieve a concrete carbon regulatory policies, fundamental challenges or hurdles should be addressed as new laws and policies are fraught with implementation difficulties and fear of success. Again, requirements of products from less carbon emitting firms are not clear; this uncertainty does not motivate companies to conform to regulatory policies (Kannan et al., 2022). Xu et al., (2022) confirm that lack of incentives demotivates companies to implement such carbon regulatory policies. Manufacturing companies faces many challenges in their quest to implementing regulatory policies, which affect economic and environmental performance of the entire supply chain (Kannan et al., 2022), and the volatility of carbon market prices influences transportation and emissions costs, thus affecting entire supply chain cost that makes the adoption of regulatory policies even more complex (Rezaei et al., 2022).

2.6.2. Organizational barriers

The urgent need for low carbon world has resonated in the minds of firms to reduce their carbon emissions footprint in the entire supply chain (Kannan et al., 2022). Kannan et al., (2022) assert that manufacturing challenges associated with low carbon design, lack of in-house reverse logistics, or improper waste disposal, affect firms in implementing low carbon solutions. However, inadequate research and development (R&D) facilities impedes low-carbon adoption (Jiang et al., 2020). Implementation of low carbon programs require huge capital outlay especially for recruiting new workforce, undertaking feasibility research as well as strategies implementation (Kannan et al., 2022); and most firms are unable to cope with the financial burden and thus make adoption of low carbon operations a challenge (Kannan et al., 2022). Lack of understanding and awareness about carbon emission and its impact on the supply chain activities among suppliers, and employees impact low carbon operation adoption in supply chain (Kannan et al., 2022). As asserted by Kannan et al., (2022) no study has explored or developed a multi-criteria decision-making model that determines barriers to the implementation of carbon regulatory policies for manufacturing. Studies by Hall et al. (2017) and Shen et al. (2018) suggests that an efficient operational system is of paramount importance for an industry to adopt low-carbon operations (LCO) effectively and achieve net-zero emissions. Luthra and Mangla (2018) stated that information asymmetry plays a vital role in achieving a specific goal. Information asymmetry involves how the industry spreads information regarding any green initiative so that all stakeholders know their roles and responsibilities (Long et al., 2016).

2.6.3. Economic and social barriers

Manufacturing firms are vulnerable due to the presence of multiple constraints while executing and implementing regulatory policies, which result in reduced economic and ecological performance of the entire Supply Chain (Kannan et al., 2022). According to De Sousa Jabbour et al., (2021) economic barrier is the main obstacle to the adoption of low carbon operations (LCO) and achieving net-zero emissions. The main challenge with the carbon tax policy is in pricing the carbon; decision-makers always tend to keep the prices high to reduce emissions, but it should also be low enough that it does not hamper economic development (Kannan et al., 2022). The fear of financial losses affects the brand image and a firm’s competitiveness (Krishnan et al., 2020). As stated by Glemarec (2022) financial hurdles could be the biggest barrier to net-zero implementation as most organizations are not sure of return on investment in the short term. Because of smaller profit margins, there is a slower return on investments (ROI) in net-zero and green supply chain management (Lopes de Sousa Jabbour et al., 2021); and initial capital investment is higher for implementing circular supply chain and net-zero (Singh et al., 2022).

According to Qian et al (2019), financial support, and investment can motivate firms to focus on low-carbon operations. Liu and Song (2017), also affirmed that tax rebates, subsidies and incentive mechanisms are important economic mechanisms to attain low-carbon emissions.

The perceived difficulty of avoiding fossil fuels and resistance to change are the main causes of the slowness of the net-zero-carbon economy transition (Tirelli & Besana, 2023). To satisfy market demands and maintain profits, businesses prioritize quick customer service and mass production. This dichotomy makes it difficult for businesses to adopt sustainable and environmentally friendly operational procedures (Munten et al., 2021).

2.6.4. Technological barriers

Businesses find it difficult to implement green supply chain practices when they don't have enough exposure to technology (Singh et al., 2022). Technology innovation is lacking in the construction and manufacturing industries (Li et al., 2021); and absence of environmental monitoring systems and other IT support systems (EMS) (Kirchherr & Urban, 2018). Obstacles include the absence of industrial infrastructures capable of implementing circular principles and the lack of facilities and machinery required to recover and recycle extremely complex products (Amiri et al., 2022). According to Bataille (2018) supply chain changes necessitate the use of particular technologies that can produce high-quality goods, use recyclable materials, and save energy. One of the ways to reduce emissions is by incorporating emissions-minimizing technology (Balcombe et al., 2018). The net-zero carbon target can be already reached by adopting existing technologies, but the availability of solutions to satisfy each performance requirement is limited (Tirelli & Besana, 2023). The most significant obstacles to moving to a circular supply chain are low knowledge of data management among stakeholders, a lack of comprehension of decentralized organizational structures for supplier collaboration, and large investments in Industry 4.0 technologies supported by the erratic nature of circular flows (Amiri et al., 2022).

2.7. Supply chain collaboration and net-zero implementation

Given the complexity and diversity of stakeholders in supply chains, collaboration has become essential to their management (Wu et al., 2017). Businesses typically work together primarily to enhance supply chain and individual performance (Barratt, 2004); As stated by Kumar et al., (2022) collaboration has also been identified as a pertinent strategy to induce sustainability performance in supply chains. Due to the large benefits of collaboration strategy along circular supply chain management (CSCM), many organizations are going to apply collaborative strategies to enhance their green performance (Sudusinghe & Seuring, 2022). Collaboration among stakeholders involved in the green supply chain plays an important role in understanding and addressing the green performance along the supply chain (Fantazy & Tipu, 2023), and there is evidence that regulatory requirements and institutional pressure enable customer and supplier collaboration (Andalib et al., 2023). In terms of innovation for a CE, supply chain collaboration is key to providing the combination of knowledge and capabilities (Berardi & Brito, 2021). Firms must focus their attention on partner selection, on assessing their partners' capabilities, and on the possibility of aligning interests between parties (Fischer & Pascucci, 2017). These are important aspects that favor the exchange of information and knowledge in product and process innovation (Berardi & Brito, 2021).

2.8. Adoption of circular supply chain and net-zero: an institutional theory perspective

The institutional theory explains how various institutional pressures exerted by different stakeholders drive a firm's behavior (DiMaggio & Powell, 1983). As stated by Delmas and Toffel (2004) stakeholders such as governments, regulators, customers, competitors, and industry associations impose different pressures on firms. These pressures can be perceived as coercive, normative, and mimetic, collectively known as isomorphic forces. These pressures were found to positively influence sustainability strategies and carbon abatement measures (Chithambo et al., 2020; Haque & Ntim, 2022). Institutional theory is typically used to consider how isomorphic pressures contribute to firm adoption of circular supply chain activities (Sarkis et al., 2011; Touboulic & Walker, 2015). In times of climate-related risks, firms respond to institutional pressures to reduce emissions due to legitimacy (symbolic) and efficiency (economic) oriented motives (DiMaggio & Powell, 1983; Haque & Ntim, 2022). In the context of circular supply chain, institutional theory explains how sustainable practices are key to achieving circularity (Farooque et al., 2019).

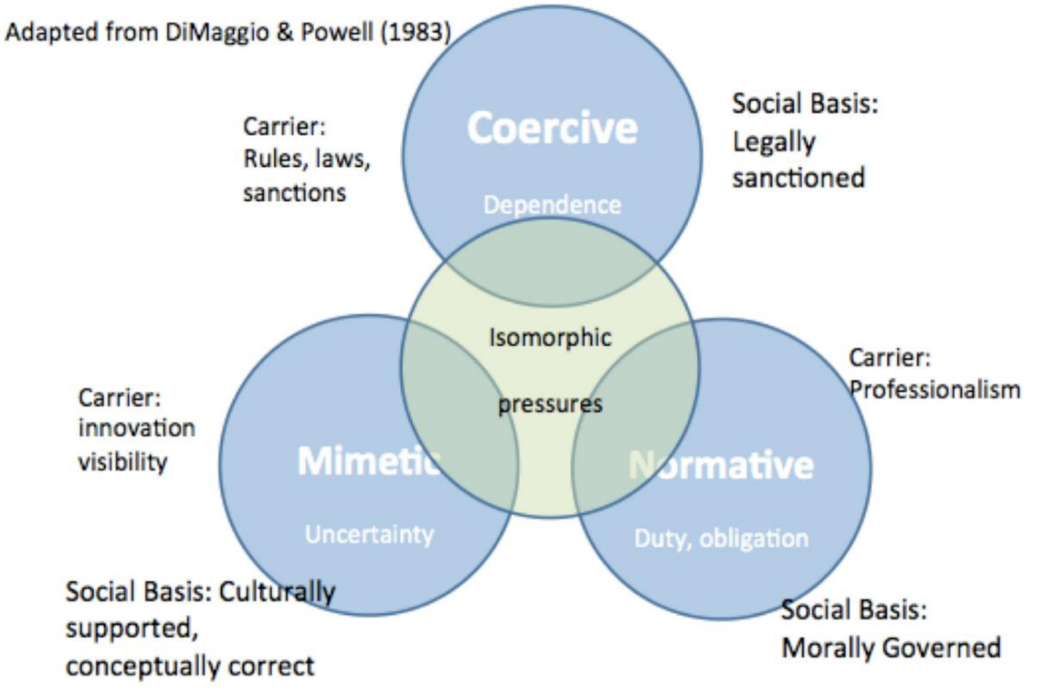


Figure 3: Institutional Drivers

Source: Adopted from DiMaggio & Powell (1983)

2.8.1. Drivers of institutional pressures

The sources of institutional pressures are nuanced and complex (Zhang, Tay, et al., 2022). Institutional pressures are categorized into three types: Mimetic pressures talks about the need to mimic other organization's strategies because competition is unpredictable, coercive pressures explains the power of centralized government, big businesses, and foundations; and normative pressures deals with social expectations through the professionalization process that results in "a pool of almost interchangeable individuals" (DiMaggio & Powell, 1983).

Coercive pressure: External stakeholders, such as government authorities and big clients, exert coercive pressure on businesses, forcing them to comply with various environmental rules and principles (Roxas & Coetzer, 2012). For example, regulatory bodies may exert coercive pressure on suppliers to abide by green measures (Berrone et al., 2013). In fighting climate change, growing regulatory pressure has contributed to firms' emissions reduction initiatives (Lewandowski, 2017). Dhanda et al., (2022) suggest coercive pressure is usually more effective than other institutional pressures for adopting mitigation strategies to reduce carbon emissions. As stated by Zhang et al., (2022) a proactive approach to dealing with coercive pressure may allow businesses to develop competitive advantages. In a coercive context, proactive firms are more likely to explore new business opportunities by rapidly reconciling the relationships with internal stakeholders (employees) and external stakeholders (policymakers, clients, and vendors) to reach a common objective (Buysse & Verbeke, 2003). For instance, proactive firms could perceive carbon neutrality as helpful to developing a company's social reputation as there is increasing urgency to achieve carbon neutrality in society (Zhang, Tay, et al., 2022).

Normative pressure: Normative pressure stems from shared beliefs in business and social norms (DiMaggio & Powell, 1983). As stated by Zhang et al., (2022) normative pressures from entities such as professional associations justify the types of activities deemed 'normal' for various organizations. Normative pressures from diverse stakeholders could generate urgent concerns for businesses to move beyond merely improving carbon awareness to implement more meaningful carbon-reduction strategies (Sprengel & Busch, 2011).

It may not be favorable to a corporation's reputation if it does not respond to customer opinions and opposes public sector unions (Roxas & Coetzer, 2012). However, normative pressures are often less effective than coercive pressures (Dhanda et al., 2022). In transitioning to carbon neutrality, firms can attempt to control public sentiment by adopting a strategy that lays out detailed plans to achieve carbon neutrality at the firm and supply chain level (Zhang et al., 2022).

Mimetic pressure: A firm may imitate the practices of early adopters within their industries to reduce uncertainty (DiMaggio & Powell, 1983). Studies have shown how peer pressure is used to shape attitudes, behaviors, and viewpoints of firms within the same industry as competitive responses (Klassen & Vachon, 2003), for sustainability reporting (Kolk, 2010), and adoption of sustainability practices (Okhmatovskiy & David, 2012). Firms respond to such pressure from their stakeholders to prevent peers within the same industry from gaining a competitive advantage (Zhang et al., 2022). In the carbon neutrality context, a firm might be concerned that its slow response to such a new initiative may give its competitors an advantage of capturing new markets and business opportunities (Zhang et al., 2022). If more peers embrace carbon neutrality, a firm could be pressured to mimic its peers and join in a similar cause because it faces uncertainty about emerging sustainability practices (Zhang et al., 2022). Moreover, a supplier may foresee that its customers can readily compare its emissions performance with its peers, potentially making the firm vulnerable to competition (Zhang et al., 2022). If an industry is transitioning to carbon neutrality, a supplier firm could be compelled to join carbon neutrality efforts for survival (Zhang et al., 2022).

