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**EXPORT-DRIVEN ECO-INNOVATION AND  
ENVIRONMENTAL SUSTAINABILITY IN SMALL AND  
MEDIUM-SIZED ENTERPRISES**

Master's thesis

Programme Management and Marketing, specialisation International Business Administration

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Tallinn 2023

I hereby declare that I have compiled the thesis independently and all works, important standpoints and data by other authors have been properly referenced and the same paper has not been previously presented for grading.

The document length is 14 385 words from the introduction to the end of the conclusion.

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## **ABSTRACT**

Most companies worldwide fall under the classification of small and medium-sized enterprises (SMEs), and thus, have a substantial combined influence on society and its challenges. With the growing public consciousness of environmental concerns, corporations are held to higher societal expectations and obligations to exhibit their commitment to a more sustainable world. Yet, addressing environmental issues entails a significant investment of resources, an aspect that SMEs often find challenging to overcome. Consequently, eco-innovation, coupled with economic expansion, is essential in developing more effective solutions.

In small markets such as Estonia, SMEs often have limited opportunities for growth, making internationalization their sole option. Previous research has shown that exporting companies tend to be more environmentally sustainable and adopt more eco-innovative practices. The purpose of this study is to examine whether this holds true in the unique context of Estonian manufacturing SMEs. To achieve this, sequential explanatory design was employed, including an online survey of 271 companies, followed by 10 in-depth interviews. Structural equation modelling (SEM) was used to analyse the quantitative data, confirming the validity of the proposed model and the correlations between sustainability awareness, stakeholder pressure, and eco-innovation practices. Qualitative findings support the effects of internationalization on companies' eco-innovation and environmental sustainability.

The results of the thesis offer guidance for policymakers and professionals in implementing eco-innovation practices and environmental sustainability as part of their business strategies and internationalization efforts. They also provide direction for further research on identified gaps in the literature.

Keywords: eco-innovation, environmental sustainability, SMEs, internationalization, SEM

## **LIST OF ABBREVIATIONS**

B2B – Business-to-business

B2C – Business-to-consumer

CE – Circular economy

CFA – Confirmatory factor analysis

CFI – Comparative Fit Index

CMIN – Chi-square

CMIN/DF – Chi-square divided by its degrees of freedom

CSR – Corporate social responsibility

EFA – Exploratory factor analysis

EI – Eco-innovation

ESG – Environmental, social and governance

FDI – Foreign direct investment

GDP – Gross domestic product

GP – Government pressure

IFI – Incremental Fit Index

KMO – Kaiser-Meyer-Olkin measure of sampling adequacy

NFI – Normed Fit Index

OECD – The Observatory of Economic Complexity

OECD – Organisation for Economic Co-operation and Development

RFI – Relative Fit Index

RMSEA – Root mean square approximation

SA – Sustainability awareness

SEM – Structural equation modelling

SMEs – Small and medium-sized enterprises

SP – Stakeholder pressure

SPGP – Stakeholder and government pressure

TLI – Tucker-Lewis coefficient

## INTRODUCTION

The recent years through the spread of the pandemic, supply crisis and natural calamities have seen a growing emphasis on the most severe global threat, climate warming. Even a few degrees of raise in the temperatures can cause irrevocable alterations to the planet, rendering it inhabitable which is why urgent action to mitigate any undesirable outcomes is needed. (World Economic Forum, 2022) In parallel, it is crucial for the economy and human wellbeing to grow to be able to work out better innovative solutions to issues evolving around climate change.

Small and medium-sized enterprises (SMEs), which are defined by the European Commission as companies with less than 250 employees, less or equal turnover to €50 million and less or equal balance sheet total of €43 million (European Commission, 2023e), have often been considered insignificant due to their size. However, these SMEs make up around 90% of all companies globally (The World Bank, 2023a) and 99% of all companies in the EU (European Commission, 2023e), making them a vital part of the global economy and significant contributors to environmental issues. This is especially true in small countries like Estonia that rank low in eco-efficiency, e.g., the created economic value versus environmental load is low (Yamasaki *et al.*, 2021) and belong to the European Union's average performance group in eco-innovation (EI) indicators (European Commission, 2023c). In such countries, SMEs play an even larger role in both, the economy, and the resolution of environmental concerns.

The Organisation for Economic Co-operation and Development (OECD) defines eco-innovation as innovative activities that lead to a reduction in environmental impact, regardless of whether this effect is intended or not. Unlike other forms of innovation, eco-innovation can have a broader impact that goes beyond the traditional organizational boundaries of the innovating organization. It may also involve broader social arrangements that result in changes to existing socio-cultural norms and institutional structures (OECD, 2009). The United Nations Environment Programme defines eco-innovation as "...a new business approach which promotes sustainability throughout the entire life cycle of a product, while also boosting a company's performance and

competitiveness...”, adding that it can be helpful for SMEs’ expansion to new markets (United Nations, 2023). Therefore, companies need to adjust to more sustainable business models and environmentally sustainable solutions not only for the environment, but for their own competitiveness.

Internationalization, or the expansion of small and medium-sized enterprises (SMEs) into operating on international markets, has been identified as an effective solution for SMEs to survive and grow (Wakkee *et al.*, 2015), particularly in countries such as Estonia, which have a limited domestic market of just 1.3 million inhabitants. However, entering foreign markets or exporting also means facing tough competition from international companies for customers, who have a wide range of providers to choose from. In today's global crisis, consumers are increasingly environmentally conscious, and while environmental policies may differ across the globe, environmental sustainability can be a key factor in helping companies gain a substantial competitive advantage (Hojnik *et al.*, 2018; Ko *et al.*, 2021). Additionally, environmental sustainability has been shown to have a positive impact on the economic performance of SMEs (Khoja *et al.*, 2022).

Trade is a significant contributor to environmental pollution, and eco-innovation and environmentally sustainable solutions can play a crucial role in reducing the harm caused by international trade and even generating environmental benefits. Research suggests that exporters have better environmental performance than their non-exporter counterparts (Forslid *et al.*, 2018) and are more likely to engage in eco-innovation due to internationalization (Torrecillas & Fernandez, 2022; Nguyen & Adomako, 2021). Nguyen & Adomako, (2021) additionally find stakeholder pressure through environmental commitment leads to increased implementation of eco-innovation. Previous research on this topic however has not specifically examined SMEs in developed countries: Hojnik *et al.* (2018) researched companies of different sizes, Torrecillas & Fernandez (2022) multinational enterprises, Nguyen & Adomako (2021) used their model in an emerging market etc., so there is still a gap in the research that this master’s thesis aims to address.

The purpose of this master’s thesis is to find out the effects and relationship between internationalization, eco-innovation, environmental sustainability, and stakeholder role in SMEs. The research problem is the limited knowledge of the effects of internationalization on the eco-innovation and the environmental sustainability of SMEs. Furthermore, the effects of internationalization on sustainable environmental practices have produced divergent outcomes, as



its impact varies over time and in different contexts (Passaro *et al.*, 2022). Hojnik *et al.* (2018) for instance find that eco-innovation adaptation has a stronger association with internationalized medium- sized and large companies while Khoja *et al.* (2022) and Dasgupta (2021) stress the limitations around sustainable innovation studies in SMEs as opposed to large companies.

The thesis also intends to shed light on the key drivers of environmental sustainability that are activated through internationalization, and how they shape the environmental strategy of the company. For comparison and to find out the effects of internationalization on implementing environmental sustainability means, differences between exporters and non-exporters will be looked at in 271 Estonian manufacturing firms through a quantitative study using structural equation modelling, a theory-driven approach to evaluate the hypothesis (Muelle & Hancock, 2019, p. 445). 10 in-depth interviews will also be conducted with internationalized companies to gain a better understanding of the factors that drive environmental sustainability through internationalization. With the results of the thesis, the author aims to narrow the gap in the research of eco-innovation in SMEs and ultimately, the findings of this thesis will contribute to the understanding of the attainability and potential benefits of eco-innovation for SMEs. To achieve the aims of the thesis, the following hypotheses have been developed based on literature review:

Hypothesis 1.: internationalized SMEs have a stronger understanding of environmental sustainability than their non-exporting peers.

Hypothesis 2.: internationalized SMEs apply more eco-innovation practices in product and process design than their non-internationalized peers.

Hypothesis 3.: internationalized SMEs experience more stakeholder pressure to practice environmental sustainability than their non-exporting peers.

Further information regarding the hypotheses can be found in section 1 of the thesis, which covers the theoretical framework and background. Hypothesis 1 is informed by the scholarly knowledge presented in paragraph 1.5. Hypothesis 2 is developed based on the literature sources discussed in paragraph 1.6. Lastly, hypothesis 3 is built upon the insights obtained from the literature sources referenced in paragraphs 1.4 and 1.5. Additionally, the following research question has been posed: what are the main eco-innovation and environmental sustainability drivers in internationalized SMEs? Current existing literature covers the correlation of internationalization of companies to

better environmental performance, however, though SMEs play a crucial role in the society and international economy, there is little insight into their environmental strategies affected by internationalization. There is also limited qualitative insight into the topic and less mixed methodology research (Dasgupta, 2021) that the present paper covers to provide a more in-depth look into the topic. The tasks of the thesis are as follows:

- Reviewing previous peer-reviewed studies conducted on the topic of environmental sustainability, eco-innovation, and stakeholder role in internationalized SMEs.
- Finding out the effects of internationalization on the environmental strategy and eco-innovation of Estonian manufacturing SMEs.
- Drawing conclusions and offering recommendations on best practices for proactive environmental strategies for SMEs intending to expand abroad.

The thesis is structured into three main sections. The first section is dedicated to a thorough review of the existing literature on environmental sustainability and eco-innovation, with a particular focus on their relevance to SMEs. Additionally, the section examines the previous studies that explore the connection between environmental sustainability, eco-innovation, stakeholders, and internationalization. The second section of the paper explains the research design and the chosen methodologies based on the sample and research setting. The chosen approach combines both quantitative and qualitative methods to gain a comprehensive understanding of the research questions. The quantitative research method includes an online survey with Estonian manufacturing SMEs, whereas the qualitative method involves conducting interviews with 10 representatives of internationalized SMEs. Finally, the third section of the thesis presents the results of the data analysis and a discussion of the findings, along with recommendations and suggestions for further research.

The author would like to express her sincere gratitude to the supervisors Tarlan Ahmadov and Wolfgang Dieter Gerstlberger for their invaluable guidance and support throughout the process of writing this thesis.

# **1. THEORETICAL FRAMEWORK AND BACKGROUND**

The first section of the present thesis focuses on providing an overview of the existing literature and research studies pertaining to the topics under investigation. First, the definition and current state of research of fundamental concepts such as environmental strategies, circular economy, eco- and circular innovations as well as stakeholder role is brought out. Then they are followed by a look into the literature on the relationship of the named concepts to internationalization which serves as the primary focus of this paper.

## **1.1. Environmental sustainability in business context**

Companies nowadays are tasked with fulfilling responsibilities beyond profit maximization. For instance, they are directly affected by the Sustainable Development Goals of the 2030 Agenda of The United Nations (Tsalis *et al.*, 2020). Complying with global goals and applying according sustainability measures is critical. Companies through a social contract are expected to fulfil the requirements of the society, including the consideration of environmental issues, where the commitment is commonly referred to as CRS - Corporate Social Responsibility (Velte, 2022). CSR activities that Chung & Cho (2018) bring out from their reviewed frameworks include recycling, employee relation, abatement and the metrics energy conservation, employee satisfaction/retention as well as lower pollution emissions leading to lower energy expenses and compliance costs as well as increased productivity.

Besides CRS, corporate actions are also referred to as the concept of Environmental, Social and Governance (ESG), both of which have noticed an increase of interest in academic research as well as showing the importance of the concepts in practice - in business, amongst management and investors (Gillan *et al.*, 2021), evincing a general concern around the area. Companies therefore are placing more emphasis on environmental strategies that form an important part of the value of a firm which together with CRS performance, have found to lead to increased financial performance (Velte, 2022).

Although business studies around sustainability have mostly been carried out amongst large companies, Khoja *et al.* (2022) with their findings state that sustainability practices in SMEs, similarly to their large counterparts, have been linked to better environmental, economic, and operational performance despite SMEs generally having less resources than their larger peers. Improving sustainability also contributes to creating competitive advantage which is why SMEs are encouraged to invest in it (*Ibid.*). Higher performance can also be obtained by SMEs that view resource scarcity as an opportunity to network and collaborate with stakeholders such as their partners and customers (Agyabeng-Mensah *et al.*, 2022). Bakos *et al.* (2020) brought out management and stakeholder pressure as greatest drivers of environmental sustainability of SMEs in 122 examined studies while also mentioning the importance of sustainability awareness and knowledge for the adoption of sustainability practices. That, however, is costly and time-consuming which is why the support from governmental and educational institutions is needed (*Ibid.*).

