THESISES OF THE DOCTORAL (PhD) DISSERTATION

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

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1. INTRODUCTION OF THE TOPICS AND OBJECTIVE

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

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

FIGURE 1. ***LINEAR ECONOMY VS. CIRCULAR ECONOMY.***
SOURCE: GRIGORYAN & BORODAVKINA (2017).

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

AL., 2017). Subsequently, this approach will help extend the product lifecycle in a way that reduces the pressure on the environment and increases competitiveness, innovation, and profit. CE and CSCM are two notions that have sparked several arguments in the recent decade. The growing integration of CE into the SCM, on the other hand, illustrates a developing area where they have explicit interactions. Furthermore, the drivers and the barriers to implementing the circular economy into the supply chain management system are unclear. As a result, the study's goal was to look at these drivers and challenges.

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

The primary objectives of this research are as follows:

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

By addressing these objectives, the study aims to identify the many drivers and barriers to CSCM implementation and provide appropriate methods for mitigating challenges and leveraging drivers for better and more effective CSCM adoption. This study will also look into the governance and environmental aspects of incorporating CE principles into supply

chain management, as well as the interaction between various drivers and barriers to CSCM implementation. In summary, this study aims to provide complete insights into the factors impacting CSCM practices in the Jordanian FMCG industry. The findings are intended to assist policymakers, industry stakeholders, and businesses in their attempts to transition to more sustainable and circular supply chains, ultimately adding to the larger knowledge base on sustainable supply chain management.

2. MATERIALS AND METHODS

2.1. Introduction

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

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

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

stop overview, (2) recognise gaps in knowledge, (3) derive fresh thoughts for research, and (4) place their intended contributions to science (DONTHU ET AL., 2021).

Bibliometrics as a methodology originally belonged to library science which involves a large volume of bibliographic materials but has found applications in different fields of study (BROADUS, 1987). Early discussions on bibliometrics began in the 1950s, implying that the bibliometric technique is not novel (WALLIN, 2005). However, the expansion of bibliometrics in the domains of "business, management, and accounting," "economics, econometrics, and finance," and "social sciences" on Scopus using "bibliom*" as a keyword in the "article title, abstract, and keywords" is relatively new. It has also gained attention from various areas of management and has become more popular in business research in recent years (HOTA ET AL., 2020). Its popularity can be traced back to (1) the Improvement, availability, and accessibility of bibliometric tools like Gephi, Leximancer, and VOSviewer, as well as scientific databases like Scopus and Web of Science, and (2) the bibliometric methodology's cross-disciplinary pollination from information science to business research (DONTHU ET AL., 2021). This technique helps provide a macroscopic perspective of enormous quantities of academic literature. The features and evolution of scientific output within a certain field of inquiry may be traced using a quantitative analysis of information on the publication history (JIA ET AL., 2014), (LI & HALE, 2016). Bibliometric analysis is frequently used in conjunction with network visualisation tools, which can range from totally graphical user interface-based software like VOSviewer (VAN ECK & WALTMAN, 2010) to command-based software such as the Bibliometrix package in R (ARIA & CUCCURULLO, 2017).

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

2.2. Research Design

Answering the research question and testing the hypothesis is the main purpose of every research. The research design is the plan or the path to answer the research question with the influence of available knowledge in the research area CRESWELL & CRESWELL, 2017). According to Leavy, P. (2017), five major research approaches may overlap or differentiate, these approaches: quantitative, qualitative, mixed methods, arts-based research, and community-based participatory research (LEAVY, 2017). Quantitative research is known to be experimental, semi-experimental, correlational, or descriptive (HOLTON & BURNETT, 2005). According to Gerrish and Lacey (2010), quantitative research is "the broad term used to denote research designs and methods that yield numerical data " (GERRISH & LACEY, 2010). Compared to qualitative research, quantitative research employs standard research designs in which the goal is to describe, explain, and forecast phenomena, as well as probability sampling and larger sample sizes (COOPER ET AL., 2006). Quantitative research is based on deductive reasoning or deduction and employs a wide range of quantitative analytic techniques, ranging from the simple descriptive analysis of the variables to advanced statistical modelling to demonstrate statistical correlations between variables (BOUGIE & SEKARAN, 2019), (SAUNDERS ET AL., 2009). Furthermore, Bibliometrics is a quantitative analytic approach that uses scientific literature's exterior properties as study objects (WANG ET AL., 2020). It is useful for anticipating future trends in fields, and it is commonly used to assess the state of research, frontier directions, and development patterns in various disciplines (KOSKINEN ET AL., 2008).