2.9. Adoption of circularity and net-zero by supply chain partners: relational-view theory perspective.

Partnerships along supply chains have often been utilized as a core activity to ensure that strategies related to sustainability are implemented successfully (De Angelis, 2018; Sudusinghe & Seuring, 2022). According to Dyer and Singh (1998) *relational view explains that long-term profits are essentially based on network relations, or more precisely on resources that are deeply embedded in inter-firm relations*. According to the relational view, a collection of several different organizations can obtain mutual benefit by collaborating resources (Cao & Zhang, 2011; Dyer & Singh, 1998). Partnerships and the competitive advantages attained through cooperation have been explained by the relational view theory (Köhler et al., 2022a). Companies may pursue a collaborative approach for several reasons: to gain access to a partner's expertise in CO_2 mitigation, to improve the organization's own reputation by helping a less-skilled partner reduce emissions, or because emissions are a result of a joint process that can better be managed when combining expertise (Theißen et al., 2014). Thieben et al., (2014) suggest that addressing environmental issues by working closely with supply chain partners promotes environmentally friendly product innovations, thereby creating advantages. Bai et al., (2017) developed a framework for a zero-carbon logistics support practice to demonstrate to businesses and their ancillary suppliers how to build strong chains and strive toward zero-carbon goals. Gong et al., (2018) further state, that to determine the most lucrative ways to reduce overall emissions, organizations must take a supply chain approach to engage multiple tiers' of suppliers and customers. Dyer and Singh (1998) defined *"relational rent'' as a supernormal profit jointly generated in an exchange relationship that cannot be created by either firm in isolation and can only be created through the joint contributions of the collaborative partners.* As opined by Dyer and Singh(1998) the relational view constituting the focal point of the proposed collaboration framework outlines four main drivers of "relational rents" arising from partnerships: (i) knowledge-sharing routines, (ii) complementary resources and capabilities, (iii) relation-specific assets, and (iv) effective governance.

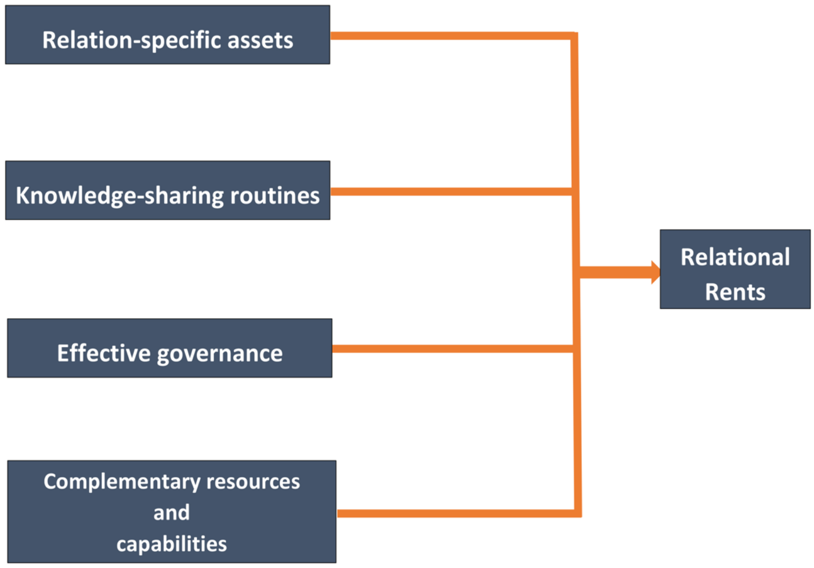


Figure 4: Depicts drivers of relational rent

Source: Adopted from Dyer et al., (2018)

2.10. Drivers of relational rent

The drivers of relational rent which are relation-specific assets, knowledge-sharing routines, effective governance and complementary and resource and capabilities are explained below.

2.10.1. Relation-specific assets

By investing in relation-specific resources and combining assets in creative ways, businesses can expect to increase productivity in their supply chain activities (Dyer and Singh,1998). To realize these gains, firms need to commit to partnerships with a certain stake (Theißen et al.,2014). Relation-specific investments can foster trust, enhance further knowledge sharing, and open innovation activities. Investing in co-specialization assets relates to successful circular supply chains (Terstriep & Lüthje, 2018). Thus, transitioning to a circular supply chain requires capital and resource investments (De Angelis, 2018) that are potentially easier to raise in partnerships. All the firms in a SC are impacted by the problems of sustainable growth, so it is imperative to concentrate on group solutions because individual firm efforts are not enough (Singh et al., 2022).

2.10.2. Knowledge-sharing routines

According to Köhler et al., (2022) new technologies, business models, and processes will be required for the implementation of circular supply chain, thus demanding a paradigm shift towards enhanced knowledge sharing. Knowledge-sharing routines comprise a "regular pattern of interfirm interactions that permits the transfer, recombination or creation of specialized knowledge" (Dyer & Singh, 1998). As asserted by Jean et al., (2012) Knowledge-sharing routines can thus increase innovative activities both within and between firms, which is consistent with findings from previous studies indicating that innovations can be linked to the suppliers or networks in which firms are embedded. Thus, knowledge sharing is crucial for enhancing open and collaborative innovation efforts for achieving a circular supply chain (Lozano et al., 2021). There has been a progressive change in attitudes regarding inter-firm knowledge management because knowledge is now seen as a vital resource that needs to be properly managed throughout the supply chain (Agostini & Nosella, 2020). In order to attain sustainable growth, knowledge management across multiple firms is more important than knowledge management within each firm alone (Kassaneh et al., 2021).

According to Kohler et al 2022, the relational view offers a compelling explanation of the quality of relationships necessary for engaging in open innovation with network partners and for employing strong dynamic capabilities. (Inigo & Albareda, 2019), as arguably is the case of circular supply chain (Köhler et al., 2022b).

2.10.3. Complementary resources and capabilities

According to Dyer and Singh (1998) complementary resources are those distinctive resources of alliance partners that collectively generate greater rents than the sum of those obtained from the individual endowments of each partner. Resource and capability complementarity has been emphasized as a primary driver for attaining relational rents, especially in dynamically changing business environments (Dyer & Singh, 1998). Sensing and seizing the complementary nature of resources and capabilities of other firms is thus an essential capability for effective relationships (Teece, 2020). This aspect acquires additional meaning in relation to product-service systems or shared assets in a circular supply chain, since the sharing of assets will become easier through new innovations (De Angelis, 2018), thereby further strengthening relationships within networks and partners.

2.10.4. Effective governance

To enable effective open innovation, the design of collaborations should ensure information flows easily and flexibly toward areas where it generates the highest value (Teece, 2020). Thus, collaboration design should enable a culture capable of swiftly absorbing and applying external knowledge to adapt to dynamically changing environments (Teece, 2020). Yet, such openness also creates a threat of opportunistic behavior, which necessitates effective governance mechanisms based on formal and/or informal agreements or even on common goals to mitigate the risk of opportunism (Köhler et al., 2022b).

2.11. Summary and research model

In this research, we gathered literature from circular economy, circular supply chain management and net-zero to form the basis of the theoretical framework. A circular supply chain will generate zero waste because it is designed to systematically restore and regenerate resources in the industrial and natural ecosystem in which it is embedded (Farooque et al., 2019). The framework (see **Figure 5**) shows how circularity adoption by supply chain companies may lead to the achievement of net-zero. We have shown the barriers and drivers that affect companies' ability to adopt circularity in supply chain as indicated in the framework. The drivers are what pushes companies to adopt circularity while the barriers indicate an organizational lack of resources or capacity for circularity implementation. The research adopted institutional theory in the framework as isomorphic pressures make organizations comply with institutional rules. External stakeholders, such as government authorities and big clients, exert coercive pressure on businesses, forcing them to comply with various environmental rules and principles (Roxas & Coetzer, 2012). We also adopted the relational view theory in the framework (see **Figure 5**) to explain supply chain collaboration and relations. Relational view theory has been applied to explain partnerships and the competitive advantages achieved through collaboration (Köhler et al., 2022a). The bottom of the framework (see **Figure 5**) indicates a combination of isomorphic pressures and relational rent, which we believe could aid organizations to achieve net-zero in supply chain. Collaboration offers benefits both for companies lacking in CO_2 mitigation skills as well as for companies whose own skill level is high, but whose supply chain partners are increasing their products' overall CO_2 footprint (Theißen et al., 2014).

The research model **(see Figure 5)** will aid in answering the research question **"Achieving circularity in supply chain: institutional drivers and barriers of ASKO AS''**

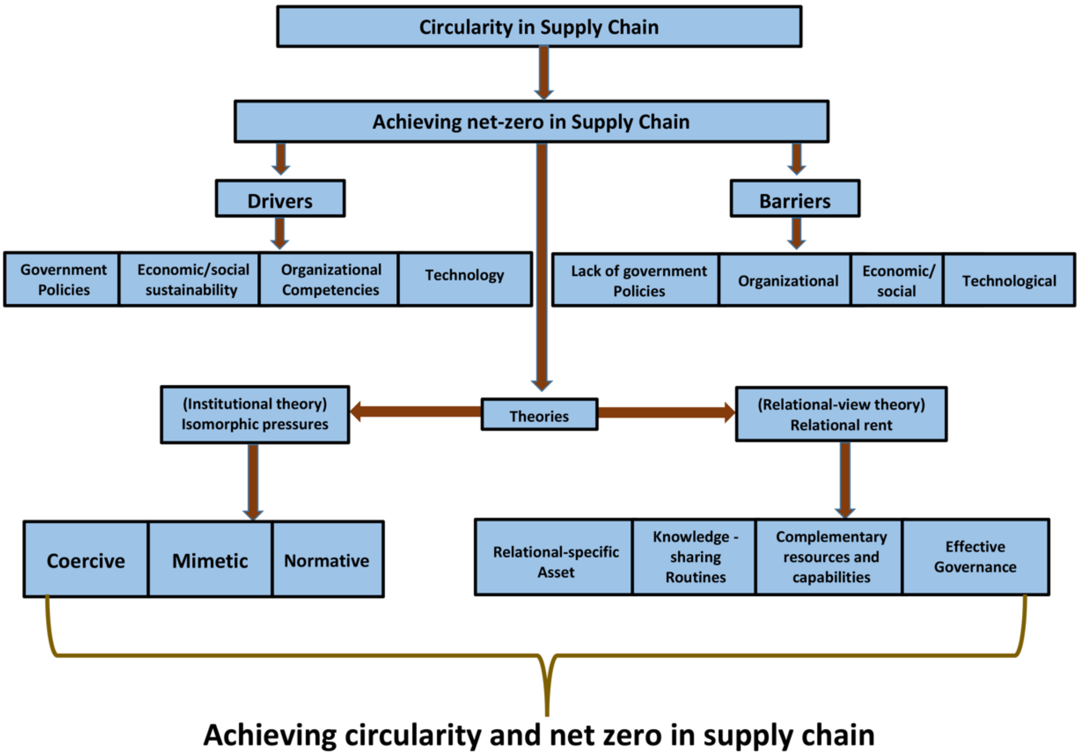


Figure 5: Research model

3.0. Research methodology

Melnikovas (2018) defined research methodology as a general research strategy that delineates how the research should be undertaken. It includes a system of beliefs and philosophical assumptions that shape the understanding of the research questions and underpin the choice of research methods (Melnikovas, 2018). Research methodology is an integral part of a dissertation or thesis which helps to ensure the consistency between chosen tools, techniques, and underlying philosophy (Melnikovas, 2018). The main purpose of the study is to explore how the adoption of circularity leads to the achievement of net-zero in supply chain business operations. In this chapter, we present the methodological approach by introducing the research philosophy which links the research aims and objectives. We will introduce a research approach and research method. We further discuss the research design which entails preparations before data collection, sampling, and data collection method. Also, undertake a content analysis which included literature search and secondary data.

3.1. Research philosophy

According to Melnikovas (2018), research philosophy forms a basis of the research by delineation of ontology (nature of reality), epistemology (nature, sources of knowledge or facts) and axiology (values, beliefs, and ethics) of the research. Whether you are consciously aware of them or not, at every stage in your research you will make a number of types of assumptions (Saunders et al., 2007). These include assumptions about the realities you encounter in your research (ontological assumptions), about human knowledge (epistemological assumptions), and about the extent and ways your own values influence your research process (axiological assumptions) (Saunders et al., 2007). These assumptions inevitably shape how you understand your research questions, the methods you use, and how you interpret your findings (Crotty, 1998). A well-thought-out and consistent set of assumptions will constitute a credible research philosophy, which will underpin your methodological choice, research strategy, and data collection techniques and analysis procedures (Saunders et al., 2007). This will allow you to design a coherent research project, in which all elements of research fit together (Saunders et al., 2007). In this thesis, we adopted an interpretivist philosophical stance. Interpretivist research is to create new, richer understandings and interpretations of social worlds and contexts (Saunders et al., 2007). If the research will focus on the use of qualitative data which is often the case, interpretivism may be chosen as the main philosophy (Melnikovas, 2018). The ontological stance of the interpretivist is described as socially constructed interpretation, realities, experience, and practices (Saunders et al., 2007). On the other hand, the epistemological stance of the interpretivist states theories and concepts, focus on narratives, interpretations, and gaining new understanding and worldview (Saunders et al., 2007). The axiological position of the interpretivist focus on value-bound research where the researcher is part of what is researched and hence is subjective and reflexive (Saunders et al., 2007).