Applying environmental sustainability means is slowly turning from a voluntary to a standardized regulatory action where it is no longer a choice or a strategy – the Corporate Sustainability Reporting Directive of the European Union applicable to large companies and some SMEs for reporting financial year 2024, making the environmental risks and opportunities of the company more transparent, will be entered into force in 2023 (European Commission, 2023b). Although the field of environmental sustainability application has received less attention in SMEs than in large companies, Suchek *et al.* (2022) confirm that environmental strategies lead SMEs to environmental, economic, and social benefits. Therefore, it is reasonable for SMEs where such changes might require more resources, to plan their strategies in advance and embed environmental sustainability into their business strategy. Making environmental sustainability a part of the business culture can make it more cost effective for the transition to take place over time and as was mentioned previously, will yield benefits not only for the environment but for the business economically and socially while also proactively preparing SMEs as environmental sustainability becomes a standardized regulatory action rather than a choice or strategy.

## 1.2. Circular business practices

Improving sustainability performance of SMEs can effectively be done by adopting circular economy (CE) practices (Dey *et al.*, 2022). In turn, a circular business model can be transitioned to through the application of eco-innovative processes (Scarpellini *et al.*, 2020). Though CE is a concept that is becoming widely researched – Scopus analytics show almost a fifteen-fold increase to the topic comparing 2016 to 2022 (Scopus, 2023), there is no one consensus on the terminologies of CE (Kirchher *et al.*, 2017). Based on their literature review on CE definitions, Kirchher *et al.* (2017) propose that circular economy is: “...an economic system that replaces the ‘end-of-life’ concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity, and social equity, to the benefit of current and future generations. It is enabled by novel business models and responsible consumers” (*Ibid.*). Winans *et al.* (2017) summarize the concept: “A central theme of the CE concept is the valuation of materials within a closed-looped system with the aim to allow for natural resource use while reducing pollution or avoiding resource constraints and sustaining economic growth” (Winans *et al.* 2017).

Figure 1 illustrates the circular economy model whose idea is to reduce any waste to minimum (European Parliament, 2023). The process starts with introducing raw materials and designing products in a sustainable way before starting production, after distributing the products, they are consumed and instead of going to waste, collected. Recycling follows collection where minimum residual waste is eliminated, and the remainder serves as further input.

Sucheck *et al.* (2022) conceptualize the entrepreneurial process leading to circular business model implementation where the opportunities are seen in market limitation, regulatory structure, sustainability commitment, economic attractiveness, differentiation, and the process is then influenced by internal (knowledge, skills, time workforce, culture of sustainability, leadership, financial resources.) and external (suppliers, consumers, network relationships, governmental support) factors. Similarly to environmental sustainability practices in general, cost has been found to be the biggest barrier in adapting circularity by Briguglio *et al.* (2021). It was also found that those companies that were already born circular and thus have a clear vision and objectives when it comes to sustainability, face less obstacles (*Ibid.*).

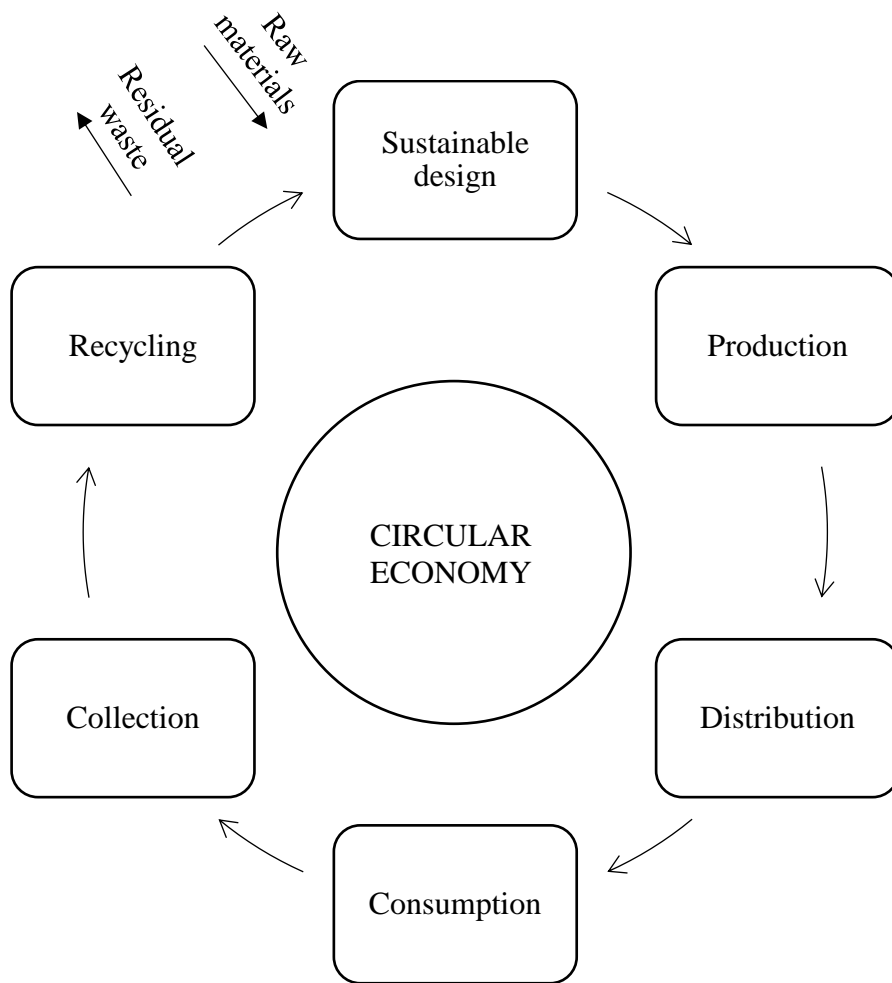


Figure 1. The circular economy model  
 Source: European Parliament (2023)

As was mentioned, policymakers tend to place more emphasis on economic aspects, however they could benefit from understanding EI in the transition to CE and the common grounds of both while EI promotes and acts as a pathway to CE (de Jesus *et al.*, 2018). EI functions as a pathway to CE on a micro level as well (Scarpellini *et al.*, 2020).

Overall, the circular economy model aims to reduce waste and promote sustainable resource use while sustaining economic growth. The implementation of circular business models can be influenced by various internal and external factors, and cost remains a significant barrier. Policymakers could benefit from understanding the role of environmental innovation in the transition to a circular economy, as it promotes and acts as a pathway to CE, not only on a macro but also on a micro level. EI in turn can help to transition towards CE as a first step for companies and policymakers to understand and to take.

### 1.3. Eco-innovation and circular eco-innovation

As of recent, predominantly “Eco-innovation”, interchangeably called “environmental innovation” and “green innovation” is a term defined by researchers for its environmental and innovator aspect, having received an agreement across literature that regulation is what differentiates it from regular innovation (Díaz-García *et al.*, 2015).

While Díaz-García *et al.* (2015) in their framework on eco-innovation literature divide the drivers into macro (policy instruments), meso (market dynamics) and micro (firm) levels, Bossle *et al.* (2016) take a broader approach and divide them into two categories: external and internal drivers. The main external factors of eco-innovation are regulatory and normative pressures as well as the government; cooperation, expanding market, technology. Internal factors are named to be efficiency, environmental culture, management, leadership and capabilities, certifications, performance, and human resources of the company (Bossle *et al.*, 2016).

According to the theoretical framework by Hermundsdottir & Aspelund (2020), sustainability innovations (of the three dimensions proposed – social, environmental, and economic the current thesis concentrates on the environmental) are driven by internal motivation and external pressures and they lead to better competitiveness. Based on their literature review of a hundred studies, they divide sustainability innovations into product, process, and managerial innovations. Product innovation includes improved quality and environmentally friendly material choices, while process innovation aims mostly to reduce energy and resource consumption and managerial part consists of the methods, marketing, and certifications. (Hermundsdottir & Aspelund, 2020)

Scarpellini *et al.*, (2020) use the term “circular eco-innovation” in their study to explore business eco-innovations that can be applied to CE by measuring the relationship between the level of firms’ CE and their eco-innovation outcomes. They measure the circular eco-innovation construct by items such as eco-innovation investments, eco-design element, circular energy use and circular R&D investments, reaching the conclusion that the CE-related actions in the companies observed behaved similarly to EI and that informal environmental management tools like environmental management accounting, environmental HR and corporate governance promote circular eco-innovation, whereas the traditional environmental management systems do not. (*Ibid.*) As CE is seen behaving similarly to EI, it could facilitate companies in planning the implementation of CE strategies and their outcomes. In addition to the role of regulatory pressures, internal motivation

through different factors is crucial, pointing towards the need for internal audits and analysis at product, process, and managerial level. The latter belongs to the stakeholder group that is discussed as follows.

#### **1.4. Stakeholder role**

The stakeholder theory, focusing on how companies could work the most effectively, emphasizes the importance of value created for and by every stakeholder in a business, independent of whether they are in the board of the firm or not (Freeman *et al.*, 2010, p. 9) has had numerous organizational sustainability practices research based on (Baah *et al.*, 2021).

Innovation processes and the role of stakeholders in them is still not well defined (de Jesus *et al.*, 2021), however Dey *et al.* (2022) find that the successful adoption of CE practices needs internal motivation as well as support from stakeholders and policymakers. Furthermore, Baah *et al.* (2021) found that organizational stakeholder pressure significantly predicted green production practices as well as environmental performance, amongst other variables that stakeholders have effect on. Nguyen & Adomako (2022) looked at primary (government/ regulators, customers/ suppliers, employees, competitors) and secondary (NGOs/ activists, media) stakeholder pressure on environmental commitment and additionally the mediating effect of environmental commitment on eco-product innovation. Their findings confirm the importance of stakeholder green pressure for SMEs and their eco-innovation practices (*Ibid.*).

Regulatory stakeholder pressure was found to have a similar significant positive correlation to green production practices as well as environmental performance (Baah *et al.*, 2021). Bakos *et al.* (2020) in their literature review confirm that government is a major driver in the adoption of environmental sustainability in SMEs. Regardless, policymakers are still more focused on economic aspects in the context of European SMEs according to Dey *et al.* (2022). Passaro *et al.* (2022) propose that for SMEs to implement eco-innovation measures successfully, further effort, such as considering the company size, market, type etc. from policymakers is needed.

Stakeholder pressure, both from regulatory and non-regulatory stakeholders, has been found to significantly predict green production practices, environmental performance, and eco-innovation in SMEs. While governments have been identified as a major driver of environmental



sustainability adoption in SMEs, further policy efforts that consider factors such as company size, market, and type are necessary for successful implementation of eco-innovation measures. Overall, internal, and regulatory stakeholder pressures are critical to incentivizing SMEs to implement environmental sustainability and eco-innovation practices. The role of foreign pressures through internationalization will be looked into in the following sections.

## **1.5. Internationalization and sustainability**

Steinhäuser *et al.* (2021) in their summary on the research done on the internationalization of SMEs in the past twenty years observe an increase in the number of publications year-by-year and bring out the three clusters of the process: antecedents on internationalization, patterns of internationalization (meaning actions carried out to achieve internationalization), and outcomes of SMEs internationalization. Some of the most important antecedents of internationalization that can initiate the process to highlight are the opportunities recognition and domestic uncertainties, while process innovation is brought out as an important pattern of internationalization and product innovation as one of the influential factors of an SMEs internationalization outcome on firm-level. (*Ibid.*)

When internationalizing, there is a lot for an SME to consider - foreign business environment and the specifics of the new market, while companies that remain in their home country do not need to deal with foreign pressures. Especially if foreign environmental regulations are more stringent than in home base, creating green barriers (Wei, 2019, 193). As discrepancies in legislation as well as in demand between different countries exist, internationalization can help in improving the environmental sustainability of companies, especially in case of more stringent regulations (Colombelli *et al.*, 2021). International marketplace means environmental sustainability can create competitive advantage for SMEs.

The emissions of the industry sector (including manufacturing) in the EU have been decreasing over the past decade, however they still account for over the half of greenhouse gases (Eurostat, 2023) which is why it could be assumed that trade related to manufacturing is a major player in pollution, however the answer concerning SME trade is not that clear. International business operations take place in different places, responding to the minimum criteria by local regulations and therefore creates waste across the supply chain and therefore contributes to environmental

contamination, argue Yu *et al.* (2023) in their multinational enterprise-context study. Forslid *et al.* (2018) contribute to the discussion of whether trade leads to an increase or decrease in emissions by suggesting that as trade enhances production volumes, the emissions intensity decreases, and the cost of abatement is dispersed across a larger number of units. According to the authors, rising incomes enable greater investment in cleaner technology and encourage businesses not involved in cleaner production to exit the market, resulting in a neutral impact on emissions (*Ibid.*). Lu *et al.* (2020) still find that exports to several different countries with the aim of diversification increases carbon emissions, however ecological innovation can help in reducing them.

Internationalization presents both challenges and opportunities for SMEs, and it is important for companies to consider the environmental impact of their operations. While the impact of SME trade on emissions is not yet clear and this is an area that the current thesis aims to investigate more in depth, research suggests that increased trade can lead to lower emissions intensity and greater investment in cleaner technology. However, companies must also embrace ecological innovation to mitigate the potential negative impact of international trade on the environment. The subsequent section provides a detailed examination of the link between internationalization and eco-innovation.