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

2.3. Data Collection Strategy

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

Search String 1- Drivers:

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

Search String 2- Barriers:

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

The first search string is related to the drivers and enablers of the CSCM, and it was divided into two blocks. The first part aims to search for terms linked to CSCM in the title since authors only want to look at documents that are directly connected to the issue. The second part of the string aims to find the terms “drivers”, “enablers” or “opportunities” in the title,

abstract, and keywords. Applying this search strategy to Scopus database has resulted in retrieving 580 documents. In turn, to construct the second search string, two blocks of terms were produced. The first was designed to bring terms related to CLSC, while the second was designed to retrieve documents with terms "barriers", "challenges" or "obstacles" in the title, abstract, or keywords. This search string has resulted in retrieving 636 documents from Scopus database.

In the second stage, a questionnaire was designed for 25 measures, identified from the literature review. The questionnaire was designed in English and Arabic, as it is the most common language used in Jordan. It took approximately 15-20 minutes to complete a questionnaire for an individual participant. The final questionnaire consisted of five parts: (i) demographic questions. (ii) job-related questions. (iii) questions about the 12 drivers of the CSCM were based on the question “Rate your level of agreement with each statement”. Furthermore, each question was assessed on a 5-point scale of ‘strongly agree’ (1) to ‘strongly disagree’ (5). (iv) questions about the 13 barriers of the CSCM, and they were based on the question “Rate your level of agreement with each statement”. Similar to the drivers section, the question was assessed on a 5-point scale of ‘strongly agree’ (1) to ‘strongly disagree’ (5). (v) The last part includes an additional question to ask for other drivers and barriers of the CSCM that were not mentioned in the questionnaire which was based on the question “Are there any other drivers and/or challenges related to sustainability in the FMCG chain that was not mentioned above and that you believe are still relevant? Please describe it below (this question is optional). After the finalisation of the questionnaire structure, it was distributed to the participants.

2.4. Questionnaire distribution

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

Utilisation of Google Forms:

Google Forms emerged as the primary tool for the distribution of the questionnaire in Jordan. The questionnaire was initially developed in English, but it faced a limited response

rate due to the linguistic diversity in Jordan and the prevalence of Arabic, broadening its reach; a decision was made to convert the questionnaire into Arabic.

Engagement with big firms

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

Persistence in pursuit of responses

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

Outcome

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

2.5. Data Analysis Methods

2.5.1. Pilot Test

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

2.5.2. Exploratory Factor Analysis

In this study, exploratory factor analysis (EFA) is employed. The goal of employing FA is to represent the potential covariance connection between observed variables in terms of a few unobservable random variables known as the factors. In other words, this approach examines the interrelationships between an enormous number of indicators to determine

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

2.5.3. Structural Equation Modelling (SEM)

SEM is a powerful, multivariate technique that can deal with a high number of endogenous and exogenous factors, as well as latent (unobservable) variables expressed as linear combinations (weighted averages) of observed variables. Lei and Wu (2007) describe SEM as a flexible statistical modelling method. It is used to determine the complex links between

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

Model specification

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

Measurement model development

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

Model identification

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

Path model specification

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

Model Estimation

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

Model modification

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

Model Assessment

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

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

2.5.4. Data Analysis Process

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

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

The following analysis was conducted using confirmatory factor analysis (CFA). CFA is a statistical technique to test a specific hypothesis about the relationships between observed variables and underlying latent constructs. It is used to verify whether a pre-determined factor structure fits the data. The fitness indices of interest included Chi-square goodness-of-fit, RMSEA, CFI, TLI, IFI, etc.