3.2. Research approach

It is important to note that qualitative research is inductive in nature, which means that the research questions, the data collection, and the data analysis are based on a theory or preconceived notions that the researcher has, the researcher lets the data speak for itself, and form itself into themes without the bias of an existing theory (Creswell & Creswell, 2017). Our research, however, is centered on an inductive approach. As opined by Saunders et al., (2007) the inductive approach should be used when collecting data and developing a theory as a finding of the data analysis and it relates to interpretivist philosophy. According to Melnikovas (2018), inductive reasoning is a way of theory building, that starts with a specific observation on the basis of which a general rule is formulated. In the inductive approach, a small sample of subjects might be more appropriate than a large number as with the deductive approach (Saunders et al., 2007). Inductive approaches start with data collection and then move to the development of a clear theoretical position (Melnikovas, 2018). Researchers using this approach are more likely to work with qualitative data and to use a variety of methods to collect these data to establish different views of phenomena (Saunders et al., 2007). The adoption of inductive approach is linked to the research, achieving circularity in supply chain: institutional drivers and barriers of ASKO AS. In circular supply chain, the decarbonization process becomes a necessity as it has been seen that carbon footprint rises significantly in the upstream supply chain (McKinnon, 2010). The focus of the research is to explore how the adoption of circularity in the supply chain leads to the attainment of net-zero. This was conducted by exploring literature and comparing it with existing theories. The researchers hope to add to the body of knowledge already available in the supply chain and circular economy fields.

3.3. Research method

The research employed a qualitative method. As defined by Creswell (2017) research method is the techniques or procedures used to gather and analyze data related to some research questions or hypothesis. As stated by Korstjens & Moser (2017) qualitative research takes into account the natural contexts in which individuals or groups function, as it aims to provide an in-depth understanding of real-world problems. During the data collection, the researchers interact with the participants directly as it happens while data collection is through interviews. consequently, data collection is subjective and detailed (Rahman, 2016). In contrast to quantitative research, generalizability is not a guiding principle (Korstjens & Moser, 2017). By applying a qualitative research approach, the researcher might explore how and why participants act, understand their context, and be able to interact effectively with them, analyze data and report their findings (Korstjens & Moser, 2017). Thus thorough and appropriate analyses of an issue can be produced by utilizing qualitative research methods, and therefore the participants have sufficient freedom to determine what is consistent for them (Rahman, 2016).

This thesis explores how the adoption of circularity by supply chain companies can lead to net-zero. We look at institutional drivers and barriers affecting circularity implementation as well as explore the collaborations in the adoption of circularity in supply chain.

3.4. Case study

A case study is an empirical method that investigates a contemporary phenomenon (the case) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident (Yin, 2018 p.15). We employed a case study for this research where we sought to explore how ASKO's adoption and implementation of circularity can lead to the achievement of net-zero in the supply chain. Supply chain operations are said to be among the sectors with high levels of carbon emissions. As confirmed by McKinnon (2022) supply chain emissions account for 10-11% of global emissions. To arrive at the answer to the main question of ‘‘*achieving circularity in supply chain: institutional drivers and barriers of ASKO*". We employed a content analysis tool to review important documents relating to measures to achieve net-zero by adopting circular supply chain. A case study was adopted to provide an in-depth knowledge of how institutional drivers and barriers affect circularity adoption and companies' quest to achieve net-zero in supply chain. The more that your question seeks to explain some present circumstance (e.g., ‘‘how’’ or ‘‘why’’ some social phenomenon works), the more the case study method will be relevant (Yin, 2009). The method is also relevant the more that your questions require an extensive and ‘‘in-depth’’ description of some social phenomenon (Yin, 2009). A single case study is ideal for researchers who focus on one single thing, group, or people from a group (Yin, 2009). In this study, a single case design was used because it connects well with an inductive research approach. The use of inductive process tracing in a single case study has the advantage of generating new hypotheses, either particular to that individual case or potentially generalizable to a broader population

(Bennett & Checkel, 2012). We adopted a single case for this research because; a single case study offered a methodological rigor (Bennett & Checkel, 2012). Therefore, the findings and contribution of this research will contribute to understanding the adoption of circular economy principles to the achievement of net-zero in supply chain. This would be achieved through institutional mechanisms of the company's operational area as well as its collaborations or relationships with supply chain partners. The findings of this research do not seek to generalize, interpret, or conclude that this is the only solution for supply chain companies to achieve net-zero but seek to bring out different interpretations and understanding of the topic. This thesis adopted a content analysis and relied on the use of secondary data such as the company's report, online resources, newspaper headlines, speeches, and articles to understand ASKO's drive to net-zero ambitions.

3.5. Research design

As stated by Yin (2018) research design is the logical sequence that connects the empirical data to a study's initial research question and, ultimately, to its conclusion. Sileyew (2019) posits that, research design is intended to provide an appropriate framework for a study. It articulates what is required, what methods are going to be used to collect and analyze this data, and how all of this is going to answer your research question (Wyk, 2015). There are three types of research design namely, explorative study, descriptive study, and explanatory study (Saunders et al., 2009) and the choice depends on the purpose of the research (Al-Ababneh, 2020). The study sought to explore how the adoption of circularity in supply chain could lead to net-zero, by looking at the institutional drivers and barriers as well as supply chain company's relations with partners.

3.6. Data Collection

The study made use of qualitative data relating to the adoption of circularity by companies and how that could lead to the achievement of net-zero in supply chain. Data collection for a case study is extensive and draws from multiple sources such as archival records or documents, physical artifacts, and audiovisual materials (Hancock et al., 2021). The qualitative research method involved content analysis of existing documents. As stated by Walliman (2021) there are different methods used in research to gather information, all of which fall into two categories, i.e. primary, and secondary data. This study relied on secondary data as the main source of data collection. As part of gathering data for the study, secondary data sources like books, journals, websites, and publications were examined. Secondary data tends to be far less costly and takes far less time to organize as compared to the primary data which takes longer processes and time to design (Walliman, 2021). It provides a broad range of topics and the quality of these data from reputable organizations is often high (Walliman, 2021).

Based on the existing studies of institutional and relational theories and empirical findings, the researchers came up with the research problems and this formed the basis of data analysis. The use of existing datasets can accelerate the pace of research because some of the most time-consuming steps of a typical research project, such as measurement development and data collection are eliminated (Johnston, 2014).

3.7. Literature Search and Secondary Data

Important literature demonstrates to readers that the author has a firm understanding of the topic and provides credibility to the author and integrity to the work's overall argument (Denney & Tewksbury, 2013). The secondary data for the study was sourced from the company's website, newsletters, sustainability reports, newspapers, and other online searches relating to the case of ASKO. The main target of secondary data for the study was academic databases mainly Web of Science and Scopus through the Nord University website and Google Scholar. These databases were used to search for important articles relating to the research question. To make sure that the data collected were related to the study, key themes within the questions were used as guides in our search. Related themes such as circular economy, circular supply chain, net-zero, achieving circularity in supply chain, institutional drivers and barriers were used to lead the search. Several articles were screened and regrouped according to the sub-questions and formed part of the main pool of data that we read in our quest to answer the question.

3.8. Validity and reliability

According to Saunders et al., (2009), validity is concerned with the correctness and appropriateness of the method that is employed in research, the accuracy of the results that are analyzed and the generalizability of the outcome. Cypress (2017) posits that validity and reliability are two factors that any qualitative researcher should be concerned about while designing a study, analyzing results, and judging the quality of the study. Reliability in qualitative research is rooted in the idea of data adequacy, which makes it possible to show consistent support for one's analysis across participants. Validity, on the other hand, is related to data appropriateness, which makes it possible to provide an accurate account of the experiences of participants within and beyond the immediate context (Spiers et al., 2018). This thesis ''achieving circularity in supply chain: institutional drivers and barriers of ASKO AS'' is situated on internal validity. This is because the researchers employed content analysis to make inferences on documents regarding ASKO's circularity adoption reports. Internal validity in a case study concerns the issue of making inferences (Thomann & Maggetti, 2020). With respect to the reliability of the data, findings were considered somehow subjective since the data gathered was collected from secondary sources. To increase the internal reliability of the research findings, the thesis relied firstly on official data sources such as company reports, websites, newsletters and hence the internal reliability of the results can confidently be deemed accurate. Secondly, two researchers were independently involved in the collection and analysis of the data, and later compared the results, which provided a similar outcome. To further strengthen the reliability of the data, the researcher fact-checked sustainability initiatives that have been reported by other independent research bodies on the company.

On the external validity of the research result, the researchers found it irrelevant since it focused on a single case- ASKO rather than an entire industry. As opined by Hancock et al., (2021) it is not feasible to apply a single case and generalize its results to a larger population. Generalizability refers to inferences based on a sample drawn from a defined population and how the study can be applied to other studies (Maxwell, 2021). It is therefore difficult to generalize the findings since the study may be different in many or different situations, times, and the industry in which the case company operates.

3.9. Ethical considerations

According to the National Committee for Research Ethics in Social Sciences and the Humanities (NESH 2022), research ethics consist of a core set of scientific norms which are developed over time. These norms dictate that the scientific method be used responsibly to give credence to the integrity of the research. To ensure integrity in our research, all ethical considerations were followed. The purpose of research ethics is to promote free, reliable, and responsible research to foster good scientific practice and researchers must adhere to methodological norms such as factuality, accuracy, and transparency (NESH, 2022). We adhered to strict guidelines to ensure that ethical considerations were considered in every step of the research. The responsibility for research ethics applies in all stages of a project, from conceptualization to completion (NESH, 2022). It is more likely that a research's results will be accurate and fair if the research's design and sampling techniques, data collection method, data collection tools, materials, and data analysis methods are ethically conducted (Knottnerus & Tugwell, 2018) .As researchers we complied with the requisite guidelines stipulated by the Norwegian Centre for Research Data regarding permission to use the company's information for our study. The Agency granted us permission on the 8th of March, 2023 with reference number **632592** to commence our research study with ASKO (Appendix 1). Unfortunately, the company later wrote to us that due to their busy schedules they could not make time for interviews. The researchers did not abandon the project, but it changed the researchers' focus from conducting interviews to content analysis. The reasons were based on the relevance of the research topic and the plethora of information on the company's website and other online searches which was enough to give us the needed information for the research.

3.10. Case description

ASKO is a subsidiary of Norgesgruppen and a leading supply chain company in the grocery retail business in Norway. The company is focused on environmental ambitions which include green and efficient logistics, competitive handling of goods and achieving sustainable climate neutrality (ASKO, n.d.-a). Since 2000, ASKO has expanded to become one of Norway's largest transport companies with 700 trucks on the road every day with great diversity of large and small suppliers and carries approximately 30,000 product lines within different categories. The company has a storage area of approximately 300,000 m2 which comprises 13 regional ASKO companies, 9 Storcash stores for the professional market, central warehouses, and a loading terminal at Vestby in Akershus which provide opportunities for efficient distribution and a short distance to over 15,000 customers in the grocery and hospitality market throughout Norway (ASKO, n.d.-b).

Environment sustainability has become part of the organization's future growth path which is constantly shown in its new green initiatives. "*Sustainability means that social, ethical, and environmental considerations permeate our decisions and that we have profitability in ASKO and climate neutral means that we have eliminated greenhouse gas emissions in our own operations*" (ASKO, 2021b). Various green initiatives undertaken by the company include renewable energy, green transport, waste and source separation and customer sensitization drive. On renewables, the focus areas include the construction of a 90,000m2 solar cell facility to reduce the company's reliance on conventional electricity. The construction of the company's own wind turbines for electricity generation, investment in biofuels to power thirty (30) heavy-duty bioethanol vehicles as well as hydrotreated vegetable oil (HVO) and forty (40) trucks for logistics operations. In 2009, ASKO launched the world's first distribution vehicle powered by bioethanol, a by-product of cellulose production at Borregaard and it's the first company in the world to put hydrogen powered trucks in distribution operations. The energy reduction strategy is crucial to ASKO's green drive, and this involves the construction of hydrogen project with energy from own solar cells for electrification. The company has made great strides in renewable energy by constructing its own wind turbines and has put on the road

Norway's first electrically powered distribution vehicles, Hydrogen project with energy from own solar cells powered trucks and distribution vehicles in 2018. On green transportation, the company has embarked on zero-emission transportation initiatives which involves the phasing-in of seventy (70) electric trucks, hydrogen-powered trucks for warehouse distribution operations, and the installation of charging infrastructures for electric distribution vehicles. ASKO acknowledges that, to achieve net-zero emission reduction, inter-modal freight transport and complementarity would play a significant role. As a result, the company is complementing the use of hydrogen and electric-powered trucks with electric sea drones and rail trains for the carriage of bulk cargoes. ASKO believes that waste management (source separation and segregation) will help the company to achieve its net-zero goals. In view of this, 91% of bread, fruits and vegetables that are to be thrown away go into animal feed production as well as into utilization of bio-residue for production as a replacement for fertilizer. Also, products that are nearing expiration are given to food banks and charities as measures to reduce food waste. Recycling is important to the company to realize its net-zero objectives where customers can return source-sorted packaging materials to ASKO's distribution vehicles for recycling. Lastly, the company believes that sensitizing the customer on net-zero initiatives will help in minimizing carbon emissions. The company has established a sorting concept called "KING" where customers can return source-sorted packaging material to ASKO's distribution vehicles for onward recycling.