## **1.6. Internationalization and eco-innovation**

Internationalization similarly to eco-innovation is challenging and risky, however nowadays it can be riskier to be a business without engaging in either of these concepts (Šumakarīs *et al.* 2020). With more awareness and perception of environmental risks, the European consumer is becoming more sustainable in their consumption behaviour (Saari *et al.*, 2021). Aibar-Guzmán & Somohano – Rodríguez (2021) in their observations acquired over 16 years found that despite customers not always behaving as per their attitude of preferring environmentally friendly products, eco-innovations have proven to be worth of the investment and benefit companies with growth in sales. Mačiulytė-Šniukienė & Sekhniashvili (2021) reach similar conclusions when eco-innovation is looked at on a country level within the EU – they confirm eco-innovation should be encouraged since it leads to better competitive position, economic growth, and environmental sustainability and Colombelli *et al.* (2019) add that high growth rate of the firm contributes to the effects even more.

Internationalization has been found to be one of the key drivers to eco-innovation (Hojnik *et al.*, 2018). Torrecillas & Fernández (2022) contribute by looking into more detail by comparing the export and outward foreign direct investment (FDI) strategies of internationalization, types of eco-innovation and degree of novelty of the innovation (whether it is incremental or radical) in Spanish manufacturing and serve multinational enterprises, both large and SMEs. Their results confirm that though exporting brings more and faster eco-innovation than inward and outward FDI, both strategies of internationalization lead to eco-innovation by learning and upgrading technologically (*Ibid.*).

Knowledge acquisition through exporting is one of the main reasons of internationalized companies applying more eco-innovation (Šumakaris *et al.*, 2020). Hojnik *et al.* (2018) with their sample of Slovenian micro, small, medium, and large manufacturing companies also add that better economic performance through internationalization is achieved with the help of eco-innovation as it provides companies with competitive advantage, however though the authors claim the results apply to all, the link is found to be stronger in medium-sized and large companies than in micro and small companies as well as in business-to-consumer (B2C) than business-to-business (B2B) and in companies with ISO 14001 certification.

Despite the considerable amount of research on eco-innovation, the factors driving it and the circumstances of SMEs have received relatively little attention (Passaro *et al.*, 2022). Besides internationalization, some of the main drivers in the literature review of SME eco-innovation with frequent mention are also pressures from suppliers and customers, from public administration, technological availability, however drivers can change in time (*Ibid.*). Aboelmaged & Hashem (2019) stress the importance of a clear sustainable orientation of the firm as well as collaboration with partners and suppliers in line with Nguyen & Adomako (2021) who looked at the role of stakeholder pressure in the eco-innovation of SMEs and confirm that higher international orientation leads to higher eco-innovation, however the conclusions in both cases were made in the context of emerging markets (Egypt and Vietnam respectively). Swiadek *et al.*, (2022) investigated the ITC and industry sectors in Poland with a sample of companies of different sizes and though in the ITC size had no relevance, in industry it did – the larger the company, the more eco-innovation is applied (*Ibid.*).

The present thesis will explore the impact of internationalization on eco-innovation and environmental sustainability of SMEs in a developed country, aiming to shed light on the ongoing

discussions and determine whether findings from studies conducted in developing nations and mainly on large corporations are applicable in this particular context. This investigation will be carried out in the subsequent section of the paper.

## **2. RESEARCH DESIGN**

The second part of the present thesis is grounded in the theoretical framework established in the previous chapter, and focuses on outlining the research design of both, quantitative and qualitative methodologies used for the study. First, the research setting, and sample characteristics are elaborated upon, after which the chosen methodologies - namely, a quantitative survey followed by interviews with a purposive sample of participants and the corresponding hypothesized models are expounded upon. Lastly, an exhaustive account of the survey and interview designs is presented.

### **2.1. Research setting and sample**

The country of Estonia presents a distinctive case for investigation, owing to its notable economic development during the post-Soviet period. Specifically, Estonia has experienced a remarkable 8-fold increase in its Gross Domestic Product (GDP) from 1995 to 2021, as evident from its GDP values of \$4.5 billion in 1995 and \$37.19 billion in 2021. This growth rate is substantially higher than that of neighbouring countries such as Finland and Sweden, where the GDP increased by 2-fold during the same period. (The World Bank, 2023b)

As of 2020, the share of Estonia in global trade was 0.10% (The Atlas of Economic Complexity, 2022). In 2020 the trade deficit showed \$16.8 B in product exports and \$19.3 B in imports and the main export partners were Finland and Sweden (OEC, 2023). Though Estonia has close links commercially, financially, and culturally to Scandinavia and Finland and has well developed high value-added sectors such as electronics and IT services, there is a lack of land connections with the rest of the EU and the economy has a high sensitivity to external shocks (Coface, 2023). Estonia's exports made up €21.3 B in 2022 (Statistics Estonia, 2023) while there is still \$9.4 B unrealized export potential for the country (Intracen, 2023). At the same time, Estonia's gross domestic spending on R&D (1.752% of GDP in 2021) is considerably less than the average in the European Union (2.149% of GDP in 2020) and almost half of Germany (3.133% of GDP),

indicating lower portion of total GDP invested towards research and development resulting in potential eco-innovation carried out by companies, research institutes, university, and government laboratories (OECD, 2023). Despite a lower governmental support in terms of resources for innovation, Estonia has had the highest new business density in the world in the past years (The World Bank, 2023b).

Estonia together with Finland and Sweden has the least polluted air in the European Union (Eurostat, 2021) and despite lower eco-innovation levels, Estonia has improved its circular material use rate, forming part of top 5 countries in the European Union (European Environment Agency, 2023). It was confirmed in the study of Gerstlberger *et al.* (2021) around the enablers and barriers for circular economy in Estonia that most studied manufacturing companies already apply CE practices (especially ensuring that the components of their products have replaceable components), even though generally they do not find CE to be their priority due to lack of resources and due to modest volumes of production.

Table 1. Sample profile

Sample profile					
Respondents profile			Industry profile		
	n	%		n	%
<b>Gender</b>			<b>Internationalization</b>		
Female	86	32%	Internationalized	141	52%
Male	184	68%	Non-internationalized	107	39%
Prefer not to say	1	0.4%	Planned	23	8%
<b>Education level</b>			<b>Business type</b>		
Diploma/certificate	116	43%	B2B	85	31%
Undergraduate	72	27%	B2C	64	11%
Master's degree	83	31%	Both	122	45%
<b>Position</b>			<b>Certification</b>		
Owner	206	76%	Certified	41	15%
Production manager	28	10%	Non-certified	230	85%
Marketing Manager	4	1%	<b>Size (employees)</b>		
Supply chain manager	4	1%	1= ≤9	193	71%
Quality manager	7	3%	10-49	65	24%
Other	22	8%	50-249	12	4%
–	–	–	≥250	1	0.3%

Source: Research results, author's calculations

Gerstlberger *et al.* (2021) reported a growing interest and support from stakeholders in both the public and private sectors, indicating that circular economy (CE) is gaining momentum in Estonia. However, there are still several challenges to be addressed, such as regulatory issues, lack of

awareness, and inadequate collaboration between stakeholders. In Estonia, a variety of initiatives, including funding opportunities, policy measures, and awareness-raising campaigns, support CE practices. The authors suggest that promoting circular business models, fostering cooperation among stakeholders, and developing a comprehensive circular economy strategy would be essential steps to further advance CE in Estonia (*Ibid.*)

Industry besides transportation and power generation account for the biggest part of carbon dioxide emissions (United Nations, 2022) which is why manufacturing companies of different specialization have been chosen for the study. The data from the companies were collected through an online survey. The sample it was sent to included 4317 small and medium-sized manufacturing companies registered in Estonia found using Orbis Europe database (Orbis, 2023) to be filled in by the most adequate person regarding environmental sustainability. In January 2023, the survey was distributed, and the respondents were given a month to complete it. The survey garnered a total of 455 responses, with an estimated response rate of 10.5%. Out of these, 271 surveys were fully completed and considered appropriate for data analysis, which corresponds to a response rate of 6.3%. The survey included a language preference question, offering participants the choice to communicate in Estonian, English, or Russian. The survey was administered using Qualtrics XM software. Out of the 271 companies that completed the questionnaire: 141 of them replied they were operating internationally and 107 were non - internationalized manufacturing SMEs from Estonia (see further details on sample characteristics in table 1). Further details on the quantitative part are presented in paragraph 2.4.

As seen in table 1, the sample consisted of 271 companies, of which a bigger part (71%) fell under micro companies (9 employees or less) and 24% were small companies; only 4% were medium-sized and one of the respondents also represented a large company (over 250 employees) (European Commission, 2023e). Almost half of the companies do both, B2B and B2C business and one third specifies in only B2B, leaving a minority to only B2C-type of business (11%). Most of the companies (85%) do not own an ISO, Eco-Management and Audit Scheme EMAS or another environmental certification. Only 15% do and the majority of certifications (88%) belong to internationalized companies. Two thirds of the respondents were male and one third female and most respondents reported their position to be the owner, followed by product managers. Under position “others”, accountants, innovation managers and operation managers as well as CEOs had taken part in the survey.

Table 2. Fields of activity

Field of activity	n	%
Other (Specify)	47	17%
Manufacture of fabricated metal products, except 18= machinery and equipment	41	15%
Manufacture of wood and of products of wood and cork	30	11%
Manufacture of furniture	26	10%
Manufacture of machinery and equipment	22	8%
Manufacture of wearing apparel	19	7%
Manufacture of food products	18	7%
Printing and reproduction of recorded media	11	4%
Manufacture of rubber and plastic products	10	4%
Manufacture of textiles	9	3%
Manufacture of beverages	8	3%
Manufacture of basic metals	6	2%
Manufacture of motor vehicles, trailers and semi-trailers	5	2%
Manufacture of leather and related products	3	2%
Manufacture of paper and paper products	3	1%
Manufacture of chemicals and chemical products	3	1%
Manufacture of computer, electronic and optical products	3	1%
Manufacture of other transport equipment	3	1%
Manufacture of other non-metallic mineral products	2	1%
Manufacture of electrical equipment	2	1%

Source: Research results, compiled by the author

As is seen in table 2, there is a variety fields of activity amongst the studied manufacturing companies with “other” being the most common. Under “other”, wood- and stone detail manufacturing as well as specific textile and metal products and natural cosmetics had been brought out as activity fields. The second most popular classification of field of activity was manufacturing of fabricated metal products, followed by manufacture of wood and products of wood and cork, as well as manufacture of furniture. The full list of fields of activities is provided in appendix 1.

The data for the qualitative part of the study with was based on 10 interviews carried out amongst the studied internationalized manufacturing SMEs from Estonia. The qualitative part was designed subsequently as a complimentary follow-up for in-depth understanding of the most relevant topics that were considered as needing additional input. A more detailed description is available in section 2.5.



## 2.2. Hypotheses

Based on the existing literature and research review, the research problem was posed, the general task set and the hypotheses in figure 2 formed. H1, H2, H3 are to be confirmed or rejected by the quantitative research and additionally posed supporting question to be answered with the qualitative part of the study.