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

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

2.6. Presentation of Hypotheses

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

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

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

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

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

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

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

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

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

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

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

3. MAIN FINDINGS OF THE DISSERTATION

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

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

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

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

Internal factors:

Key Drivers:

1. **Employee involvement:** Employee engagement is a crucial driver for the successful deployment of CSCM processes. Engaging employees in sustainability activities develops an environmentally responsible culture within the organisation.

Encouraging employee participation in sustainability initiatives can result in new ideas, enhanced commitment to CSCM objectives, and better execution of sustainable practices.

2. **Long-term sustainability investments:** Prioritising long-term sustainability investments over short-term economic incentives is an important driver of CSCM adoption. Companies that prioritise the long-term benefits of sustainability are more likely to adopt CSCM strategies, despite the absence of immediate financial gains. Investing in sustainability for long-term benefits can boost operational efficiency, reduce resource reliance, and increase resilience to environmental challenges. This strategic approach promotes long-term growth and ensures organisations' competitiveness and viability.
3. **Incentives for overcoming barriers:** The appearance of barriers, such as low customer awareness and a lack of experienced personnel can encourage businesses to invest in CSCM initiatives to address these issues. Despite being cited as a barrier in the literature, the analysis found that poor customer awareness had a positive correlation with CSCM implementation. This shows that a lack of customer awareness may prompt businesses to enhance their sustainability policies to educate and attract environmentally sensitive customers. Similarly, the analysis found a positive correlation between the lack of skilled personnel and training programs and CSCM implementation. This suggests that businesses may be more encouraged to invest in sustainability initiatives and training programs to close the skills gap, thereby improving their overall sustainability performance.

Key Barriers:

1. **Traditional Organisational Culture:** Traditional organisational culture can greatly hamper the adoption of CSCM methods. Common difficulties include resistance to change, a lack of commitment from leaders, and a concentration on short-term financial performance. These cultural barriers impede the acceptance of new sustainability practices and the implementation of circular supply chain operations. Overcoming this demands strong leadership, regular training, and a long-term strategic view to develop an innovative and sustainable culture.

2. **Lack of information systems/Information sharing:** The lack of effective information systems and poor information sharing considerably impede the implementation of CSCM methods. Tracking, monitoring, and optimising circular supply chain operations is difficult without reliable data management and communication tools. Investing in modern information technologies and encouraging a culture of information sharing is critical for improving transparency, collaboration, and efficiency in sustainable supply chain management.
3. **Communication and Collaboration gaps:** Communication and collaboration gaps among supply chain stakeholders are significant barriers to implementing CSCM methods. These gaps can result in misconceptions, inefficiencies, and a lack of alignment with sustainability goals. Improving communication channels and cultivating collaborative connections are critical to the effective implementation of circular supply chain processes. Building trust, guaranteeing clear and consistent communication, and supporting collaborative problem-solving initiatives should be the primary objectives.

External factors:

Key Drivers:

1. **Social Responsibility (CSR):** Corporate Social Responsibility (CSR) is critical to pushing the adoption of CSCM practices. FMCG firms are increasingly recognising the significance of incorporating sustainability into their business models to achieve their social obligations. Emphasising CSR can encourage businesses to embrace sustainable practices since they align with their goals of positively contributing to society and the environment. Companies that incorporate CSR into their core values can improve their brand, increase consumer trust, and gain a competitive advantage.
2. **Brand Image:** The desire to improve brand image is a significant driver for implementing CSCM practices. Companies seek to differentiate themselves in a competitive market by demonstrating their commitment to sustainability. Improving brand image through sustainable practices can boost customer loyalty and attract environmentally aware consumers. This not only helps to create a positive public

image but also promotes long-term economic success by harmonising with consumer values and expectations.

3. **Cooperation with suppliers:** Strong supplier cooperation is essential for successful CSCM implementation. Effective partnership with suppliers ensures that sustainable practices are seamlessly integrated across the whole supply chain. Building solid partnerships with suppliers can help to promote the use of sustainable products, improve waste management practices, and increase overall supply chain efficiency. Collaboration with suppliers enables FMCG firms to solve sustainability concerns more efficiently and meet their CSCM objectives.