The research question was answered based on a selected case of ASKO and the choice of the company was based on two main factors. Firstly, ASKO is a Norwegian logistics and supply chain company and is on an environmental ambition for "Sustainable - climate neutral". The company is transitioning to circularity to sustain resources and cut down on emissions in its logistics operations into the future. ASKO has set its objective to attain climate neutrality by the year 2023. "*This means that we will focus on energy efficiency measures, renewable and sustainable resources and zero emissions in transport "*. Secondly, the transition process is based on the institutional and regulatory pressures by the government through the adoption of the Norwegian Climate Policy and the National Transportation Plan 2018-2029 which are aligned with that of the European Union. The European Union has proposed measures to make freight transport more efficient and more sustainable, by improving rail infrastructure management, offering stronger incentives for low-emission lorries, and better information on freight transport greenhouse gas emissions. The aim is to increase efficiency within the sector, helping it to contribute to the target of cutting transport emissions by 90% by 2050, as set out in the European Green Deal (European Commission, 2023).

4. Empirical findings

This chapter will review empirical findings of secondary data based on the research question **‘‘Achieving circularity in supply chain: institutional drivers and barriers of ASKO AS''**. The Norwegian government’s policy documents on green initiatives such as the Climate Action Plan, and National Transport Plan 2018-2029 are discussed as well as ASKO’s sustainability report. The Norwegian climate policy agenda is dovetailed into the European Union’s Climate Action Plan with the UN Race-to-Zero and the Paris Agreement acting as the driving force to net-zero emission targets. This research does not concentrate on supranational climate policies like the EU Climate Action Plan, UN Race-to-Zero, and the Paris Agreement, but narrows the focus on the Norwegian climate policy agenda and ASKO’s net-zero initiatives.

Findings from the company’s (ASKO) sustainability report/ net-zero initiative are discussed in the following. (4.1) measures to achieve net-zero by adopting circularity, (4.2) institutional drivers and barriers that affect ASKO’s net-zero adoption, (4.3) opportunities for supply chain collaboration on ASKO’s net-zero performance, and (4.4) success stories and opportunities.

4.1. Norwegian government climate action plan 2021-2030 relating to green transportation

The Government has submitted an ambitious plan for the transport sector which is aimed at reducing greenhouse gas emissions by half by 2030 relative to the 2005 level and making zero-emission vehicles the natural preferred choice (Norwegian Ministry of Climate and Environment, 2021). Among the key policy instruments implemented to cut emissions from the transport sector are carbon tax, biofuel quota obligations, different requirements for the use of zero and low-emission technology, and investment support schemes (Norwegian Ministry of Transport, 2021). Transport accounts for roughly 60 % of non-ETS emissions in Norway and without deep cuts in transport emissions, it will be impossible to achieve the target of reducing non-ETS emissions by 45 % by 2030 (Norwegian Ministry of Climate and Environment, 2021). In the 2021 budget, the government proposed an allocation of approximately NOK 32 billion for the railways, which is more than twice the 2013 level (Norwegian Ministry of Climate and Environment, 2021). The purpose is to shift away from the transport of goods from road to rail to reduce congestion and huge traffic on the road which account for higher emission rates as well as improve the overall vehicle turnaround time (VTAT) (Norwegian Ministry of Climate and Environment, 2021). The focus is a modal shift from road transport to shipping by adopting green shipping technologies and vehicles. The action plan covers all vessel categories, including cargo vessels, ferries and high-speed passenger vessels, and various specialized vessels (Ministry of Climate and Enviroinment, 2019). The climate initiatives by the government are intended to contribute to domestic emission cuts, enhance CO_2 removals and promote technological advances that can be used both in Norway and internationally (Norwegian Ministry of Climate and Environment, 2021). Our discussions on the Norwegian government's Climate Action Plan will concentrate on the role of government in ensuring low emissions in freight transportation in relation to supply chain activities of ASKO. We will further narrow the discussion to four (4) critical thematic areas that the government intends to give priority attention to achieve the net-zero emission target. These include government's role in ensuring low emissions in freight transport, tax incentives and burdens on freight transportation, innovation and technology in the transportation sector, and the use of intermodal freight transport as a preferred choice to mitigate net-zero emissions.

On the government's role in ensuring low emissions in freight transport, the government has developed a framework for business sectors that already have considerable adaptive capacity to green transition and the target is for Norway's businesses and corporate bodies to reduce its non-ETS emissions by 45 % by 2030 (Norwegian Ministry of Climate and Environment, 2021). That is, emissions that are not covered by the EU Emissions Trading System (Norwegian Ministry of Climate and Environment, 2021). The adoption of the National Transport Plan 2018–2029 is to support the ambition of reducing transport emissions by 50%, increasing biofuel quota obligation for road traffic, maintaining the use of heavy-duty electric vehicles and facilitating the rapid development of charging infrastructure throughout the country using a combination of policy instruments and market-based solutions to keep pace with the expanding use of electric mode of transport (Norwegian Ministry of Climate and Environment, 2021).

Tax incentives and burdens on freight transport are part of the government's plans to discourage companies that use fossil fuel vehicles from adopting green solutions. The policy document outlines areas in the transport sector where taxes should be raised and reduced. From 2023, the Norwegian parliament waved purchase tax based on the cars weight on all new EVs (Haugneland et al., 2017). The government will further implement a 25 percent VAT waiver on the purchase price of electric vehicles from 500,000 Norwegian Kroner and over and no annual road tax from 2022 (Haugneland et al., 2017). From 2023 and beyond, road tolls for electric vehicles will be reduced by 70% (Haugneland et al., 2017). The Ministry of Finance has estimated that the overall tax incentives for electric vehicles amount to NOK 10,000–15,000 kroner per tons CO_2 (Norwegian Ministry of Climate and Environment, 2021). The government has introduced tax breaks and grants through Enova to ensure that businesses have the freedom and opportunity to choose electric vehicles. On tax burden, the government recognizes the fact that carbon tax alone would require a very high tax rate. In achieving this objective, it intends to increase the current carbon tax rate from NOK 590 to NOK 2000 per ton CO_2 eq in 2030 (Norwegian Ministry of Climate and Environment, 2021). The report from Statistics Norway on the costs of reducing Norwegian non-ETS emissions by 50 % estimated that a carbon price of NOK 2000 could result in a reduction of more than 40 % in emissions in 2030 compared with the 2005 level (Norwegian Ministry of Climate and Environment, 2021).

As part of the mix of policy instruments combining higher taxation with incentives for low-and zero-emission solutions, on innovation and technology in transport, the government has launched several flagship programs to combat climate change. These include The Longship Project, The Green Platform Initiative, and The Zero-Emission Fund among others (Norwegian Ministry of Climate and Environment, 2021). The Longship project is aimed at the capture, transport, and storage of CO_2 in Norway as a milestone in the government's industrial and climate policy efforts (Norwegian Ministry of Climate and Environment, 2021). The Green Platform initiative was launched as a tool for coordinated, enhanced, and targeted efforts to promote a green transition in the business sector. The Government is also focused on continuing its initiatives for green shipping. There are steps to make emission-free trucks a viable and attractive option for the transport of goods, facilities shoreside electric power, charging infrastructure and later, infrastructure, for alternative transport fuels such as hydrogen, ammonia, and biofuels, will be developed to facilitate zero-emission maritime transport (Norwegian Ministry of Climate and Environment, 2021).The Research Council of Norway, Innovation Norway, Enova, and SIVA (the Industrial Development Corporation of Norway) offer a range of grant schemes and are cooperating on joint initiatives with investors, corporate bodies, and businesses to promote green growth (Norwegian Ministry of Climate and Environment, 2021). In the government policy document, Enova will champion the development of zero-emission infrastructures and technological support for businesses that intend to focus on green initiatives as well as contribute to the development of technologies necessary toward 2030 and the low emission society in 2050 (Norwegian Ministry of Climate and Environment, 2021).

The government intends to make intermodal freight transport the preferred choice for zero-emissions transportation in Norway. The objective of intermodal freight transport is to reduce transport costs, exploit the comparative advantages of each mode and shift freight from road to rail and sea, and reduce carbon footprint (Norwegian Ministry of Climate and Environment, 2021). A budgetary allocation of 18 billion NOK has been made to improve rail and shipping terminals and increase capacity by building more and longer loops and connecting lines and ports. In 2020, the government allocated a total of NOK 735 million for green shipping which was aimed at shifting freight transport from road to rail and sea with the purpose to achieving positive effects on congestion and traffic safety and will also have climate and environmental benefits (Norwegian Ministry of Climate and Environment, 2021). To strengthen maritime transport, grants will be allocated to shipowners who shift freight from road to sea (Norwegian Ministry of Climate and Environment, 2021).

4.2. The Norwegian National Transport Plan 2022-2033

The Norwegian national transport policy outlines the agenda for the 2033 transport horizon and provides the framework for resource allocation for 12 years (Norwegian Ministry of Transport, 2021). The objective is to achieve climate neutrality by reducing transport costs, exploiting the comparative advantages of each mode, and shifting freight from road to rail and sea (Norwegian Ministry of Transport, 2021). The policy is aimed at building a more modern transport system that will meet future demand, and adopt modes of transport that are efficient, safe, and environmentally friendly to realize the objective of climate neutrality (Norwegian Ministry of Transport, 2021). As a commitment, a budget allocation of 933 billion NOK has been earmarked for a twelve-year period (Norwegian Ministry of Transport, 2021). The national transport policy has identified critical areas where improvements are required to stem greenhouse gas emissions. These include the adoption of intermodal shifts in transport, adopting environmental-friendly technologies, infrastructural development and climate-friendly legislation (Norwegian Ministry of Transport, 2021). The policy envisions that climate-friendly modes of transport and fuel may contribute towards low-carbon society (Norwegian Ministry of Transport, 2021). As a result, it will encourage and facilitate more long-distance freight transport by sea and rail. This will be achieved through investment in rail systems to improve the reliability and efficiency of rail freight transport (Norwegian Ministry of Transport, 2021). The introduction of incentive schemes for shifting freight from road to sea will stimulate more environmentally sound and efficient ports (Norwegian Ministry of Transport, 2021). To strengthen maritime transport, grants will be given to ship owners who shift freight from roads to sea, to ports that improve their efficiency and environmental performance and cooperation among ports (Norwegian Ministry of Transport, 2021).

The adoption of environmentally friendly-transport technologies, alternative fuels as well as efficient transport is critical to the government's agenda to stimulate growth of zero-emission technologies in the transport sector (Norwegian Ministry of Transport, 2021). According to the

Ministry of Transport and Communication’s "Disruptive Scenario" CO_2 emissions from road transport may be reduced to 3.8 million tons in 2030 (Norwegian Ministry of Transport and Communications, 2017). Steps taken by government are that by 2023, 50% of all heavy-duty vehicles will be electric. The Government will take steps to make emission-free trucks a viable and attractive option for goods transport. Improvements in technological maturity, in a way that zero-emission vehicles will be competitive in relation to conventional vehicles, is a precondition for the targets (Norwegian Ministry of Transport and Communications, 2017).

On climate-friendly infrastructure, the government has prepared a roadmap for hydrogen technology designed particularly to support the development and establishment of infrastructure, focusing on the establishment of hydrogen hubs and supply chains that will facilitate the commercial use of hydrogen (Norwegian Ministry of Transport and Communications, 2017). Enova has provided a total of about NOK 136 million for the establishment of charging infrastructure for electric vehicles (Norwegian Ministry of Transport and Communications, 2017). A contract of NOK 629 million has been awarded by Enova for the construction of over 80 shoreside electric power projects, and shoreside electric power facilities are being established or already operating in more than 60 ports (Norwegian Ministry of Transport and Communications, 2017). Another funding instrument by Enova is earmarked to support biogas production and associated infrastructure for biogas use (Norwegian Ministry of Transport and Communications, 2017). As stated by DNV GL, vessels at berth account for 7 % of greenhouse gas emissions from shipping and as a result, significant investment in the establishment of shoreside electric power is a priority in its green policy agenda (Norwegian Ministry of Transport and Communications, 2017). Shifting freight transport from road to rail and sea will have positive effects on congestion on roads, traffic safety as well as climate and environmental benefits. As a result, in the 2021 budget, the government proposed an allocation of approximately NOK 32 billion for the railways sector, which is more than twice the 2013 level (Norwegian Ministry of Transport and Communications, 2017).