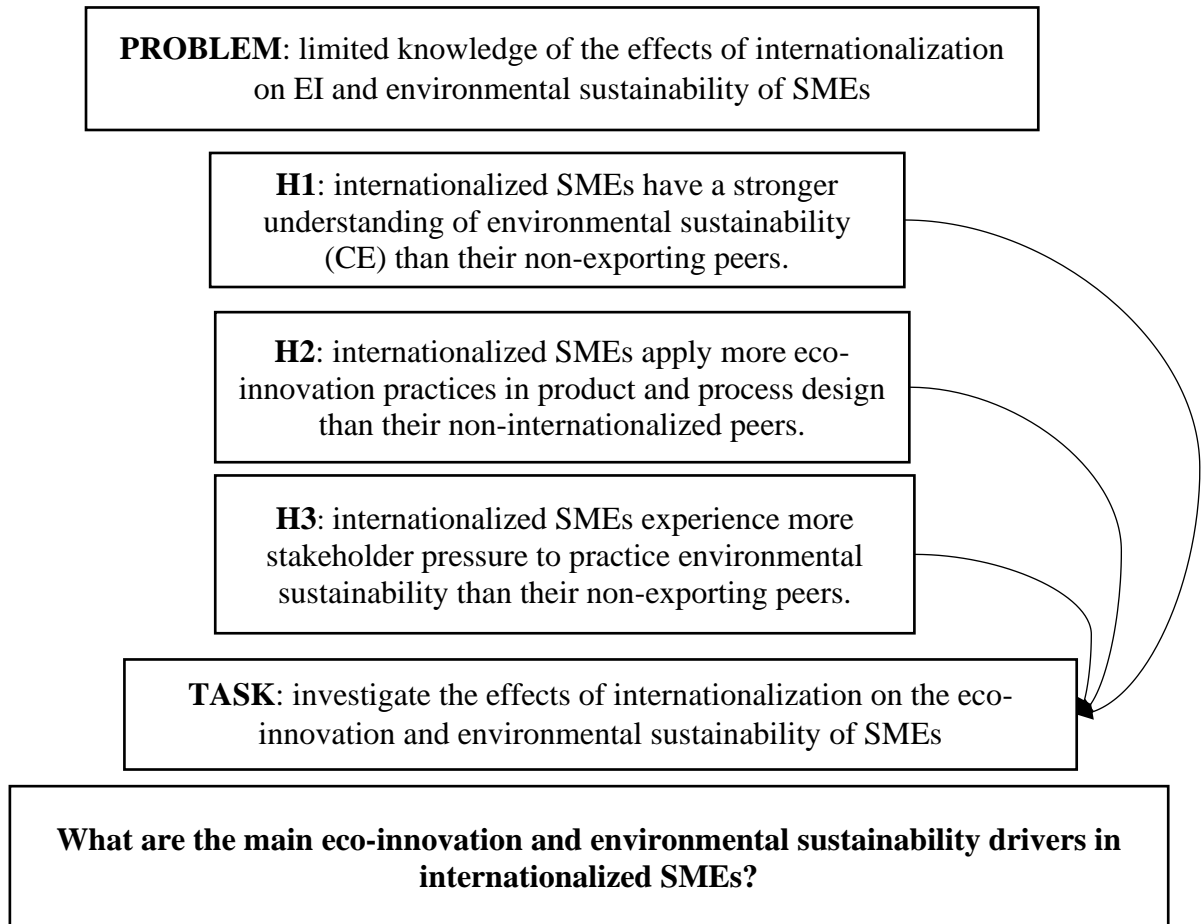


Figure 2. The problem-hypotheses-task scheme of the thesis

Source: Created by the author

As resulted from the literature review done in the first part of the present thesis, paragraph 1.5., there is no agreement yet on the effects of internationalization on the eco-innovation and environmental sustainability of SMEs since most studies previously done on the topic have concentrated on large companies. Previous studies involving a different country and commercial environment as well as including large companies, have found that internationalization has mostly positive effects on the companies' environmental sustainability and eco-innovation, besides

increased finances as was discussed in paragraph 1.6. Therefore, the effects are found to be significant and positive, however it has also been mentioned that large companies have more resources available and therefore can allow bigger investments in their sustainable development and eco-innovation means.

As was previously explained in the literature review section, internationalized companies are found to be more environmentally sustainable than non-internationalized companies and there is a significant role of stakeholder pressure in the environmental practices of the companies, leading to the hypothesis that higher stakeholder pressure is experienced by internationalized companies (exporters) regarding their environmental sustainability than their non-exporting peers as was discussed in paragraph 1.4. The current thesis with the hypotheses formed based on previous studies aims to bring further clarity to the gaps of existing research on SMEs and find out, what drives eco-innovation and environmental sustainability in internationalized SMEs in Estonian manufacturing companies' context.

### **2.3. Methodology**

With the present thesis, the author aimed to contribute to the research carried out on the environmental sustainability and eco-innovation of internationalized SMEs and filling the gaps of knowledge in overcoming the barriers of potential foreign pressure. The author had chosen mixed methodology consisting of literature review, an online survey, and semi-structured interviews with the aim of finding out the cause-effect of factors resulting from internationalization and the accompanying environmental strategies of SMEs and test the hypotheses.

Only 3% of previous studies on this topic have previously chosen a mixed methodology approach (Dasgupta, 2021), which has the current paper contributing to the existing literature with its comprehensive approach. Mixed methods allow for the quantitative and qualitative methods to use the strengths of both and complement each other where they are not sufficient alone in both phases of the sequential explanatory design as seen in figure 3 (Ivankova *et al.*, 2006). Phases of the used methods have been visualized with their according procedures and products. Qualitative methods follow the quantitative procedures chosen as priority (capitalized) for an in-depth explanation of the results. Method integration is done when the two phases connect – with the

selection of participants for the second and when the outcomes are discussed, and implications are drawn. (*Ibid.*)

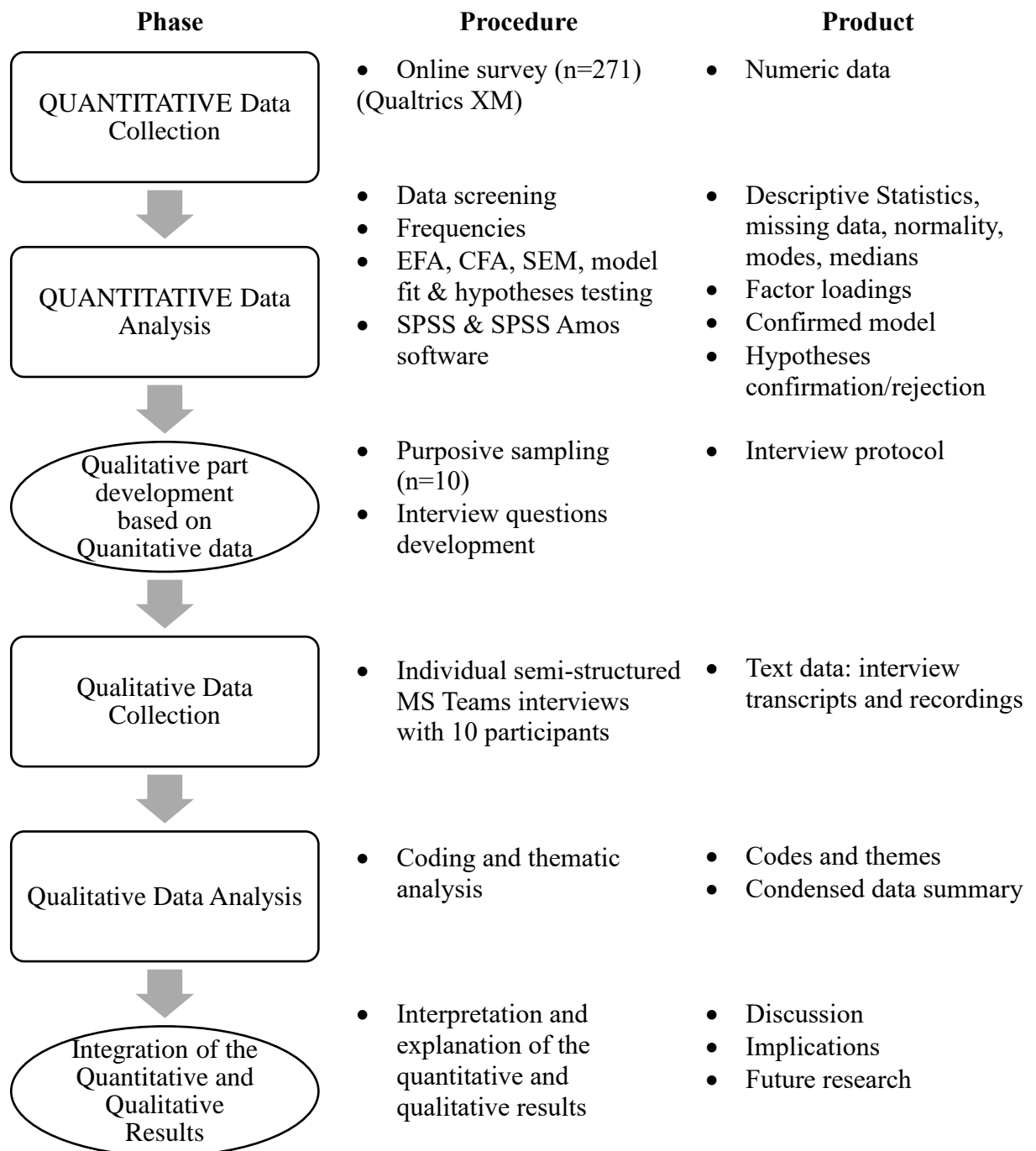


Figure 3. Visual model - sequential explanatory design procedures of the thesis  
 Source: Created by the author based on Ivankova *et al.*, 2006

The quantitative data for deductive conclusions was achieved through a survey with questionnaires sent out to the sample (Estonian manufacturing SMEs) aimed to find out differences between exporters and non-exporters towards eco-innovation and environmental sustainability.

Questionnaires had been adjusted from previous research done on the topic and were divided into four categories: firm's environmental awareness, firm's eco-innovation and environmental sustainability practices, stakeholder pressure and government pressure. Further details are explained in 2.4. The questions to understand respondents' opinions were formed to be replied to with an assessment on a 5-point Likert-type scale, all questions ranging from "strongly disagree" (1) to "strongly agree" (5) (Taherdoost, 2019), except in firm's eco-innovation and environmental sustainability practices where "not applicable" had been added for companies that would not find the practices applicable to their business. The reasoning behind the factors and their importance was then looked at by conducting qualitative analysis that would additionally help mitigate the distortion from the Likert scale questionnaire and its potential central tendency bias (Douven, 2018).

Qualitative part with interviews following the quantitative survey aimed to decipher the results further. Qualitative research in the form of in-depth semi-structured interviews was conducted to provide a deeper understanding and reasoning behind the adaptation and stakeholder pressures for exporters including their experience from home and host country on changes and eco-innovation and whether more/ less stringent host results in different outcomes. The anonymous interviews would contribute by translating the internal and external motivations of the eco-innovation that has been driven by internationalization. The data and the permission to transcribe was acquired through informed consent of participants that was provided by the most appropriate professionals chosen by the sample companies internally (such as environmental managers or similar).

## **2.4. Quantitative research**

The survey questionnaire had been adjusted from previously validated studies taken as reference for the present thesis and adjusted accordingly to the sample and the hypotheses of the paper. The survey form is available in appendix 2. Hojnik *et al.*, (2018) carried out a study amongst Slovenian internationalized companies of all sizes to explore the mediating role of eco-innovation in between

internationalization and economic performance, stressing the importance of environmental sustainability and eco-innovation in internationalization of companies to improve their economic performance. Questions from eco-innovation practices (EI1-EI5) had been adopted from their study. Nguyen & Adomako (2022) based their study on exploring the role of external pressures to SMEs that are taken as a reference for questions regarding stakeholder pressure (questions SP1-GP2); EI6 - EI7 had been added with reference to Dasgupta (2021) regarding the role of external help as well as participation in networks supporting environmental sustainability. Additionally, questions regarding firm's sustainability awareness had been added: SA1 refers to Mungai *et al.* (2020) based on their study on voluntary management systems and environmental performance, SA2 Dey *et al.* (2020) based on their study on the effects of CE on the sustainability of SMEs, and SA3 to Kushwaha & Sharma (2016) based on their study on the green initiatives on firms' performance.

In previous studies, looking into the systematic literature review on SMEs and their eco-innovation, Dasgupta (2021) finds the most common tools to be structural equation modelling (SEM), partial least squares method, multinomial logit regression amongst others. SEM had also been used by Hojnik *et al.* (2018) and Nguyen & Adomako (2022). Therefore, SEM was decided to be used for the present thesis, to evaluate the previously studied theories the hypotheses have been based on (Mueller & Hancock, 2019, p. 445). SEM, due to its complex causal modelling capacities falls under second-generation techniques and can provide additional value and unique theoretical insights into unobserved variables as opposed to first-generation techniques, such as correlations and regressions that have limited capabilities with regards to multiple effects (Lowry & Gaskin, 2014).

SEM allows to examine the relationships between one or more independent and one or more dependant variables and the stages of the process involve preliminary exploratory factor analysis to help reduce the variable set, then confirmatory factor analysis as a fundamental component for the appropriateness of the measurement model (Ullman & Bentler, 2012, 661- 677).

SEM was used to measure the relationship between measured and latent variables with multi-group analysis by using a grouping variable that groups the companies based on whether they operate internationally (export) or not (Z7) and the dependent variables under their construct. Based on literature review, the following latent variables were used - sustainability awareness, eco-innovation practices, stakeholder pressure and government pressure, all supported by previous

research. Sustainability awareness was measured by 4 items, eco-innovation practices by 7 items, stakeholder pressure by 6 items and government role by 3 items on a Likert scale.

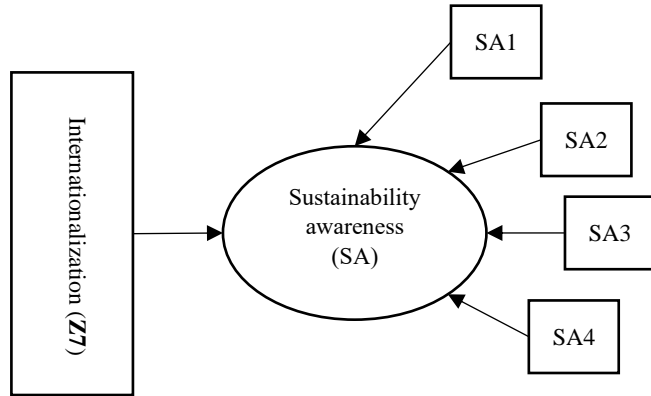


Figure 4. The proposed model for H1  
Source: Created by the author based on reviewed literature

Firm’s sustainability awareness construct (SA) was made up of variables (questions) SA1, SA2, SA3, SA4; the eco-innovation practices construct (EI) of variables EI1, EI2, EI3, EI4, EI5, EI6, EI7; stakeholder pressure construct (SP) of variables SP1, SP2, SP3, SP4, SP5, SP6 and government pressure construct (GP) of variables GP1, GP2, GP3. The proposed models for each hypothesis testing can be seen as follows separately.