Key Barriers:

1. Severe Environmental Regulations: Strict and complex environmental laws might be a substantial barrier to the implementation of CSCM methods. Companies may have difficulty complying with these requirements due to high expenses and operational issues. While environmental regulations are necessary to ensure sustainability, overly rigorous requirements can overwhelm businesses, particularly in developing countries such as Jordan. Policymakers should strive to strike a balance between regulatory expectations and support measures that assist businesses in seamlessly transitioning to sustainable practices while maintaining operational viability.
2. **Poor facilities and transportation infrastructure:** Inadequate facilities and transport infrastructure greatly hinder the implementation of CSCM methods. The lack of appropriate infrastructure makes it difficult for businesses to implement and integrate sustainable supply chain processes. The development of resilient facilities and transport networks is crucial for the proper implementation of CSCM principles. Infrastructure investments can help to streamline the flow of commodities, improve resource management, and reduce environmental effects. Policymakers, industry stakeholders, and investors must prioritise infrastructure development to help FMCG firms achieve their sustainability goals.

3.1. Theoretical Implications

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

Integration of CSR and Sustainability Theories

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

Brand Image and Competitive Advantage

The emphasis on brand image as a driver for CSCM implementation lends support to the theoretical claim that sustainability might provide a competitive advantage. By tying brand image improvements to sustainable practices, the study adds to the literature on brand management and sustainability, demonstrating that organisations can differentiate themselves in the market by their dedication to environmental stewardship.

Collaboration and Network Theory

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

Employee Engagement and Organisational Behaviour

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

Long-term vs. Short-term Perspectives

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

Training and Skill Development

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

Regulatory and Institutional Theory

The presence of strict environmental regulations lends weight to regulatory and institutional theories that underscore the significance of external barriers in affecting organisational behaviour. This implies that while regulations are required to ensure compliance with environmental standards, they must be balanced with supportive measures to encourage CSCM implementation. This study implies that rather than serving as simple motivators for CSCM, strict environmental rules may pose major challenges. The complexities and potential contradictions within regulatory frameworks might limit efficient CSCM implementation, forcing businesses to manage compliance costs and regulatory uncertainty. These findings highlight the importance of a balanced regulatory strategy that promotes sustainability while also facilitating practical implementation within the business. This viewpoint adds depth to the current literature by emphasising the dual role of environmental legislation as both drivers and barriers to sustainable activity. Addressing these regulatory issues through better policy direction and increased compliance support can help Jordan and other developing countries utilise CSCM more effectively.

Infrastructure and Resource Dependency Theory

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

Organisational Culture and Change Management

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

Information Systems and Technology Adoption

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

Communication and Collaboration

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

4. NEW AND NOVEL RESULTS OF THE DISSERTATION

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

4.1. Expanding the Role of CSR in Emerging Market Supply Chains

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

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

By framing CSR as a culturally aligned strategic enabler rather than a secondary business obligation, this research expands current supply chain literature and offers a transferable model for other economies where religious and cultural values shape business ethics. It challenges the Western-centric view of CSR adoption and demonstrates that in transitional economies, particularly those with strong communal values and religious influences, CSR can serve as a ***foundational pillar*** for driving circular supply chain transformations.

4.2. Reconceptualising Barriers as Potential Enablers

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

4.3. Insights into Regulatory Challenges Unique to Developing Countries

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

The results show that compliance burdens, regulatory volatility, and the lack of fiscal incentives limit firms' ability to engage with CSCM meaningfully. For instance, only 14% of FMCG firms in Jordan can afford compliance costs, and evolving standards in areas like packaging and water reuse create significant implementation uncertainty. These dynamics reflect a broader paradox: while regulations intend to enforce sustainability, in contexts of limited institutional capacity, they may deter it. However, it is important to note that these findings are context-specific. Jordan's regulatory landscape, institutional structure, and economic constraints shape how regulations impact CSCM adoption. While similar

challenges have been noted in other developing contexts, we caution against overgeneralisation. Even countries with comparable regulatory environments may experience different outcomes due to variations in enforcement capacity, industrial maturity, or public-private coordination.