4.3. ASKO sustainability and net-zero initiative report based on analyzed documents

The sustainability reports of ASKO and Norgesgruppen are interlinked as Norgesgruppen is a parent company of ASKO. As a result, the researchers utilized data from these two companies. ASKO has pledged to be climate neutral by 2030 and aspires to become the environmentally friendly logistics company in Norway (ASKO, 2021b). In compliance with the Norwegian climate and zero emission policies, the company is working toward achieving the SDG goals 7 and 12-15 as part of its environmental target (NorgesGruppen, 2022b) . ASKO’s short, medium to long term objectives are to reduce its GHG emission footprint by 6.2 per cent (NorgesGruppen, 2022a). ASKO has stated in the company's sustainability report that the company's philosophy about *sustainability means that social, ethical, and environmental considerations pervade our decisions and that we have profitability at ASKO. Climate neutral means that we have eliminated greenhouse gas emissions in our own operations* (ASKO, 2021c). Findings from ASKO's company report and other sources will be discussed in the following.

4.4. Measures to achieve net-zero by adopting circularity

ASKO has pledged to be climate-neutral by 2030 and embarked on measures such as green transportation, renewable energy, food waste management and customer awareness to attain climate neutrality (ASKO, 2021b). On green transportation, electric, and hydrogen-powered trucks are at the top of the agenda and show how important they will drive the company's green transition. ASKO has phased in 70 electric trucks in their fleet and will continue until the company reaches its net-zero target in 2026 (ASKO, 2021a). ASKO contends that transport chains are becoming climate-neutral and adopting environmentally friendly modes of transport is the future for the company. Renewable energy is critical to making the green shift a reality and ASKO has invested in biofuels as part of its commitment to net-zero ambition (ASKO, 2021a); and these includes investment in its own tank facilities and uses Hydrotreated Vegetable oil (HVO) throughout most part of the year. ASKO MIDT-NORGE AS has started a pilot project where the energy from solar cells on its own roof is used to produce hydrogen. ASKO recognizes food waste as a major contributor to GHG emissions and has set a goal that by 2025, 91% of bread, fruit, and vegetables that must be thrown away will go to animal feed production. The remaining volumes will go to biogas upgraded to fuel, where it will utilize the bio residue from production as a replacement for fertilizer (ASKO, 2021a). ASKO has embarked on a customer sensitization drive as part of measures to attain carbon neutrality as the company believes that reaching a green transition can only be achieved through customer collaborations and engagement. In 2010 ASKO in collaboration with Norgesgruppen established a sorting concept called KING where customers can return source-sorted packaging material to ASKO's distribution vehicles. This concept sensitizes the public on environmental consciousness and promotes the company's zero-emission drive (NorgesGruppen, 2022a).

4.5. Institutional drivers and barriers that affect ASKO's net-zero adoption.

ASKO believes that climate measures throughout the supply chain are important to achieving a balanced use of resources. The company is working towards achieving the government's

Zero-emission target of 2021-2030, the National Transport Plan of 2022-2033 and the company's own SDGs goals 7, and 12-15 as part of their environmental sustainability and climate-neutral target of 2026. The government's Zero-Emission Strategy, tax incentives, government programs on green initiatives and institutional support and competition within the industry are some of the identified drivers that can help the company achieve its net-zero initiative. The identified barriers that can limit ASKO's net-zero emission implementation are institutional inability to predict returns on green investment, limited low-carbon infrastructure, and challenges in adopting nascent technologies.

4.5.1. Drivers

The Norwegian government has introduced four flagship programs as part of its strategic vision to combat GHG emissions. These programs include the Greenland Transport Program, the Longship Project, the Zero-Emission Fund, and the Green Platform Initiative (Norwegian Ministry of Climate and Environment, 2021). The Greenland Transport (GLTP) program is part of the Ministry of Climate and the Environment's ambition to halve greenhouse gas emissions in the transport sector by 2030. It aims to speed up the roll-out of low to zero-emission technology on light heavy vehicles and machinery across industries (Confederation of Norwegian Enterprise, n.d.). ASKO is a member of this flagship program and is required to comply with the Greenland Transport program (Confederation of Norwegian Enterprise, n.d.). The Longship project is aimed at the capture, transport and storage of CO_2 in Norway as a milestone in the government's industrial and climate policy efforts (Norwegian Ministry of Climate and Environment, 2021). The Green Platform initiative was launched as a tool for coordinated, enhanced, and targeted efforts to promote a green transition in the business sector. ASKO, as a logistic and distribution company contributes to GHG emissions and has set a target to achieve 50% of emission cut by 2026. This ambition by the company is in tandem with the government's programs and initiatives to limit GHG emissions by 2030. The government initiative can be one of the factors that is driving ASKO circularity and net-zero goals.

On tax incentives, the government intends to provide tax relief to discourage companies that use fossil fuel vehicles to adopt green solutions (Norwegian Ministry of Climate and Environment, 2021). The policy document outlines areas in the transport sector where taxes would be raised and reduced. From 2023, the Norwegian parliament waved purchase tax based on the cars weight on all new EVs (Haugneland et al., 2017). The government will further implement a 25 percent VAT waiver on the purchase price of electric vehicles and no annual road tax from 2022 (Haugneland et al., 2017). Furthermore, other incentives the government has initiated are that, from 2023 and beyond, road tolls from electric vehicles will be reduced by 70% (Haugneland et al., 2017). Also, the Ministry of Finance has estimated that the overall tax incentives for electric vehicles amount to NOK 10,000–15,000 kroner per tons CO_2 (Norwegian Ministry of Climate and Environment, 2021). ASKO has large fleets of trucks that distribute goods across Norway and stands to benefit from the incentive packages being offered by the government in its drive to limit GHG emissions. Vehicle taxes have been used to encourage a shift towards decarbonization in Norway. For example, CO_2 and NOX (nitrogen oxide) components have been included in vehicle registration taxes for conventional vehicles, and various tax exemptions have been introduced for zero-emission vehicles (Norwegian Ministry of Climate and Environment, 2021). Policy instruments advocate for stronger financial incentives to cut emissions and make it easier for industries to plan emission reduction strategies (Norwegian Ministry of Climate and Environment, 2021).

Institutional support is another factor that can drive a company like ASKO to adopt circularity. The establishment of institutions like the Research Council of Norway, Innovation Norway, Enova, and SIVA (the Industrial Development Corporation of Norway) provide financial grants, and technical support and cooperates with investors, firms, and businesses to promote green growth (Norwegian Ministry of Climate and Environment, 2021). The Research Council of Norway supports research and the generation of new skills and innovation in both business and industry (Norwegian Ministry of Climate and Environment, 2021). Innovation Norway contributes to sustainable growth and exports through the grant scheme for environmental technology, the bio-economy program, and other schemes such as innovation grants and innovation contracts (Norwegian Ministry of Climate and Environment, 2021). Enova promotes greater use of battery, electric, hydrogen, and biogas solutions on land and at sea through early market introduction. Since 2015, Enova has provided a total of about NOK 136 million for the establishment of charging infrastructure for electric vehicles. This is part of the overall government commitment to mitigate the effects of greenhouse gas emissions (Norwegian Ministry of Climate and Environment, 2021). ASKO has tapped into these initiatives to augment the company's net-zero drive by cooperating with Enova and other institutions for technical, technological, and financial support for its net-zero implementation.

On the Norwegian government's zero-emission strategy, there is an ambitious plan to reduce greenhouse gas emissions by half by 2030 and make zero-emission vehicles the natural preferred choice (Norwegian Ministry of Climate and Environment, 2021). This strategy involves increasing carbon tax, encouraging the use of biofuel, providing zero-emission technologies and adopting inter-modal transport as the preferred option to mitigate GHG emissions (Norwegian Ministry of Climate and Environment, 2021). On carbon tax , the government intends to increase the rate from NOK 590 to NOK 2000 per ton CO_2eq in 2030 (Norwegian Ministry of Climate and Environment, 2021). What this means is that it discourages a distribution company like ASKO which has large fleets of vehicles to transition from conventional fuel to low-emission vehicles to avoid paying huge carbon tax. The report from Statistics Norway on the costs of reducing Norwegian non-ETS emissions by 50 % estimated that a carbon price of NOK 2000 could result in a reduction of more than 40 % in emissions in 2030. On the inter-modal shift, the focus is to move goods from road transport to shipping and adopt green shipping and vehicle technologies to reduce congestion and huge traffic on the road which account for higher emission rates (Norwegian Ministry of Climate and Environment, 2021). ASKO as part of its green transition drive, has adopted inter-modal transport to mitigate GHG emissions and as a cost containment measure. ASKO MIDT-NORGE's transport of goods from Trondheim to Bodø is moved from road to train and has also procured two autonomous electric vessels with the capacity to carry 16 trailers of cargo, each with a maximum capacity of 29 tons to cross the Oslo fjord to deliver groceries. On climate-friendly infrastructures, the government has prepared a roadmap for hydrogen technology designed particularly to support the development and establishment of infrastructure, focusing on the establishment of hydrogen hubs and supply chains that will facilitate the commercial use of hydrogen (Norwegian Ministry of Transport and Communications, 2017). Enova is providing charging infrastructure for electric vehicles and the construction of more than eighty (80) shoreside electric power facilities in more than sixty (60) ports across Norway. ASKO has procured the world's first hydrogen distribution trucks to augment its logistics and distribution operations. With the establishment of hydrogen hubs and electric charging stations across Norway, the company would be able to distribute goods to clients without delays. The government's infrastructural support through Enova can be one of the drivers that ASKO is pursuing net-zero initiatives.

Competition in the logistics and supply chain industry is another driving force in ASKO's net-zero emissions reduction strategy. There is intense competition within the industry and as the first movers, ASKO is working towards becoming an industry leader in the green shift. They were the first to deploy electric sea drones and hydrogen-powered trucks in the supply chain operation in Norway.

4.5.2. Barriers

One of the major barriers to green transition according to ASKO is an institutional inability to predict accurately green shift initiatives. Institutions like Enova, SIVA, Research Council of Norway that are to champion the government's green transition agenda are unable to accurately predict returns on green investments by companies that are into sustainability. As asserted by ASKO *"We need predictability so that we can make major environmental investments related to transport"*. ASKO contends that, changing from conventional fuel trucks to electric, hydrogen, and biofuel trucks requires huge capital outlay, however, institutions like Enova, SIVA, or the Research Council of Norway are unable to predict companies returns on investment when they shift to green transition. ASKO further asserts, *"We have moderate requirements for profitability for our production of renewable energy"*. The investment cost to venture into green initiatives could be expensive, and hence the company's inability to know the returns on investment makes the transition effort challenging.

Limited low-carbon infrastructure is another major barrier that is militating against ASKO's green transition effort. Even though, Enova is championing the development of zero-emission infrastructures and technological support for businesses that intend to focus on green initiatives, (Norwegian Ministry of Climate and Environment, 2021). The provision of facilities for shoreside electric power, EV charging infrastructure, hydrogen refueling stations, and biofuels to facilitate zero-emission maritime transport is limited. As stated by ASKO, *"at present, there is no infrastructure for charging such vehicles, only some charging points under private auspices."*. Currently, not enough zero-emission infrastructure has been deployed compared to the number of zero-emission vehicles on the road. This creates competing demands for the few zero-emission infrastructures for long-haul trucks that transport perishable goods for companies like ASKO.

Insufficient funding in net-zero investments is a challenge to the achievement of net-zero for companies like ASKO. Enova is responsible for the funding of zero-emission infrastructures and technological support for businesses for the government's 2030 low-emission transition agenda (Norwegian Ministry of Climate and Environment, 2021). ASKO asserts that funding is inadequate considering the huge capital outlay in green transition investments. "*We also believe that support from Enova should be increased so that the difference between buying a regular truck and, for example, an electric truck is reduced"*. This could suggest the subvention provided by Enova to companies to go into green transitions be increased.

Challenges in adopting nascent technologies when a company like ASKO is transitioning to circularity. In most cases, introducing new technology is costly and risky (Norwegian Ministry of Climate and Environment, 2021). As stated, "*ASKO was the first to introduce an electric truck and there are many indications that Tesla will meet the requirements in terms of range, load capacity and price /operating costs. Although some unanswered questions remain, ASKO wants to be early. The order placed is conditional – the cars must of course meet the* *requirements for efficient and reliable use*". Even though the company has placed orders for new Tesla trucks, ASKO could not guarantee its efficiency and reliability because the trucks use new technology. Reducing emissions often requires new technology and can therefore be more difficult (Norwegian Ministry of Climate and Environment, 2021).