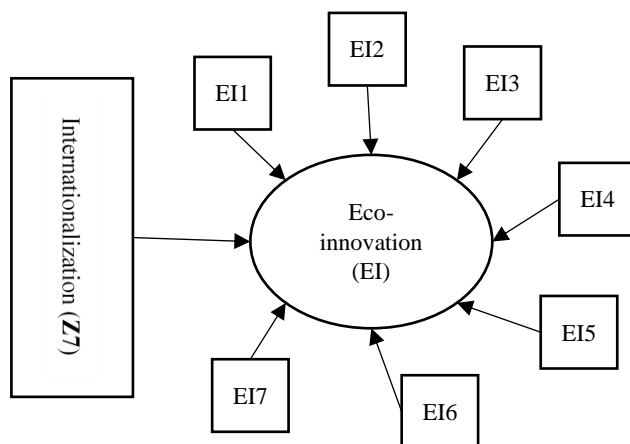


Figure 5. The proposed model for H2  
Source: Created by the author based on reviewed literature

Figure 4 displays the proposed model for H1 where the latent variable/ factor is “Sustainability awareness”. The measured variables for the construct of “Sustainability awareness” are referring to SA1-SA4. Internationalization (Z7) is brought out as the measured grouping variable since differences between internationalized and non-internationalized companies are being looked at and the hypothesis suggests that internationalization leads to higher sustainability awareness.

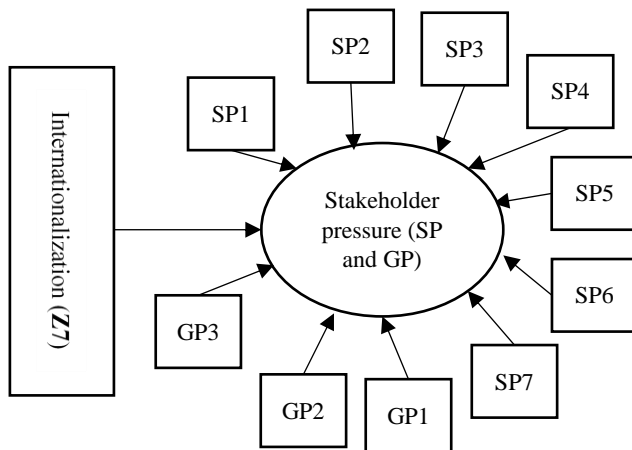


Figure 6. The proposed model for H3  
Source: Created by the author based on reviewed literature

Figure 5 displays the proposed model for H2 where the latent variable/ factor is “Eco-innovation (EI)”. The measured variables for the construct of refer to questions EI1-EI7. Differences between internationalized and non-internationalized companies are being looked at as the hypothesis suggests that internationalization leads to higher eco-innovation. Figure 6 displays the proposed model for H3 where the latent variable/ factor is “Stakeholder pressure (SP and GP)”, referring to the stakeholders as well as the government. The measured variables for the construct of refer to questions SP1-SP7 and GP1-GP3. Differences between internationalized and non-internationalized companies are being looked at as the hypothesis suggests that internationalized companies experience more stakeholder pressure than non-internationalized companies.

## 2.5. Qualitative research

In addition to the quantitative research described previously, qualitative methods were used for deep-dive purposes and to contribute to the literature supporting the theoretical part, aiming to

gain further insights into the internationalized companies' challenges related to environmental sustainability and eco-innovation.

Table 3. Interview sample profile

<b>Sample profile</b>					
<b>Company #</b>	<b>Respondent's position</b>	<b>Years operated abroad</b>	<b>% of production exported</b>	<b>Main export countries</b>	<b>Field of activity</b>
1	Environmental Manager	29	90%	Germany, the US, Finland, Sweden	manufacture of wood and products of wood and cork
2	CEO	5	75-80%	Norway, Sweden, Finland, Denmark	manufacture of furniture
3	Quality Manager	21	100%	Norway, Sweden, Finland	manufacture of wood and products of wood and cork
4	CEO	6	55%	Finland, Sweden, Czech Republic, Switzerland	manufacture of chemicals and chemical products
5	Factory Manager	10	100%	Finland	manufacture of wearing apparel
6	Innovation Manager	3	20-25%	Sweden, Finland, Czech Republic	manufacture of beverages
7	Founder	8	30-50%	Switzerland	manufacture of beverages
8	General Manager	2,5	5%	Finland	manufacture of fabricated metal products
9	CEO and owner	32	70%	Finland, Norway, Latvia, Sweden, Germany, Canada	manufacture of wearing apparel
10	CEO	14	100%	China, Belgium, Germany, Switzerland	manufacture of computer, electronical and optical products

Source: Research results, compiled by the author



From the companies that had previously taken part in the quantitative study, purposive sampling (Etikan *et al.*, 2016) targeted internationalized companies that were approached to participate in an anonymous semi-structured thirty-minute interviews carried out, recorded, and transcribed in Microsoft Teams environment with the participants' permission. The interviews with the Estonian companies were conducted in English and they were recorded and transcribed by the system. The sample profile description is seen in table 3 and the sample size was based on trying to achieve data saturation where new additional interviews would provide few new insights (Saunders *et al.*, 2009, 590).

The companies have been labelled with numbers from 1-10 for further analysis purposes. The respondents as seen in table 3, were mostly CEO-s and managers of different areas of companies active in the field of wood, furniture, chemicals, apparel, beverages and metal products, they had been considered internally as knowledgeable representatives regarding environmental sustainability for the survey. The sample had operated abroad between 2,5 and 32 years and 3 of them do not sell any of their products to the Estonian market, exporting 100% of their production while most of them sell less than half of their production in the local market, Estonia. The main countries the companies operate in are Finland, Sweden, and Norway, but Germany, the US, Switzerland, Czech Republic, Belgium, Latvia and China had also been mentioned.

For data analysis, directed content analysis appropriate for studies with predetermined theories (Hsieh & Shannon, 2005) was decided to be used for the interviews. Initial codes were established through question themes based on predetermined categories (theories) and new codes given to any new categories (*Ibid*). The interview protocol can be found in appendix 3 and it was formulated based on and in line with previously reviewed literature on the factors determining the surveys questions guided by the survey results to gain deeper insights: firm's sustainability awareness, environmental sustainability and eco-innovation practices, stakeholder pressure and government pressure.

The semi-structured interviews guideline was comprised of three sections: firm's internationalization and opinion on environmental sustainability experience on foreign markets and their effects on the firm's environmental sustainability and eco-innovation, stakeholders and their and how they have affected the firm's environmental sustainability and eco-innovation. The transcripts from the interviews were then analysed, worked through, and organized, following the

established coding themes that had been developed based on previous literature review in part 1 of the present thesis.

### **3. RESULTS AND DISCUSSION**

The third section of this thesis presents the empirical findings from both quantitative and qualitative research conducted for this study, followed by a discussion section that contextualizes and interprets the results. The quantitative analysis comprises the presentation of the survey results, while the qualitative analysis examines the results in greater depth. The subsequent discussion section offers new insights and contributions to existing knowledge, including suggestions for future research.

#### **3.1. Quantitative results**

After collecting the survey data, a preliminary analysis with the data set was done using IBM SPSS Statistics to investigate general tendencies of the responses. From collected data medians and modes as the recommended central tendency measures for ordinal Likert type data (Joshi *et al.*, 2015) were looked at by previously established themes that divided the survey questions into the following categories: firm's sustainability awareness, eco-innovation practices, stakeholder pressure and government pressure. The means and modes can be found in appendix 5.

It was found that respondents had the highest agreeing rate with the first category - firm's sustainability awareness with the median and mode being "4" – "Agree" for all questions, except in "Firms want to reduce environmental pollution" where the opinions were neutral "neither agree or disagree". Eco-innovation related questions followed with their median, and mode "Agree" for all, except last two questions related to the company's understanding of circular economy practices and using external help for environmental sustainability that is mostly disagreed with. Based on the results in stakeholder pressure and government pressure, the surveyed organizations agree that "Management will' is necessary for taking valuable steps supporting effective CE in the firm", however they do not agree with other stakeholder pressure questions regarding employees, investors, NGOs', or competitors' pressure neither to variables around government pressure in pursuing sustainable environmental practices.

Mann-Whitney U Test, suitable for testing ordinal data (McKnight & Najab, 2010) was used to then evaluate the difference between internationalized and not internationalized companies e.g., using the grouping variable Z7 in all the ordinal questions across the factor categories, full results can be found in appendix 6. The respondents that chose the organization not operation on international markets (“No”) or “Planned”, were grouped together for more significant results (“planned” n=23) for the following analyses. The test revealed no significant differences across other variables between internationalized (median = 2, n=141) and not internationalized companies (median =2, n=130), besides in participating in business networks that support environmental sustainability between internationalized (median =2 , n=141) and not internationalized companies (median =2, n=130),  $U= 7718$ ,  $z=-2.369$ ,  $p=0.018$  (rejection of the null hypothesis since  $p < 0.05$ ),  $r=0.14$ .

### **3.1.1. Exploratory and confirmatory factor analysis**

During the data screening for structural equation modelling (SEM), out of 20 ordinal questions 2 had 34 missing values of 271 values (0.6% of total responses). The missing values were replaced by calculating the median of the according variables (Jadhav *et al.*, 2019). The engagement of the respondents was checked with the standard deviation of the ordinal values of each case and no unengaged respondents were found (standard deviation above 0 in all cases).

After making sure the data was reliable, exploratory factor analysis (EFA) was performed with the sample size 271 which, approximant  $n=300$  would be an adequate sample size based on the review of Hogarty *et al.* (2005, 203) using maximum likelihood analysis and promax rotation to make up a matrix to be used in confirmatory factor analysis (CFA). The minimum factor loading criteria was set to 0.30 which is a commonly used criterion for factor analysis, exposing anything that is more than “poor” (*Ibid.*). Initially, EFA was conducted for variables SA1 – SA4; EI1 – EI7, SP1 – SP6 and GP1 – GP3. The results of Bartlett’s Test of Sphericity were significant, chi-square ( $n=271$ ) = 1709.028 ( $p=0.000$ ), which indicates its suitability ( $p < 0.05$ ) for factor analysis (Williams *et al.*, 2010). The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) which indicates the appropriateness of the data for factor analysis, was 0.807. The KMO Measure of Sampling Adequacy values above 0.50 are considered suitable for factor analysis (*Ibid.*). Variation of this data was 49.29%, however a few variables had extreme deviated extraction values while they should all be  $\pm 0.3$  to be considered appropriate to determine correlation with other dependent

variables or multicollinearity in other words (*Ibid*). SA3, EI6, EI7, SP1 and GP3 were removed one by one to get more accurate results. EFA was then repeated without including these items. The results indicated sampling adequacy of the data for factor analysis with 0.801 in the KMO measure. The results of Bartlett's Test of Sphericity were significant ( $p < 0.001$ ), chi-square ( $n=271$ ) = 1349.654 ( $p=0.000$ ), which indicates its suitability for factor analysis. The result of variance improved to 50.742%, after removing items. The four factors identified as part of this EFA were also determined by the Goodness-of-fit Test (Chi-Square= 228.334;  $df=115$ ; Sig.0.000) and root mean square error of approximation (RMSEA) indicator of model fit (Xia & Yang, 2019) that showed acceptable fit with 4 factors (RMSEA=0.059888679) and marginal change (0.012088413) to a higher number of factors.

Table 4. EFA pattern matrix

Pattern Matrix <sup>a</sup>				
	Factor			
	1	2	3	4
SA1	–	–	–	.838
SA2	–	–	–	.464
SA4	–	–	–	.449
EI1	–	.742	–	–
EI2	–	.793	–	–
EI3	–	.729	–	–
EI4	–	.685	–	–
EI5	–	.451	–	–
SP2	.655	–	–	–
SP3	.803	–	–	–
SP4	.639	–	–	–
SP5	.811	–	–	–
SP6	.668	–	–	–
GP1	–	–	.590	–
GP2	–	–	.983	–
Extraction Method: Maximum Likelihood.				
Rotation Method: Promax with Kaiser Normalization.				

Source: Research results, compiled by the author

The identified factors aligned with the theoretical proposition in this thesis. Factor 1 included items SP2 to SP6, referring to stakeholder pressure construct (separating the regulatory stakeholder pressure to a separate factor 3 described as follows). Factor 2 included items EI1 to EI5 which represents Eco-innovation onstruct. Factor 3 gathers items GP1 to GP2 which represents government pressure construct. Finally, factor 4 includes items SA1, SA2 and SA4 which

represents sustainability awareness construct. Factor loadings of the pattern matrix can be seen in table 4.