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

4.4. The Influence of Cultural Resistance on Organizational Change

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

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

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

A key practical takeaway is the need for a hybrid policy model that balances regulatory enforcement with enabling mechanisms such as fiscal incentives, capacity-building initiatives, and phased implementation timelines. This approach may empower firms to

pursue circularity without jeopardising operational viability, which is a particularly relevant concern in resource-constrained settings.

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

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

4.6. Theoretical Contributions and Directions for Future Research

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

5. PRACTICAL APPLICABILITY OF THE RESULTS

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

For Policymakers:

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

For Industry Leaders:

1. Technological Innovation**:**
    - Action: Invest in innovative technologies and digital platforms that enable CSCM activities. This includes automation, data analytics, and IoT solutions to improve supply chain visibility and efficiency.

- Impact: Impact: Technological developments will streamline processes, eliminate waste, and enhance resource utilisation, resulting in more sustainable and resilient supply chains.

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

For Supply chain partners and collaborators:

1. Strategic Partnerships:
    - Action: Establish and foster partnerships with suppliers, customers, and other stakeholders to share CSCM resources, knowledge, and best practices. Collaborative initiatives should prioritise cooperative problem-solving and sustainable innovation.
    - Impact: Effective collaboration will allow for shared solutions to common barriers, resulting in more coherent and sustainable supply chain operations throughout the industry.
2. Training and Capacity Building:

- Action: Invest in training programs and capacity-building activities for employees and supply chain partners to help them better understand and apply CSCM processes.
- Impact: A well-trained staff and knowledgeable supply chain partners are more suited to execute and sustain CSCM processes, resulting in enhanced performance and sustainability outcomes.

For Researchers and Academics:

1. **Continued research:**
    - Action: Conduct further research to investigate the contextual elements that influence CSCM adoption in various areas and sectors. Examine the long-term effects of CSCM techniques on economic and environmental outcomes.
    - Impact: Ongoing research will provide deeper insights and evidence-based recommendations to help with continual development and greater adoption of CSCM techniques.
2. **Knowledge spreading:**
    - Action: Share research findings with industry practitioners and policymakers via publications, conferences, and collaborative projects. Convert academic information into useful recommendations and toolkits for industrial use.
    - Impact: Bridging the gap between research and practice will ensure that the most recent insights and developments in CSCM are available and actionable to those working in the area.

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

6. LIST OF PUBLICATIONS RELATED TO THE DISSERTATION

Articles, studies

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

Conference, presentations

1. "From gifted people to young researchers" - Activities supporting the academic career at the University of Debrecen, Hungary.
2. International Scientific Conference of Economics, Management, Finance (EMF 2022) New trends and challenges for Academics and Entrepreneurs, Zlin, Czech Republic.

List of other publications

1. Khalid, U., Mustafa, O. M. A., Naeem, M. A., Alkhateeb, M. Y. M., & Awad, B. M. A. E. (2020). Direct optimisation of an automotive sheet metal part using ANSYS. International Journal of Engineering and Management Sciences, 5(3), 134-142.

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Subject: PhD Publication List

Candidate: Othman Mohammad Ahmed Mustafa
Doctoral School: Doctoral School of Management and Business
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List of publications related to the dissertation

Articles, studies (4)

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

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3. **Mustafa, O. M. A.**, Lengyel, P.: Circular Economy: a Bibliometric Mapping.
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4. Lengyel, P., Bai, A., Gabnai, Z., **Mustafa, O. M. A.**, Balogh, P., Péter, E., Tóth-Kaszás, N., Németh, K.: Development of the Concept of Circular Supply Chain Management: A Systematic Review.
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   DOI: http://dx.doi.org/10.3390/pr9101740
   IF: 3.352

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List of other publications

Articles, studies (1)

5. Khalid, U., **Mustafa, O. M. A.**, Naeem, M. A., Alkhateeb, M., Awad, B. M. A. E.: Direct Optimization of an Automotive Sheet Metal Part Using ANSYS.
International Journal of Engineering and Management Sciences. 5 (3), 134-142, 2020.
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Total IF of journals (publications related to the dissertation): 3,352

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

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