4.5.3. Opportunities for supply chain collaborations on ASKO's net-zero performance

ASKO has engaged in a partnership with Norwegian government institutions such as Enova, SIVA, Innovation Norway, supply chain companies, and vehicle manufacturing companies among others. ASKO Midt- Norway has collaborated with CargoNet, Meyership, and Nova Sea to transport it's goods from Trondheim to Nordland via rail. This collaboration has saved fifty-two (52) trailers in daily transport and an annual 13,000 fewer trailers on the roads in Nordland. The environmental benefits of transferring goods transport from road to rail are considerable, and for the Nordland Line alone it represents an annual reduction of more than 6,000 tons of CO_2 (NorgesGruppen ASA, 2019). Another project between Solwr and ASKO includes the provision of an initial 12 warehouse robots to be delivered by Solwr in 2023 which sorts out products that are nearing expiration to be given to food banks and charities as measures to reduce food waste and mitigate GHG emissions. The project was assessed as having an international innovation height by the Research Council of Norway and was awarded 16 million kroner in research support over 4 years. ASKO has had a prototype for testing in the operating environment, with promising results.

MENY which is part of Norgesgruppen has saved nearly 170,000 food bags from ending up as waste through its collaboration with ''**Too Good To Go**'' in 2021. The project is aimed at providing cheaper prices of left-over food and groceries at Norgesgruppen chain stores for customers through online apps. This collaboration has been significantly successful in controlling food waste and reducing GHG emissions by ASKO. A pioneering project involving Kongsberg Maritime and ASKO is set to bring a radical new approach to using two newly built autonomous electric vessels to cross the Oslo fjord to deliver groceries. The zero-emission vessels, both battery-driven, will have the capacity to carry 16 trailers of cargo, each with a maximum capacity of 29 tons. It will reduce road travel by two million kilometers and cut CO_2 emissions by 5000 tons annually (ASKO and Kongsberg, 2020). A group agreement has been reached between ABB and ASKO regarding the delivery of charging infrastructure for its expanding fleet of battery-electric trucks. ASKO aims to distribute groceries with zero emissions by 2026, with 600 trucks operating on the road every day. Under the terms of the agreement, ABB will provide distribution centers all over Norway with dependable and effective battery-electric truck charging infrastructure. ASKO in Kalbakken, Oslo, is currently using the first ABB HVC 150C (150 kW) lightning chargers. ABB's chargers, which are a component of its AbilityTM digital solutions and services for all business domains, are web-connected for minimal downtime, enhanced efficiency, and remote charging point monitoring and configuration. (ASKO and ABB, 2020). This collaboration by the two companies is helping ASKO to meet its net-zero emission targets. The grocery company BAMA Group has entered into a logistic and distribution agreement where ASKO will be responsible for the distribution of goods to BAMA stores across Norway. The agreement requires ASKO to use its electrical distribution trucks to transport grocery goods to BAMA stores nationwide. This collaboration saves BAMA Group from using its conventional fuel vehicles which could have contributed to GHG emissions (ASKO, 2020).

4.5.4. Success stories and prospects of net-zero adoption

ASKO has achieved significant progress in the green shift. The company is certified in accordance with ISO 14001, an environmental standard that requires continuous improvements and external audits (ASKO, 2021a). The company has about 30 heavier vehicles that use bioethanol and 40 biogas-powered distribution vehicles and was the first company in the world to use bioethanol in distribution operations (ASKO, 2021a) which is crucial to cutting down on emissions. NorgesGruppen, which is a parent company of ASKO has food waste that can be used for biogas and ASKO aims for food waste that is not suitable for animal feed to be used for biogas. The company has prioritized using biogas produced with the right raw material and using bio-residues to replace artificial fertilizers in agriculture. The company has adopted the top of the waste hierarchy which is aimed at reducing waste with a particular focus on food waste. The company has 18 different fractions of how waste is sorted, some of which are cardboard, plastic, glass, wood, EE waste and food waste. The waste that is sorted forms part of NorgesGruppen's circular economy, where for example, the cardboard becomes new packaging cardboard that returns to the value chain via our suppliers and plastic that becomes plastic bags in NorgesGruppen's stores (NorgesGruppen, 2022a). A unique tracking system and quality control of the waste make it possible to follow up the degree of sorting at source and to reward good behavior with each customer as this is to ensure optimum utilization of raw materials. In collaboration with NorgesGruppen's stores, a source sorting concept was established in 2010, which they called KING (Source Sorting in NorgesGruppen (NorgesGruppen, 2022a). In the established solution, NorgesGruppen's stores and ASKO's catering customers can return source-sorted packaging material with ASKO's distribution vehicles (NorgesGruppen, 2022a).

ASKO in 2016, introduced Norway's first electric distribution vehicle and has phased in 70 electric trucks for the distribution of goods. The company's ambition is to continue overhauling its fossil fuel trucks with electric ones in 2026 (ASKO, 2021a). Electric and hydrogen-powered trucks are at the top of ASKO's hierarchy in green shift and it is highly prioritized. As a result, ASKO MIDT-NORGE AS is running a pilot where the energy from solar cells on its own roof will be used to produce hydrogen (ASKO, 2021a). The hydrogen will be used for trucks in the warehouse and for distribution vehicles supplied by Scania. The use of biofuel to replace fossil fuels will go a long way to cutting down on greenhouse gas emissions. ASKO has invested in its own tank facilities and uses HVO (Hydrotreated Vegetable Oil) throughout large parts of the year to produce biofuel (ASKO, 2021a).

Initiatives	Focused areas	Projects
Renewable Energy	Solar power Wind power Biofuel Hydrogen Energy reduction	Construction of 90,000m2 of solar cell facility Construction of own wind turbines 30 heavy-duty bioethanol vehicles are in operations, Investment in Hydrotreated Vegetable oil (HVO) and 40 biogas trucks for logistics operations. Implemented the first hydrogen-powered distribution vehicles in the world. Hydrogen project with energy from own solar cells
Green Transportation	Zero Emission Transportation (ZET) Inter-modal freight transport	Phased-in 70 electric-powered trucks for distribution. Hydrogen-powered trucks for warehouse distribution operations. Installation of charging infrastructures for electric distribution vehicles. Hydrogen trucks are use in distribution operations to compliment electric sea drones.
Waste	Source separation and segregation Food waste Waste recycling	The company has 18 different fractions of how waste is sorted. 91% of bread, fruit and vegetables that must be thrown away will go to animal feed production. Utilization of bio-residue from production as a replacement for fertilizer. Products that are nearing expiration are to be given to food banks and charities as measures to reduce food waste. Catering customers can return source-sorted packaging materials with ASKO's distribution vehicles, unique tracking for recycling
customer sensitization drive	Achieved through customer collaborations and engagement	Established a sorting concept called "KING" where customers can return source-sorted packaging material to ASKO's distribution vehicles. Sensitizes the public on environmental consciousness

Table 1: An overview of ASKO'S net-zero initiatives

The table above provides an overview of ASKO's net-zero initiatives. The net-zero initiatives table is subdivided into three (3) different sections namely, the **initiatives**, **focused areas,** and specific **projects**. The initiatives refer to the proposed net-zero emission policies of ASKO which are the major pointers around which their sustainability objectives revolve. The initiatives are subcategorized into four (4) thematic areas which are aligned with our research objectives. The second section, which is called the **focused areas,** describes the targeted areas that are being planned for implementation under the various initiatives set up in the first section. The focused area also provides detailed and specific deliverables within each sustainability initiative that the company believes can help it achieve net-zero objectives. Finally, the third section represents the **''projects''** which describes exactly what ASKO is doing under each focused area. These are the specific projects that are being implemented or are in various stages of implementation to achieve the company's net-zero objectives.

5. Discussions

The purpose of this dissertation is to offer an understanding of achieving circularity in supply chain; institutional drivers and barriers of ASKO AS. In this chapter, we analyze the empirical findings based on the content analysis and the information from related theoretical frameworks adopted in chapter two. We have segmented this chapter into three (3) main sections for discussion. The first section discussed the measures to achieve net-zero by adopting circularity in supply chain. The second section addressed the institutional drivers and barriers that affect circular supply chain while the third section discussed the opportunities for supply chain collaboration by adopting circularity. The fourth section addresses the linkages of the empirical findings through the lenses of institutional and relational-view theories, while the last section discusses the summary of the analysis.

5.1. Measures to achieve net-zero by adopting circularity in the supply chain

Carbon emission is a problem in freight transport and this is as a result of the adoption of linear supply chain model (Singh et al., 2022). Our empirical findings revealed that one of the strategies by ASKO to achieve net-zero in the supply chain is the adoption of zero-emission vehicles. The reason why ASKO adopted this strategy is that zero-emission transport abates carbon emissions and decreases emissions in the distribution and logistics operations as confirmed by McKinnon (2010). Also, ASKO sees the adoption of zero-emission vehicles as a competitive advantage and a boost to its market share. However, our findings identified distance charging locations and limited performance of low-emission vehicles as constraints as confirmed by Tirelli and Besana (2023).

Our findings revealed that ASKO has provided green infrastructures such as shoreside charging systems, hydrogen filling, and battery replacement stations at strategic locations as a major boost to achieving decarbonization as confirmed Borbujo et al., (2021). Even though green infrastructure has been identified as an important measure of net-zero, we also found out that the availability of charging infrastructure was limited and could limit the transitional efforts of ASKO toward net-zero emission target.

Intermodal transport is a strategy that ASKO has adopted to achieve net-zero emission targets. ASKO's purpose for choosing different modes of transport in the distribution and supply chain activities includes reducing GHG emissions, and improving environmental performances and it's believed to be an appropriate strategy to decarbonize freight transport than unimodal road transport as confirmed by Kaack et al., (2018;) and Okyere et al., (2019). Our empirical findings further revealed that, ASKO is pursuing intermodal freight transport because of the

Norwegian government's intermodal shift policy which is to decongest the roads and improve transport movements as stated by the Norwegian Ministry of Climate and Environment (2021). Our empirical findings revealed that ASKO's preference for maritime transport over the road is because of the ecological benefit of intermodality which is to reduce carbon footprint as confirmed by Chen et al., (2020). Furthermore, analyzed report from ASKO identified the benefits of intermodality to improving company's competitiveness, reducing travel time and ensuring flexible, as the integration of road, sea, rail, and air in the transport sector as confirmed by Mutlu et al., (2017). Lastly, our empirical findings identified cost containment measures as a reason for multimodal transport choices which is in line with the government's policy to offset transport cost, consider the benefit of choosing the available transport options like sea, road and rail to offset carbon footprint (Norwegian Ministry of Climate and Environment, 2021).

The study we conducted on ASKO revealed that food perishability results from long lead time, and consumption variability among others were some of the reasons identified as causing food waste as confirmed by Cagliano et al., (2016). ASKO has incorporated recycling and reuse philosophy in their product design stage, with the view to mitigating supply chain emissions and waste as confirmed by Burke et al., (2021). Empirical evidence revealed that ASKO is recycling waste products for reuse to mitigate GHG emissions, as product reprocessing can help abate GHG as opined by Zhang et al., (2022). Furthermore, analyzed data from ASKO revealed a collaboration between ASKO and some partnered customers to engage in recycling to reduce waste and abate GHG emission along the supply chain (Fantazy & Tipu, 2023). On the contrary, our empirical findings revealed limited availability of facilities and equipment for recycling highly complex products (Amiri et al., 2022).

Empirical findings revealed renewable energy as another strategy that ASKO is implementing to achieve net-zero emissions objectives and considers renewables as an alternative to decarbonization. ASKO believes that renewable energy sources are critical for reducing global temperature to 1.5°C and transforming to the net-zero world as confirmed by Perlaviciute et al., (2021). Again, our empirical findings revealed a collaboration between ASKO and some selected firms on renewable energy such as solar power, wind power, biofuels, hydrogen as success factors and these sources of energy were found to abate GHG emissions as confirmed by Stern and Valero, (2021). However, our empirical findings revealed performance limitations for each green energy solutions as confirmed by Tirelli and Besana (2023).

5.2. Institutional drivers and barriers that affect circularity adoption

Our empirical findings reveal the government's promotion of zero-emission technologies on light-heavy vehicles for logistics and distribution firms to mitigate greenhouse gas emissions. As a key player in the logistics and distribution industry, ASKO has adopted the government's zero-emissions technology policy directive which is aimed at promoting a net-zero transition as confirmed by Lee et al., (2017).

Our study reveals the government policy on intermodal transport and how that will play a critical role in the green agenda. The policy is driving ASKO to pursue intermodal transport as the preferred transport option to attain the stated low-carbon target in 2026. ASKO's reason for intermodal transport is to shift from road to rail or ship and reduce congestion, and huge traffic on the road which account for higher emission rates as envisioned by the Norwegian Ministry of Climate and Environment (2021). Our empirical study revealed that, ASKO's adoption of intermodal transport is meant to enhance the company's operational, and environmental performance as compared to unimodal transport and seeks to become the preferred strategy to decarbonize the freight transport as confirmed by Kaack et al., (2018).