After performing EFA to deliver the satisfactory pattern matrix with acceptable KMO, communalities and factor loadings to ensure data reliability and validity, establishing the fundamental structure confirmatory factor analysis (CFA) was performed using IBM SPSS Amos that evaluated the level of accuracy to measure and evaluate the concepts (Brown & Moore, 2012, 262). Table 5 presents factor loadings, which indicate the extent to which the observed variances relate to a latent variable.

Table 5. CFA factor loadings

Observed variable		Latent Variable	Factor Loading
SA1	<---	SA	.830
SA2	<---	SA	.463
SA4	<---	SA	.471
EI1	<---	EI	.745
EI2	<---	EI	.800
EI3	<---	EI	.725
EI4	<---	EI	.680
EI5	<---	EI	.451
SP2	<---	SPGP	.645
SP3	<---	SPGP	.800
SP4	<---	SPGP	.714
SP5	<---	SPGP	.770
SP6	<---	SPGP	.692
GP1	<---	SPGP	.346
GP2	<---	SPGP	.455

Source: Research results, compiled by the author

In the CFA analysis, all factors showed a loading of over 0.3, indicating a correlation between the items and the respective factors. Higher factor loadings suggest a stronger identification of the construct. For instance, a factor loading score of 0.830 indicates a higher probability of correctly identifying the sustainability awareness construct compared to SA2 or SA3. Likewise, EI1-EI4 were found to be better at identifying the eco-innovation construct than EI5.

### 3.1.2. Model fit and hypothesis testing

The below path diagram in figure 7. represents a graphical depiction of the theories to specify the statistical model where the measured variables: SA1, SA2, SA4, EI1, EI2, EI3, EI4, EI5; GP1,

SP2, SP3, SP4, SP5, SP6, GP1, GP with their error terms and unobserved factors: SA, EI, SPGP with the grouping variable Z7.

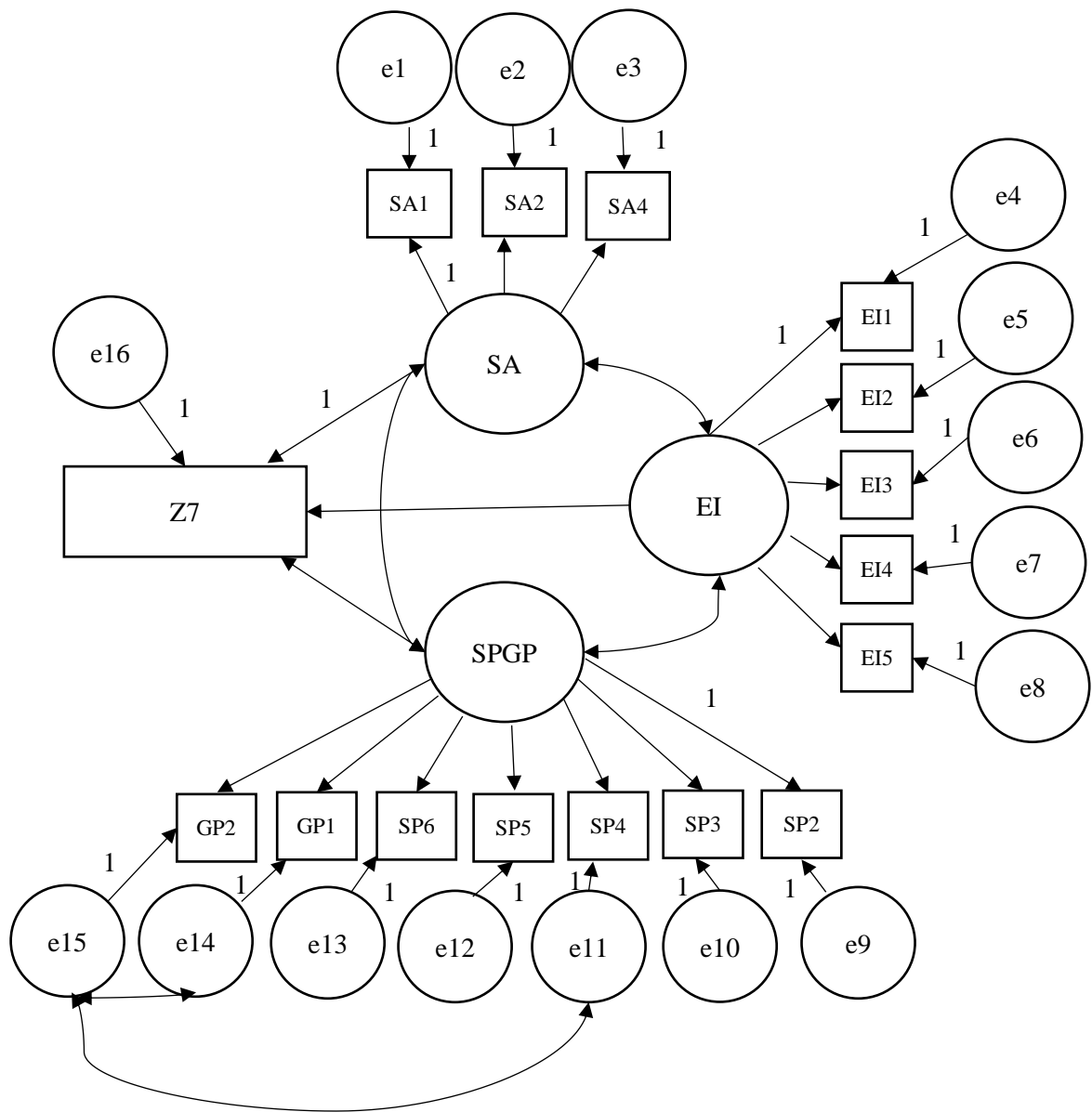


Figure 7. Path diagram

Source: Created by the author based on reviewed literature

The directional arrows point from the causes to effects while the non-directional represent covariance between the elements. The numbers (1s) in the diagram are regression coefficients, show the strength and direction of the relationship between variables in standard deviation units and the circled “e”-s represent the unmeasured factors, residual or error terms not explained by the

predictor variables – the variation of the dependent variable not accounted for by the predictor variables. (Mueller & Hancock, 2019, p. 447)

Model fit of the theoretical hypotheses set seen in the path model (figure 7) was assessed with rigorous model fit assessments. The model testing was done using appropriate indices such as baseline comparison, chi-square (CMIN) and RMSEA. CMIN is used to determine whether a difference between the observed variables and the expected findings is statistically significant (West *et al.*, 2022, 186-189). CMIN reveals whether the sample data and hypothetical model suit the analysis well. If CMIN/DF value is  $\leq 3$ , then there is an acceptable fit (Kline, 1998). In this case CMIN/DF value is 1.365. Therefore, we can conclude that model is good. Summary of CMIN is shown in table 6.

Table 6. CMIN summary

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	39	132.363	97	.010	1.365
Saturated model	136	.000	0	–	–
Independence model	16	1394.197	120	.000	11.618

Source: Research results, compiled by the author

Baseline Comparisons refer to the default, saturated, and independence models that SPSS Amos automatically fits for each analysis. If the Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), Tucker-Lewis coefficient (TLI), and Comparative Fit Index (CFI) values are close to 1, they indicate a good fit. According to the below table results, it can be concluded that there is a good model fit. (Byrne, 2016)

Table 7. Baseline Comparisons

Model	NFI	RFI	IFI	TLI	CFI
Default model	.905	.883	.973	.966	.972
Saturated model	1.000	–	1.000	–	1.000
Independence model	.000	.000	.000	.000	.000

Source: Research results, compiled by the author

The difference between the observed covariance matrix per degree of freedom and the observed covariance matrix is measured by RMSEA. Values between 0.05 and 0.08 are considered acceptable and values  $\leq 0.05$  are considered excellent. According to table 8, the model is acceptable. (*Ibid.*)



Table 8. RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.037	.019	.052	.928
Independence model	.198	.189	.208	.000

Source: Research results, compiled by the author

Finally, hypothesis testing was carried out. As can be seen in table 9, the correlation between internationalization (Z7) and sustainability awareness (SA) is not statistically significant ( $p = 0.349$ ). The correlation between internationalization (Z7) and eco-innovation (EI) is not statistically significant ( $p = 0.109$ ). The correlation between internationalization (Z7) and stakeholder pressure is not statistically significant at  $\alpha=0.05$  ( $p=0.408$ ). So, all of the formed hypotheses have to be rejected for not being significant.

Table 9. Hypotheses testing

			Estimate	S.E.	C.R.	P
Z7	<---	SA	.042	.044	.936	.349
Z7	<---	EI	.056	.035	1.602	.109
Z7	<---	SPGP	-.044	.053	-.828	.408
SA	<-->	EI	.179	.067	2.663	.008
EI	<-->	SPGP	.153	.050	3.088	.002
SA	<-->	SPGP	.114	.044	2.590	.010

Source: Research results, compiled by the author

When looking into the correlation between the constructs, the correlation between sustainability awareness and eco-innovation is statistically significant at  $\alpha=0.05$  ( $p=0.008$ ). The correlation between eco-innovation and stakeholder pressure is also statistically significant ( $p=0.002$ ). The correlation between sustainability awareness and stakeholder pressure is statistically significant at  $\alpha=0.05$  ( $p=0.01$ ).

### 3.1.3. Summary of the quantitative results

The study aimed to identify factors, referring to groups of related variables, that could explain the traits of the sample studied related to their environmental sustainability awareness, eco-innovation practices, stakeholder roles. To achieve this, exploratory factor analysis was used to look for patterns in the data to group variables related to each other and after testing them, four different factors were identified: sustainability awareness, eco-innovation, stakeholder pressure and government pressure. Then confirmatory factor analysis was used to see how well the identified factors from the previous exploratory factor analysis related to the specific items.

It was found that all the identified factors had strong enough relationship with the items they measured (as all factors loaded over 0.3), indicating that there was evidence to suggest that the items were measuring the construct as the factor they were assigned to. It was also found that some items had stronger relationships with their assigned factors. As an example, an item (question) with a factor loading score of 0.830 (SA1 – “Increasing environmental pollution (e.g., increase in carbon emissions) is a major threat to our society”) was more likely to be measuring the sustainability awareness construct than an item with a lower factor loading score like 0.463 (SA2 – “Firms are majorly responsible for environmental pollution”) or 0.471 (SA3 – “Firms want to reduce environmental pollution”). Similarly, EI5 (“In our company we intentionally make changes to processes to use the least amount of energy and resources”) had the lowest loading in the eco-innovation practices construct while EI2 (“We work with clients/suppliers for the ecological design of products”) had the highest factor loading. Therefore, items EI1-EI4 were better at identifying the eco-innovation construct than EI5. In the stakeholder pressure and government pressure construct the loadings were similar. Overall, the findings provide evidence to support the validity of the identified factors and their relationship to the specific items measured.

The study assessed the theoretical hypotheses through a path model in figure 7. The model fit was assessed using several indices, indicating a good fit. Hypothesis testing was conducted, and the formed hypotheses were found not significant. However, the correlations between sustainability awareness and eco-innovation, eco-innovation and stakeholder pressure, and sustainability awareness and stakeholder pressure were statistically significant, showing that companies that have a higher level of sustainability awareness may be more likely to engage in eco-innovation and respond to stakeholder pressure and that companies with higher levels of stakeholder pressure also implement higher levels of eco-innovation practices.

### **3.2. Qualitative results**

After conducting the interviews and working through the transcripts, the findings were condensed into summarized key points that can be found in appendix 4. Directed content analysis was carried out by determined themes that were based on previous studies. Three main themes had been established: the effects of internationalization on environmental sustainability and eco-innovation,

foreign stakeholder pressure and the role of government and NGOs whose findings are shown in the following subparagraphs.

Regarding their opinion on environmental sustainability, most companies stated they consider environmental sustainability important and implement sustainable means because of their internal values and intrinsic motivation to minimize environmental pollution, their carbon footprint; also, to mitigate the issues related to climate warming and protect the nature as 4 of the companies had been born green, with sustainability tightly embedded into their principles. Generally, the interviewed companies want to reduce their environmental impact, with some even making it a central topic in their operations even though several challenges such as managing certain types of waste are also mentioned. Some companies are driven by the demand from clients or wanting to change consumer mindset, while others hope to be leaders in sustainability and motivate others to be sustainable as well.

The interviewed firms notice the importance of environmental sustainability increasing, as was stated by company 7: "...now it's becoming more and more relevant. I personally see it is now time to get aboard the train and those who won't, will be left behind." Companies 3 and 6 stated their goal by being environmentally sustainable is to set an example to others as a responsible partner and a member of the community. Company 5 also made a mention about foreign customer demand as the main reason for their striving towards higher sustainability and eco-innovation: "The main motivation would be sales as the customers really appreciate it - they make the decision to buy largely based on the eco friendliness labels and in Estonia it is not this way yet." Overall, the importance of sustainability is emphasized and the need for more attention and action in this area is highlighted.