Empirical findings revealed government's tax incentives are part of the measures to promote green shift and the purpose is to discourage firms from using fossil fuel vehicles which accounts for high greenhouse gas emissions. Tax incentives such as VAT waivers on the purchase price of electric vehicles, no annual road tax, and reduction of road tolls for electric vehicles offered by the government to firms such as ASKO incentivize firms to adopt green shift as confirmed by Haugneland et al., (2017) and Liu and Song (2017). Our empirical study further revealed that government's financial assistance to firms adopting circularity. Reduction in taxes on low-carbon vehicles, infrastructure and other incentives are an important measures to motivate firms to attain the low-carbon mission as confirmed by Qian et al., (2019).

Empirical findings on ASKO revealed that institutional support is an important factor that drives supply chain firms to adopt net-zero initiatives. According to our analyzed report on ASKO, the establishment of institutions like the Research Council of Norway, Innovation Norway, Enova, and SIVA (the Industrial Development Corporation of Norway) provide financial grants, and technical support and cooperate with investors, firms and businesses to promote green growth (Norwegian Ministry of Climate and Environment, 2021). Our findings from ASKO confirms that to promote decarbonization, an effective cross-sectoral collaboration is critical to low carbon operation implementation as opined by Chen et al., (2021).

On barriers that militate against firm's adoption of green initiatives, empirical findings on ASKO revealed that state institutions mandated to promote net-zero transition lack the ability to predict accurately on green shift initiatives. Enova, SIVA, Research Council of Norway are to champion the government's green transition agenda but are unable to accurately predict returns on green investments by companies that are into green initiatives. From the analyzed report on ASKO, green transition by logistics companies is difficult to achieve due to lack of predictability as confirmed by Cavallaro et al., (2020).

Initial capital investment in green initiatives was identified in our study as a barrier to net-zero implementation. The analyzed report on ASKO revealed that, changing from conventional fuel trucks to electric, hydrogen, and biofuel trucks requires a huge capital outlay, however, institutions like Enova, SIVA, or the Research Council of Norway are unable to provide adequate funding to companies shifting to green initiatives. The empirical finding revealed ASKO's concerns regarding the huge investment cost to venture into green initiatives and lack of access to funding could be the biggest obstacle to net-zero implementation as most organizations are not sure of the return on investment in the short to medium term as confirmed by Glemarec (2022).

An empirical finding from ASKO cited lack of infrastructural support as a net-zero emission implementation challenge. Our study revealed limited low-carbon infrastructure as some of the institutional barriers impeding net-zero emissions adoption. For example, the provision of EV charging stations for heavy-duty vehicles, hydrogen refueling stations, and biofuels to facilitate zero-emission maritime transport is limited. An analyzed report on ASKO revealed that, currently not enough zero-emission infrastructure has been deployed as compared to the number of zero-emission vehicles on the road; and the lack of infrastructure to support green transition is a major barrier as confirmed by Amiri et al., (2022). An empirical study reveals that there are challenges in adopting nascent technologies when a company like ASKO is transitioning to circularity. For example, lack of exposure to new technologies, lack of personnel to manage new technologies and equipment as well as delays in technical support impedes firms green transitional efforts as opined by Singh et al., (2022).

5.3. opportunities for supply chain collaboration in adopting circularity

There are immense benefits for companies to engage in collaborative strategies along circular supply chain management, and many organizations are going to apply their collaborative strategies to enhance their green performance (Sudusinghe & Seuring, 2022). Evidence from our empirical findings revealed collaborative strategies by ASKO with selected partners in green technologies, waste management and recycling. ASKO and other partners are employing lean tools and techniques in the industry to reduce waste and improve operational efficiencies in low carbon operations as confirmed by Ball and Lunt (2020). Empirical studies revealed that food waste and recycling are an integral part of ASKO's net-zero initiative. ASKO's food waste management strategy is part of the overall effort to alleviate hunger as confirmed by Bibra et al., (2022). A partnership involving ASKO, and some companies is providing cheaper prices of left-over food and groceries at chain stores for customers through online apps. This collaboration has been significantly successful in controlling food waste and reducing greenhouse gas emissions. ASKO is integrating end-of-product philosophy as fundamental measures to possibly reduce waste and supply chain emissions as confirmed by Burke et al., (2021).

Empirical studies revealed intermodal transport as one of ASKO's collaborative strategies to achieve decarbonization. ASKO has partnered with some selected companies to transport goods via rail and sea. ASKO says that, the implementation of intermodal freight transport is a better option for the environment than choosing a single mode of transport, and has been recommended as the best ways to minimize GHGs emissions in freight transport as confirmed by Kaack et al., (2018). Furthermore, our empirical findings revealed the reasons for ASKO's collaborative strategy which is to remain competitive in the transport sector, and make the company more flexible and favor multimodal choices such as a combination of road, sea, rail, and air as confirmed by Mutlu et al., (2017).

5.4. Looking at the empirical findings through institutional theory perspective

ASKO aims to be climate-neutral by 2026, and it is necessary that government and its affiliate agencies implement GHGs mitigation policies and specific regulations to motivate the industry to implement low-carbon operations in their organizations as confirmed by Bush et al., (2017). From the literature review, it is known that the implementation of circular supply chain can lead organizations to realize sustainability objectives, ensuring business sustainability, competitiveness, and social legitimacy as well as improving the ecological well-being of the planet. From our empirical findings it is evident that companies are driven by institutional forces (drivers) to pursue a sustainability path. Our research findings have identified isomorphic pressures or drivers such as government policies, policies of institutional/ professional bodies, and peer pressure within an industry that shapes net-zero adoption. We can link achieving circularity and net-zero from the perspective of ASKO from institutional theory.

Institutional theory states that firms behavior are shaped by the influence of stakeholders as opined by DiMaggio and Powell (1983). Three isomorphic pressures have been identified. Coercive pressures, which deals with the power of governments, big entities, and foundations.

Mimetic pressures deal with how companies copy, or mime, other firms' strategies to stay in competition because of uncertainty in competition. The third isomorphic pressure is called normative which deals with social expectations through the process of professionalization to create "a pool of almost interchangeable individuals". (DiMaggio & Powell, 1983). When examining firm's adoption of circular supply chain activities, institutional theory is usually employed (Sarkis et al., 2011; Touboulic & Walker, 2015); and in the context of circular supply chain, institutional theory explains how sustainable practices are key to achieving circularity as stated by Farooque et al., (2019).

On government policies, our empirical findings revealed the government's ambitious plans to attain net-zero objectives by 2030 and this is pressuring companies like ASKO to adopt a sustainability path. As a result, there is a reduction in taxes for companies that use green vehicles and an increase in taxes on conventional vehicles. Furthermore, government policy on the adoption of intermodal transport on logistics companies like ASKO to adopt intermodal transport as the preferred option to offset greenhouse gas emissions. The above-mentioned policies by the government have exerted pressure on ASKO to adopt green initiatives. In institutional theory, this is called coercive isomorphic pressure. Regulatory pressures on companies have contributed immensely in mitigating climate change (Lewandowski, 2017).

Empirical findings revealed that institutional and professional bodies like Enova, SIVA, Innovation Norway, Research Council of Norway regulates and support the advancement of green initiatives. These bodies exert pressure on firms like ASKO to conform to acceptable emission rules, regulations, and norms. Institutional theory says that this is called normative isomorphic pressure. Pressures from professional entities or bodies directs the kind of activities deemed 'normal' for various organizations (Zhang et al., 2022).

Empirical findings revealed fierce competition in the logistics and distribution industry in Norway. The competition is because of the increasing adoption of green or sustainable initiatives in the industry. ASKO is faced with pressure from peers within the industry to speed up its green transition effort. In institutional theory, this is known as mimetic isomorphic pressure. Research has shown that peer pressure regulates firms opinions and behaviors that operates in the same industry for competitive reasons as confirmed by Klassen & Vachon (2003), and in GHG mitigation perspective, companies might be worried that its inactions to green initiatives will give a competitive edge to its rivals to capture the market (Zhang et al., 2022).

5.5. Looking at the empirical findings through relational-view theory perspective

Companies embark on collaboration with other companies for a number of reasons; to learn from partner's know-how in CO_2 improvement strategies, to enhance firm's own image by assisting inexperienced partner to lower carbon footprint, or to engage in mutual collaboration because their joint expertise will yield positive results (Theißen et al., 2014). It is evident from the literature that CO_2 mitigation can be best managed through supply chain partnerships and collaborations. Relational-view theory says that longer term organizational advantages is achieved through inter-firms relationships or a combined assets use (Dyer and Sinh, 1998). Dyer and Sing (1998) outlines four main drivers of "relational rents" resulting from collaborations. These are knowledge-sharing routines, complementary resources and capabilities, relation-specific assets, and effective governance. We have identified drivers relating to ASKO's collaborative strategies with partner organizations to achieve net-zero emissions targets. Therefore, we can link achieving circularity and net-zero from the lenses of ASKO from a relational-view theory.

Empirical findings revealed that ASKO has combined resources with partner firms to move goods from road to rail with a view to cutting costs and mitigating GHG emissions. ASKO and its partners share assets that others lack and combine to achieve a net-zero emission target. In relational-view theory, this is called relation-specific assets. ASKO and its partners have combined their expertise and technical know-how in creative ways and investing in relation-specific resources, with the aim to achieving productivity increases in their supply chain activities as confirmed by Dyer and Singh (1998).

Empirical findings also revealed that ASKO has collaborated with partner firms on sharing knowledge, business models, and processes regarding the implementation of circular supply chain to achieve GHG emissions targets by the year 2026. In relational-view theory, this is known as knowledge-sharing routines. As opined Dyer and Singh (1998) knowledge-sharing routines comprise the networking that allows the creation and transfer of knowledge sharing and technological know-how among firms. An offshore wind power project between ASKO and its partner will provide renewable energy that will limit greenhouse gas emissions. ASKO provides knowledge of logistics and technical support while the other partners provide technological support. The aim is to limit GHG emissions through renewable energy. In relational-view theory, this is called complementary resources and capabilities. Identifying and adopting inter-firms knowledge, experiences, capabilities are the prerequisite for effective relationships (Teece, 2020).

Again, empirical evidence suggests that ASKO has entered into several collaborative agreements with partner organizations with a view to achieving greater economic and net-zero emission targets by the year 2026. This could be attributed to effective organizational governance and success stories. In relation-view theory, this is called effective governance. Effective open innovation requires that collaborations be designed so that information can flow freely and flexibly toward the areas where it adds the most value (Teece 2020). Our empirical findings revealed a combination of collaborative strategies such as relational-specific assets, knowledge-sharing routines, complementary resources and capabilities and effective governance was adopted by ASKO with industry partners to improve its competitiveness. In relational-view theory, this combined resource is called relational-rent.

5.6. Summary of the analysis of the empirical findings

Here, we summarize the findings regarding achieving net-zero in supply chain through institutional drivers and barriers of ASKO AS. Net-zero creates superior supply chain performance, increases organizational profitability, mitigates supply chain emissions footprint, and improves the well-being of society. As supply chain firms strive to achieve net-zero emission targets, there are driving forces such as government policies, pressures from institutional and professional bodies as well as competition within the industry that affect net-zero implementation. Logistics and distribution firms like ASKO also face barriers such as lack of ability to predict accurately on returns on green investments, limited low-carbon infrastructure, tax burden and lack of exposure to nascent knowledge in the implementation of net-zero emission targets. The institutional environment exerts pressures on organizations like ASKO to conform to rules, regulations, and laws to adopt sustainability practices. Firms complies with institutional pressures to reduce their carbon emission footprint in order to save their image, reputation, recognition and also to improve firms efficiency as confirmed by DiMaggio and Powell (1983) and Haque and Ntim (2022).

A firm's collaborations or relationships also play a critical role in shaping a firm's quest to achieve net-zero emission target. A study by Fantazy and Tipu (2023) confirms that, inter-firm alliance in green supply chain initiatives are critical in recognizing and delivering green performance along the supply chain.

The research model (Figure 6) highlights ASKO's measures to achieving net-zero in supply chain.