### **3.2.1. The effects of internationalization on firms' environmental sustainability and eco-innovation**

The attention towards greater environmental sustainability has only started a few years ago in Estonia whilst the export markets have had the requirement for longer and it is becoming more common across Europe: "As far as I remember, five years back, even the first year we started to cooperate with them, we were asked the same sustainability report, now it comes up more and more".

More than half of the interview participants recognize the impact of internationalization towards increased attention to their environmental sustainability: “The foreign markets are the main driving force towards sustainability.” Several companies stated that their foreign customers require them to fill in sustainability reports to ensure they qualify to partner up with them. Expanding to foreign countries has also forced the companies to acquire environmental certifications “...the feedback was that all the products are very lovely, but you need certification...” which in turn have helped the companies to communicate their sustainability and push towards finding ways to be more innovative. Eco-innovation in packaging and transportation has been born thanks to exporting, motivated by lowering transportation costs but also lowering the transport-related CO2 levels. Two companies out of ten stated their environmental practices come from the philosophy of the company but they have acquired knowledge of good practices on export markets. From the qualitative results, it can be deduced that there is a lack of consistency in sustainability awareness and practices among companies to different sizes in Estonia. Companies operating only locally may not pay as much attention to sustainability as larger or internationalized companies and it can be further deduced that foreign markets are the driving force towards sustainability with higher demand for environmentally sustainable products,

### **3.2.2. Foreign stakeholder pressure**

The qualitative findings show significant role of customers and their demand in the environmental sustainability and eco-innovation of the interviewed enterprises. Those dealing with larger foreign customers notice bigger customer pressure through them asking for sustainability reports and certifications. The level of knowledge and interest of big companies towards environmental sustainability tends to be higher. The interviewed firms also find that the high environmental awareness level of their foreign customers helps to learn and gain valuable knowledge for their own practices.

Main communication with customers takes place through the companies’ websites, social media, regular meetings, and sales processes as well as via labels on products such as the ECOCERT that help transmit the sustainability message: “...when we do demos for the new clients, then we underline what are the principles towards the sustainability in our company.” The companies already born green, stated that they experience high customer involvement in product design processes where they gather ideas from their customer community for better handling of waste and further eco-innovation. Some enterprises also show their processes to customers by inviting them

to their premises to get an overview of their production eco-efficiency: “Our customers also visit the factory to see the production...” and “...we do a lot of tours in our rooms as well, focused on the sustainability aspect...”

Besides customers, the participants showed the importance of competitors in their environmental sustainability and eco-innovation, especially in Northern Europe and countries such as Norway, Sweden, and Denmark. One participant mentioned that since ESG is something new in Estonia, monitoring competitors is important to gather information on how to design their own ESG strategies. International competitors tend to have worked on their environmental sustainability communication and awareness and therefore, monitoring them is important to stay in competition: “...we know we have to do it also because otherwise, we won't be on the market anymore. We look at what they do and try to do the same things.”

Two participants also mentioned that their own environmental principles give them a competitive advantage comparing to their competitors because of the characteristics of their competitors that do not practice environmental sustainability. And one showed concern for greenwashing coming from competitors that do not own any certification but communicate themselves as green. Competition considering green measures was seen positive:” ... I think that that competition is very healthy in this regard, that it will push others forward as well...” and that SMEs could work together to pursue mutual goals:” ...I would like to see more collaboration and healthy competition to see who can be the greenest etc. I think we could also partner up with other companies to import some products for example a more sustainable producer. I think there is potential also in banding together and forming an association.” Only a few companies mentioned collaboration is done to some extent with others to gain new information and support. Bigger competitors tend to have more resources to dedicate towards sustainability efforts as per the interviewees,

Based on the study findings, customers play a significant role in the environmental sustainability and eco-innovation of internationalized SMEs. Several companies actively seek customer feedback and implement changes based on their needs. Customers are also involved in the product design process. The companies tend to communicate their sustainability efforts through product labels, certificates, on-premises tours, websites, and sales processes.

### **3.2.3. The role of government and NGOs**

The general perception of the participants on the role of the government in their environmental sustainability was generally neutral – there are some guidelines and some laws, however not enough guidance or support: “What we get from the government at the moment is basically dos and don'ts, and basically I feel that we have to find their own way how to achieve them...” and “...I don't feel that there are hurdles put in our way, but I also don't feel like there is big support...”

EAS, Rohetiiger and the Chamber of Commerce were mentioned as the most helpful Estonian organizations for the participants that also provide useful trainings. Also, the participants expressed that the EU makes exporting easier if there are similar rules across the territory, valuing similar regulations that facilitate foreign operations. Monetary support from the government was mentioned as crucial for SME since smaller companies have less resources to spare on improving their sustainability processes. It was mentioned by one participant that the government should transmit a more receptive attitude towards greater environmental sustainability with their own practices in public procurement: “...if public procurement will only indicate the price as the only criteria, then it doesn't really reflect the idea of sustainability...”

From non-governmental organizations, consulting companies had been mentioned as helpful with guidance towards laws and regulations and with providing advice. Several participants also mentioned free Internet resources that they use to stay informed on the topic. Tallinna Loomelinnak and business organizations had been mentioned as support. Electricity price raise has also affected the environmental sustainability and need for eco-innovation of one of the participants that mentioned switching to the use of solar power has made their production greener.

While participants expressed a neutral perception of the government's role in environmental sustainability, they identified several helpful organizations and resources. Monetary support from the government was highlighted as crucial for small companies, and it was suggested that the government should lead by example in public procurement. A need for increased guidance and support for SMEs to improve their sustainability practices was expressed by most of the participants.

### **3.2.4. Summary of the qualitative results**

The qualitative results section of this study presents the findings from an interview-based investigation into the attitudes and practices of Estonian companies concerning environmental sustainability and eco-innovation. In order to analyse the data, directed content analysis was utilized, with three main themes emerging: the impact of internationalization on sustainability and eco-innovation, the influence of foreign stakeholders, and the role of government and non-governmental organizations.

Most participants shared a common view that environmental sustainability is of utmost importance, driven by intrinsic motivation and a desire to mitigate their environmental footprint. Most of the companies also agreed that foreign markets played a critical role in driving the increased attention to sustainability, with foreign customers increasingly demanding sustainability reports and certifications. It was further noted that larger companies and international competitors tended to possess higher levels of knowledge and interest in environmental sustainability, and several participants acknowledged that monitoring competitors played a crucial role in designing their own environmental strategies.

Regarding the role of the government, it was perceived as neutral and in need of further support and guidance from policymakers. Participants stressed that there is a need for greater involvement from the government in the promotion of environmental sustainability and eco-innovation, as well as the development of policies to support these initiatives. Overall, the findings suggest that Estonian companies recognize the importance of environmental sustainability, but that further action is necessary to facilitate the transition towards a more sustainable and eco-innovative business landscape.

## **3.3. Discussion**

The hypotheses in this thesis were formulated based on an exhaustive review of the pertinent literature and previous studies, which have established that internationalization has significant positive effects on the environmental sustainability and eco-innovation of companies compared to those that do not export (Forslid et al., 2018; Torrecillas & Fernandez, 2022). However, most of the prior studies have focused on large firms and different economic circumstances. This study intended to investigate whether the correlative findings of earlier research on internationalization,

environmental performance, and stakeholder role (Hojnik et al., 2018; Nguyen & Adomako, 2021) were transferable to SMEs in the manufacturing sector of Estonia.

The mixed methodology approach used in the present paper revealed a potential central tendency bias in the qualitative research component, that was followed up by a qualitative component to achieve greater clarity on the findings. Although the quantitative analysis identified differences between internationalized and non-internationalized SMEs in terms of their participation in business networks that support environmental sustainability, and the exploratory factor analysis revealed factors that aligned with the theoretical framework of this thesis, the hypotheses testing did not show significant differences between the aforementioned groups. The findings of this study were analysed using Structural Equation Modelling (SEM), which demonstrated statistically significant relationships between sustainability awareness and eco-innovation ( $p=0.008$ ) and between eco-innovation and stakeholder pressure ( $p=0.002$ ) at  $\alpha=0.05$ . The results suggest that as companies' sustainability awareness increases, their eco-innovation practices also increase, and higher stakeholder pressure leads to more eco-innovation practices being implemented by the companies.

In contrast to the qualitative investigation of the impact of internationalization on eco-innovation of Hojnik *et al.* (2018), the author of thesis employed a more detailed approach by conducting purposive sampling interviews. This method allowed for a closer examination of the specific factors within the internal and external dimensions that contribute to the relationship between internationalization and eco-innovation. The relationships that were found significant in SEM, were confirmed by the qualitative findings of the interviews carried out amongst internationalized companies that were inclined towards operating on foreign markets having a significant effect on improving their eco-innovation and environmental sustainability practices through stakeholder pressure (customer demand as well as competitors' role) and learning from their experience abroad. The qualitative results also confirmed the importance of SMEs of collaborating and cooperating with peers to fill in gaps coming from SME resource shortage (Dasgupta, 2021). The interviewees saw international markets as their main drivers for sustainability and eco-innovation and in turn, environmental sustainability as a crucial part of their success and competitive advantage in foreign markets, confirming the findings of Dey *et al.* (2022) around the adoption of CE practices needing internal motivation as well as support from stakeholders and policymakers. It was found that especially corporate clients tend to pay more attention to environmental sustainability, confirming the findings of previous studies where company size had been found



affected their environmental practices (Swiadek *et al.*, 2022). It was concluded that foreign customers are more likely to ask for sustainability reports and certifications, which can impact the company's ability to export.

Though most studied companies operate within the EU, the expectations and regulations can differ from market to market. It was also highlighted that under eco-innovation practices, foreign markets have forced the interviewed SMEs to think about ways of more sustainable transportation and recycling. Therefore, the value perceived of enhanced environmental sustainability of Estonian SMEs in international trade is an additional qualitative contribution of the research to fill the gaps in current existing literature.

On the other hand, the role of the government was seen mainly neutral, and participants expressed their expectations on government taking on a bigger responsibility in guiding and supporting SMEs that often lack as many resources as large companies as well as in regulating the labelling of products to increase transparency and help mitigate issues such as greenwashing. Challenges in waste management had also been brought out that is where policymakers could step in. Bakos *et al.* (2020) in their literature review had found lack of government's support one of main barriers to the adoption of environmental sustainability in SMEs. Furthermore, governments can display their support directly through Green Public Procurement which for now is a voluntary action though as public authorities making up 14% of EU GDP (European Commission, 2023d), the qualitative results show that SMEs find it highly influential. Environmental sustainability has been found to, amongst its other benefits, lead to an improved economic performance of companies (Khoja *et al.*, 2022; Suchek *et al.*, 2022) which, if looked into in long-term returns could motivate economic aspects-driven governments to invest in it. Therefore, the author concludes that with greater policymakers' guidance and support on environmental issues could help Estonian SMEs and in turn, Estonian economy to improve with increased exports. Governmental support and guidance are especially crucial as Europe is striving to become the first climate-neutral continent by 2050 as per the European Green Deal (European Commission, 2023a).

Moreover, governmental guidance has the potential to support the SMEs that have not yet internationalized or are planning to do so, given that the internationalization of SMEs has been shown to provide them with valuable knowledge, promote eco-innovation, and enhance environmental sustainability. Incentivising and praising environmentally friendly actions and companies could be initiated. Furthermore, it is encouraged to form associations of SMEs with their peers and policymakers to encourage doing so to overcome barriers such as lack of resources

or knowledge and foster collaborative efforts for mutual benefit. Several such initiatives have already been established by the New Circular Economy Action Plan, which aims to enhance tools and measurements for circularity and promote carbon removal incentives (European Commission, 2020).

The author of this thesis aimed to create greater awareness about the significance of uniform international environmental regulations for companies, and to emphasize the potential advantages for internationalized SMEs in terms of enhanced environmental sustainability. The author intended to make a valuable contribution to the ongoing discourse on the necessity for more extensive environmental regulations in the context of international business, while underscoring the potential benefits for SMEs that embark on internationalization strategies. By focusing on these issues, the author sought to shed light on the importance of adopting environmentally sustainable practices and encourage greater attention to environmental concerns in international business operations. Ultimately, this thesis was designed to promote greater awareness, understanding, and action with respect to environmental sustainability in the international business arena

This thesis had several limitations, including the use of a sample composed solely of Estonian manufacturing companies, which may not be representative of SMEs across other industries or regions. Additionally, potential central tendency bias in the quantitative study may have influenced the results. Future research could overcome these limitations by employing cross-sectional sampling to obtain a more comprehensive understanding of SMEs across industries and regions. Furthermore, the investigation of different stakeholder roles in greater detail, as well as the grouping of SMEs by size and business type (B2B, B2C, and both), could provide a more nuanced perspective on the relationship between internationalization, environmental sustainability, and eco-innovation.