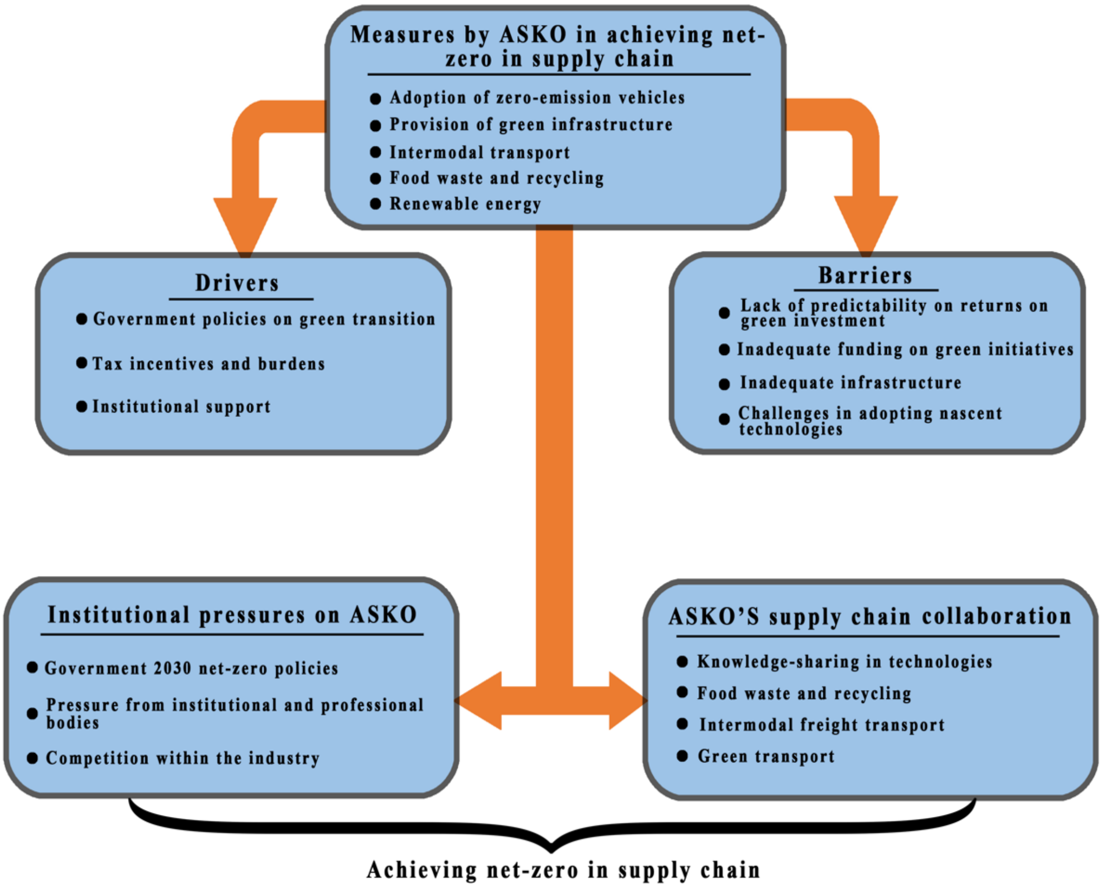


Figure 6: ASKO's measures to achieving net-zero in supply chain

6. Conclusion

The research question focused on how the adoption of circular supply chain could lead to the achievement of net-zero by Asko considering the institutional drivers and barriers that affect firms' operations. We have analyzed circularity adoption and implementation in supply chain and came up with the answer, that circular supply chain could be linked to the achievement of net-zero and has the potential to create a sustainable future. To make this study possible, we relied on the results from previous research on circular supply chain, circular economy, net-zero economy, supply chain collaboration, the Norwegian government's green action plan and transport policies, and other sustainability-related materials to understand the linkages between ASKO's operational ambitions and net-zero implementation. We presented our findings through literature reviews, content analysis, institutional and relational-view theories perspectives. ASKO can realize net-zero ambition if the company considers the adoption of zero-emission vehicles, green infrastructure, intermodal transport, renewables, waste management, and recycling as important measures to reach its 2026 carbon-neutral target. It was evident from the study that net-zero implementation needs to be guided by institutional, regulatory mechanisms and collaborative strategies with supply chain partners. Despite the adherence to regulatory rules, institutional support, and collaborative partnership in the implementation of circularity by ASKO, our empirical findings pointed lack of predictability on green investment, inadequate funding, inadequate infrastructure, and challenges in adopting nascent technologies as factors hindering ASKO's net-zero ambitions.

Furthermore, through the perspectives of institutional theory, we could connect the institutional drivers and barriers as part of the factors influencing ASKO's net-zero adoption and implementation decisions. It is therefore critical for companies to understand the isomorphic pressures exerted by institutions, as they intend to adapt to circularity implementation. Also, the relational-view theory emphasizes the competitive advantage that distribution companies gain resulting from collaboration. Due to lack of organization-specific assets, ASKO embarks on partnerships to gain a competitive advantage to achieve net-zero objectives. Its therefore important for companies to engage in collaborative strategies in supply chain operations to realize the vision to attain net-zero targets.

6.1. Contribution of circularity toward the achievement of net-zero in supply chain

Empirical findings show the implementation of circularity measures such as intermodal transport, waste management and recycling, the provision of green infrastructure, zero-emission vehicles, and green transport holds the potential for supply chain firms to achieve net-zero.

Supply chain firms should consider net-zero adoption as a critical success factor to decarbonization as manifested in ASKO's 2026 climate neutrality target.

It is evident from our empirical study that the adoption of intermodal transport in supply chain operations enhances firms' efficiency and effectiveness in its operations as compared to unimodal transport. When a company makes intermodal choices the benefits that it derives from that decision are reduced cost due to bulk transportation, decrease congestion on the road, enhanced operational flexibility of movement of goods, improvement in firms' operational performance as well as a reduction in GHG emissions.

Document analysis indicated that waste management and recycling help firms to reuse materials to save virgin materials from exploitation, reduces firms operational cost since recycled product are either manufactured or semi-manufactured product which make conversion process less costly. Recycling materials can easily be repurposed to other products at less cost which conserves energy and a strategy to reduce greenhouse gas emissions.

Evidence from our empirical analysis indicates that the adoption of zero-emission vehicles contributes to a reduced operational cost of supply chain companies, improvement in the eco-system due to emission free vehicle use in distribution operations. Also, zero-emission vehicles produce less noise on the environment as compared to conventional vehicles.

Evidence from our study confirms that green infrastructure plays a significant role in reducing greenhouse gas emissions. The availability of green infrastructure and technologies makes it easier for companies to adapt to green transition because of accessibility. For example, the provision of electric charging systems has the potential to encourage the use of electric vehicles over conventional vehicles; and green infrastructures were identified as an important success factor for logistics companies to transition to net-zero. It is evident from our empirical study that the deployment of green infrastructure and green technologies have contributed to a reduction of greenhouse gas emissions.

6.2. Recommendations of the study

We could deduce certain implications from the study to provide suggestions to the government, distribution, and supply chain firms, as well as stakeholders that are into circular initiatives. These suggestions could help the above-mentioned stakeholders to achieve net-zero in the supply chain.

The government should consider the adoption of circularity as a means towards achieving greenhouse gas emissions target by 2030. The government through the Ministry of Climate and Environment could provide adequate financial, technological, and technical support to companies and entities that are into circular initiatives to enhance the realization of net-zero target. For example, our empirical findings show that intermodal complementarity, integration, and choices helps firms to reduce GHG emissions. It is therefore crucial for the government to facilitate intermodal integration through funding to make net-zero implementation work successfully. The government should create an enabling environment to encourage and promote inter-firms' collaborations on circular supply chain and net-zero implementation. Evidence from the literature and our empirical findings shows that this will help inter-firms resource exchange and further speed up net-zero implementation process. Furthermore, the government should focus more on building green infrastructures to make it accessible to companies that lack the financial and technical capabilities to implement circular initiatives. Lastly, the government should continuously educate and sensitize firms, organizations, and customers about the need for net-zero implantation as it is evident from the literature review and our empirical findings.

Stakeholders such as Innovation Norway, Enova, and SIVA (the Industrial Development the Corporation of Norway) are responsible for promoting green growth. However, inadequate technical, infrastructural, and financial support affects companies that are into circular initiatives. Adequate support from these governmental institutions will aid a company like ASKO in its green transitional effort. Furthermore, insufficient exposure to nascent technologies, lack of personnel and delays in technical support hamper a company like ASKO in its green transitional effort. Stakeholders who are tasked to promote the government's green transition drive should endeavor to provide adequate financial and technical support for companies that are into green shift.

Distribution and logistics companies like ASKO should adopt efficient and effective technological ways of handling waste to achieve circularity. Source separation and segregation of waste for recycling will enhance value creation and the company's chances to achieve a net-zero target as envisaged their sustainability and net-zero policy documents. Furthermore, it's evident from our empirical findings that collaborative strategies with partner firms on waste management and recycling make firms more competitive and enhance the abatement of GHG emissions faster than one company going it alone. That is, collaboration in renewable energy was seen in the study as an effective way to decarbonization. It is therefore imperative that collaborations and partnerships in the green shift are encouraged at the inter-firm level, stakeholders' level, and by the government. The deployment of lean technologies and lean tools was identified as an important measure of decarbonization. Companies like ASKO should be helped by the government, institutional regulators, and stakeholders to encourage firms to use technologies and lean tools to enhance the decarbonization process.

Customer sensitization on green transition is crucial for firm's successful implementation of net-zero target. ASKO's collaboration with customers on packaging materials is an effective circular implementation drive toward net-zero target. Customers return source-sorted materials to ASKO's distribution vehicles for reuse, save cost of materials and help ASKO to realize net-zero emissions target. It's therefore crucial for companies to engage with a larger public in green transition through sensitization on low-carbon issues to save the planet.

6.3. Limitations of the thesis

There is a lack of relevant studies in the field of circular supply chain especially when connected with institutional drivers and barriers that affect a distribution company like ASKO. As a result, securing enough information and literature for the research was a challenge but owing to our interest and lack of research in the area, we pursued the study. Another limitation we encountered was with ASKO, we exchanged emails to conduct an online interview for the thesis but unfortunately, we were informed by the company that they could no longer offer us an interview opportunity. We thought of abandoning the research in the study area but looking at the relevance of the topic, we resulted in content analysis which provided enough online materials and information to conduct the research.

Despite the limitations, we believe that we have highlighted some very important issues relating to the adoption of circularity for the implementation of net-zero in the supply chain. Again, we believe that the research has generated critical areas that are of vital importance to the study of circular supply chain in relation to net-zero emission target by organizations.

6.4. Reliability of the study

To ensure the validity of our research, we followed all ethical research procedures. We duly notified the NSD and obtained permission to proceed with the research. Additionally, we ensured that all materials sourced from external sources were properly cited and duly acknowledged. The study was conducted in good faith, free from personal biases and conflict of interest. Empirical findings were obtained from reliable sources, and information was thoroughly cross-checked for accuracy. While our original plan of conducting interviews did not come to fruition, it had no impact on the dependability or excellence of our study. Our decision to utilize secondary data was carefully considered, assessing the existing data. We discovered that the available data was sufficient to provide us with the necessary information to address our research question without compromising the quality.

6.5. Suggestions for further research

Further studies about achieving circularity in supply chain, institutional drivers and barriers of a company should consider the following recommendations.

Our study primarily utilized content analysis as the main method of data collection used in answering research questions. However, we recommend that further research should consider using interviews as the data collection method. This would help us to understand the similarities and differences between the two methods.

Furthermore, since our study was conducted using a qualitative research approach, further research should consider using quantitative approach. This would help us to test the result of the qualitative study. It would be prudent if different logistic company is used as the main case area for the student to understand the difference in the logistics and distribution companies when it comes to achieving circularity in supply chain and how different companies reach the institutional drivers and barriers. It would be highly beneficial if the feature research team could explore the practices of companies outside the logistics industry. This will allow us to gain insight into how other sectors are achieving circularity and meeting their net-zero targets.

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Appendix

Assessment of processing of personal data

Reference number	**Assessment type**	**Date**
632592	Automatic	08.03.2023

Title Institution responsible for the project leader Student Project period Legal basis

Achieving circularity and net zero in supply chain: institutional drivers and barriers of ASKO AS

Nord University / Business School / Market, organization and management

Rannveig Edda Hjaltadottir

KUGBLENU ABEDNEGO & HLARY YENG

12.01.2023 - 16.05.2023

Categories of personal data

- General

- Consent (General Data Protection Regulation art. 6 no. 1 a)

The processing of personal data is lawful, so long as it is carried out as stated in the notification form. The legal basis is valid until 16.05.2023.

Notification Form

Basis for automatic assessment The notification form has received an automatic assessment . This means that the assessment has been automatically generated based on the information registered in the notification form. Only processing of personal data with low risk for data subjects receive an automatic assessment. Key criteria are:

- Data subjects are over the age of 15
- Processing does not include special categories of personal data;
  - Racial or ethnic origin
  - Political, religious or philosophical beliefs
  - Trade union membership
  - Genetic data
  - Biometric data to uniquely identify an individual
  - Health data
  - Sex life or sexual orientation

- Processing does not include personal data about criminal convictions and offences
- Personal data shall not be processed outside the EU/EEA, and no one located outside the EU/EEA shall have access to the personal data
- Data subjects will receive information in advance about the processing of their personal data.

Information provided to data subjects (samples) must include

- The identity and contact details of the data controller
- Contact details of the data protection officer (if relevant)
- The purpose for processing personal data
- The scientific purpose of the project
- The legal basis for processing personal data
- What type of personal data will be processed and how it will be collected, or from where it will be obtained
- Who will have access to the personal data (categories of recipients)
- How long the personal data will be processed
- The right to withdraw consent and other rights

We recommend using our template for the information letter.

Information security You must process the personal data in accordance with the storage guide and information security
guidelines of the data controller. The institution is responsible for ensuring that the conditions of Article 5(1)(d) accuracy and 5(1)(f) integrity and confidentiality, as well as Article 32 security, are met.