## CONCLUSION

The aim of the present thesis was to address the gaps of research into the effects of internationalization on the eco-innovation and environmental sustainability of small and medium-sized enterprises in the context of a developed country. Prior studies that had identified a positive association between internationalization, environmental sustainability, eco-innovation, (Torrecillas & Fernandez, 2022; Hojnik *et al.*, 2018) and stakeholder pressure (Nguyen & Adomako, 2021) had mostly been conducted amongst larger companies. Consequently, the impact of internationalization on SMEs in developed countries remained unclear, in spite of the critical role of SMEs in the economy and in addressing environmental concerns. This thesis contributes to the existing literature by examining the effects of internationalization on the environmental sustainability and eco-innovation of SMEs in developed countries, as well as the influence of stakeholder pressure on these outcomes.

The quantitative findings of the study suggest that there is a significant correlation between sustainability awareness and eco-innovation, as well as between stakeholder pressure and eco-innovation. This implies that companies that are more environmentally conscious are more likely to adopt eco-innovative practices, and that stakeholders have an impact on the extent to which these practices are implemented. By understanding these relationships, companies can make informed decisions about how to prioritize and address sustainability-related issues. Additionally, the results show that internationalized companies are more likely to participate in business networks that support environmental sustainability.

The study tested three hypotheses based on previous research using structural equation modelling (SEM) on a sample of 271 SMEs in the Estonian manufacturing industry. However, the study found that the grouping factor of internationalization had no effect on the companies' sustainability awareness or their application of eco-innovation practices in response to stakeholder pressure, meaning that there was no difference between internationalized (exporting) or non-internationalized (only operating locally) companies. It is worth noting that these results may be

subject to central tendency bias and industry-specific factors. Qualitative research was also conducted to further explore these differences.

The qualitative results were retrieved via conducting semi-structured interviews with 10 of the companies that participated in the survey and that operate on foreign markets. The qualitative study results emphasised the role of foreign pressure, including customer demand and competitors in the eco-innovation and environmental sustainability of the participants and determining their success when competing internationally. The qualitative results also indicated that the role of the government does not have a significant impact on their environmental means, however the interviewees mentioned more support and guidance from the institutions is needed.

Rather than being viewed as isolated and mutually exclusive, economic growth and addressing environmental issues must be pursued simultaneously to ensure the wellbeing of the planet. This approach also provides an opportunity to develop resource-intensive innovative solutions to the existing environmental problems and their expanding effects. The qualitative study results showed that internationalized SMEs implement eco-innovation and environmental sustainability practices mostly because of foreign stakeholders' pressure (customers, partners, and competitors) and gain valuable knowledge from doing business abroad. The suggestions the author would like to present as a result of the present thesis to SMEs follow:

- To expand operations abroad, SMEs should prioritize the implementation of eco-innovation practices and emphasize environmental sustainability. Obtaining internationally recognized environmental certificates is highly encouraged to strengthen the credibility of the company's commitment towards sustainable business practices.
- Consideration of a shift towards a circular business model through eco-innovation practices is recommended to address resource limitations, enhance supply chain independence, and reduce waste. Switching to solar and other renewable energy sources can reduce energy costs and improve the environmental sustainability of production processes.
- Collaboration with industry peers and formation of associations can facilitate knowledge-sharing, overcome resource constraints, and promote adoption of best practices.
- SMEs can encourage their partners to follow green standards and adopt best practices.
- Seeking guidance from professionals and participating in government-supported programs can support eco-innovation and environmental sustainability efforts.

Further recommendations to policymakers include enhancing current institutional support, increasing resources allocated to sustainability training and education, and fostering collaborations between companies and innovation hubs such as universities. Additionally, guiding regulations for product labelling, including valid certifications, CO2 footprint calculations, and waste management, are needed to promote green product transparency and mitigate greenwashing.

The limitations of the current thesis come from research done in one sector - manufacturing sector, therefore the author proposes further research could be done to study the effects in-depth across different sectors and also cross-sectionally. Additionally, a study of different markets could yield valuable insights. To identify potential influential differences, SMEs could be grouped by size and business type, using the mixed methods and proposed model that had been employed in the current study. Moreover, as the role of stakeholders was found important in the current thesis, a more detailed examination of various stakeholder groups would be necessary to gain a more comprehensive understanding on their effects on environmental sustainability and eco-innovation.

## KOKKUVÕTE

### EKSPORDIST TULENEV ÖKOINNOVATSIOON JA KESKKONNASÄÄSTLIKKUS VÄIKESTES JA KESKMISE SUURUSEGA ETTEVÕTETES

Siret Ulp

Väikesed ja keskmise suurusega ettevõtted (VKEd) moodustavad maailmas kõigist ettevõtetest ligikaudu 90% (The World Bank, 2023a) ning Euroopa Liidus 99% (European Commission, 2023e), mistõttu on neil kollektiivselt ülioluline roll ühiskonnas ja selle väljakutsetes, kaasa arvatud keskkonnaprobleemidega tegelemises. Seda veelgi enam väikestes riikides nagu Eesti, mille ökotõhusus ehk loodud majanduslik väärtus *versus* keskkonnamoormus (Yamasaki *et al.*, 2021) on madal ning mis kuuluvad ökoinnovatsiooni näitajates Euroopa Liidu keskmiste hulka (European Commission, 2023c). Selleks aga, et oleks võimalik välja töötada paremaid uuenduslikke lahendusi, on vajalik ettevõtete ja majanduse kasvamine, kuna keskkonnaprobleemidega tegelemine eeldab märkimisväärset ressursside olemasolu, mida VKEdel sageli napib.

Rahvusvahelistumist ehk ettevõtete laienemist rahvusvahelistele turgudele on peetud tõhusaks lahenduseks VKEde kasvamiseks (Wakkee *et al.*, 2015). Uuringud näidanud, et rahvusvaheliselt tegutsevad (eksportivad) ettevõtted on keskkonnasäästlikumad kui mitteeksportijad (Forslid *et al.*, 2018) ning nad panustavad rohkem ökoinnovatsiooni (Torrecillas & Fernandez, 2022; Nguyen & Adomako, 2021). Lisaks on leitud, et sidusrühmade surve suureneb ökoinnovatsiooni rakendamise veelgi (Nguyen & Adomako (2021)). Varasemalt ei ole aga arenenud riikide VKEsid uuritud: Hojnik *et al.* (2018) uurisid erineva suurusega ettevõtteid, Torrecillas & Fernandez (2022) rahvusvahelisi ettevõtteid ning Nguyen & Adomako (2021) arenevat turgu, mistõttu on uurimises lünk, mida käesoleva magistritööga püüti täita.

Magistritöö eesmärgiks oli uurida rahvusvahelistumise mõju VKEde ökoinnovatsioonile ja keskkonnasäästlikkusele arenenud riigi kontekstis. Magistritöö uurimisprobleemiks oli teadmiste

piiratus rahvusvahelistumise mõjust VKEdel ökoinnovatsioonile ja keskkonnasäästlikkusele. Töö eesmärkide saavutamiseks püstitati eelnevate uuringute põhjal järgmised hüpoteesid:

Hüpotees 1.: rahvusvahelistunud VKEdel on parem keskkonnateadlikkus kui mitterahvusvahelistunud VKEdel.

Hüpotees 2.: rahvusvahelistunud VKEd rakendavad toodete ja protsesside kujundamisel rohkem ökoinnovatsiooni kui mitterahvusvahelistunud VKEd.

Hüpotees 3.: rahvusvahelistunud VKEd kogevad rohkem sidusrühmade survet keskkonnasäästlikkuse praktiseerimiseks kui mitterahvusvahelistunud VKEd.

Uuringu valimiks oli 271 Eesti töötleva tööstuse VKEd ning uurimiseesmärkide saavutamiseks kasutati nii kvantitatiivseid kui kvalitatiivseid meetodeid – veebiküsitlust, millele järgnes 10 poolstruktureeritud süvaintervjuid. Kvantitatiivsete andmete analüüsimiseks kasutati struktuurivõrrandi modelleerimist (SEM), mis kinnitas seoseid jätkusuutlikkuselase teadlikkuse, huvirühmade surve ja ökoinnovatsiooni praktikate vahel. Nii jätkusuutlikkuselase teadlikkuse ja ökoinnovatsiooni kui sidusrühmade surve ja ökoinnovatsiooni vahel leiti seos, mis tähendab, et keskkonnateadlikumad ettevõtted võtavad tõenäolisemalt kasutusele uuenduslikke meetodeid ja sidusrühmad mõjutavad seda, mil määral neid meetodeid rakendatakse. Kvalitatiivsed uurimistulemused pärast intervjuude sisuanalüüsi näitasid, et rahvusvahelistunud VKEd rakendavad ökoinnovatsiooni ja keskkonnasäästlikkuse praktikaid peamiselt välismaiste sidusrühmade (kliendid, partnerid ja konkurendid) surve ning saavad väärtuslikke teadmisi äritegevusest rahvusvahelistel turgudel. Lisaks näitasid tulemused, et rahvusvahelistunud ettevõtted osalevad suurema tõenäosusega keskkonnasäästlikkust toetavates äriõrgustikes, kinnitades rahvusvahelistumise positiivset mõju ettevõtete ökoinnovatsioonile ja keskkonnasäästlikkusele.

Magistritöö tulemusena esitas autor järgnevad ettepanekud:

- Välisurgudele laienemisel peaksid VKEd seadma prioriteediks ökoinnovatsiooni praktikate ja keskkonnasäästlikkuse tähtsuse suurendamise. Rahvusvaheliselt tunnustatud keskkonnasertifikaadid on sealjuures usaldusväärse suurendamiseks soovitatavad.

- Ressursipiirangutega tegelemiseks, tarneahela sõltumatuse suurendamiseks ja jäätmete tekkimise vähendamiseks on soovitatav kaaluda üleminekut ringse ärimudeli poole ökoinnovatsiooni praktikate kaudu.
- Päikese- ja muudele taastuvatele energiaallikatele üleminek võib vähendada energiakulusid ja parandada tootmisprotsesside keskkonnasäästlikkust.
- Koostöö teiste ettevõtetega ja ühenduste loomine võib hõlbustada teadmiste jagamist, ületada ressursipiiranguid ja aidata kaasa parimate tavade kasutuselevõtule.
- VKEd võiksid partneritelt nõuda roheliste standardite järgimist.
- Spetsialistidelt abi ja nõu otsimine ning valitsuse toetatavates programmides osalemine võib toetada ökoinnovatsiooni ja keskkonnasäästlikkust.

Täiendavad soovitused poliitikakujundajatele hõlmavad olemasolevate toetuste ning jätkusuutlikkuse koolitusele ja haridusele eraldatud ressursside mahu suurendamist ning ettevõtete ja innovatsioonikeskuste, näiteks ülikoolide vahelise koostöö edendamist. Lisaks on keskkonnasäästlike toodete läbipaistvuse edendamiseks ja rohepesu leevendamiseks vajalikud toodete märgistamise regulatsioonid.

Antud magistritöö piirangud tulenevad vaid ühes sektoris (tootmissektoris) läbiviidud uuringust, mistõttu soovitab autor läbi viia täiendavaid uuringuid ka teistes sektorites. Lisaks võib erinevate turgude uurimine anda väärtuslikku teavet. Samuti võiks VKEd rühmitada suuruse ja äritüübi järgi, kasutades käesolevas uuringus rakendatud meetodeid ja väljatöötatud mudelit. Kuna käesoleva tööga kinnitati sidusrühmade rolli olulisust, oleks vajalik sidusrühmade üksikasjalikum uurimine, et saada terviklikum arusaam nende mõjust keskkonnasäästlikkusele ja ökoinnovatsioonile.



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## APPENDICES

### Appendix 1. Fields of activity (full list)

Field of activity	n	%
Manufacture of fabricated metal products, except 18= machinery and equipment	41	15%
Manufacture of wood and of products of wood and cork	30	11%
Manufacture of furniture	26	10%
Manufacture of machinery and equipment	22	8%
Manufacture of wearing apparel	19	7%
Manufacture of food products	18	7%
Printing and reproduction of recorded media	11	4%
Manufacture of rubber and plastic products	10	4%
Manufacture of textiles	9	3%
Manufacture of beverages	8	3%
Manufacture of basic metals	6	2%
Manufacture of motor vehicles, trailers and semi-trailers	5	2%
Manufacture of leather and related products	3	2%
Manufacture of paper and paper products	3	1%
Manufacture of chemicals and chemical products	3	1%
Manufacture of computer, electronic and optical products	3	1%
Manufacture of other transport equipment	3	1%
Manufacture of other non-metallic mineral products	2	1%
Manufacture of electrical equipment	2	1%
Production of natural cosmetics	2	1%
Service	2	1%
Outdoor advertising production	1	<1%
Production of lumber and base material	1	<1%
Projection	1	<1%
Production of hygiene and cosmetic products	1	<1%
Production of fishing gear	1	<1%
Garage and industrial doors	1	<1%
Fabric weaving	1	<1%
Making dental prostheses	1	<1%
Handicraft	1	<1%
Manufacture of interior textile products to special order, including curtains, decorative pillows, bed covers, etc	1	<1%



## Appendix 1 continued

Field of activity	n	%
Handiwork. Making folk clothes	1	<1%
Food production, crafts, farming, trainings, event management	1	<1%
Production of cosmetics and household chemicals	1	<1%
Manufacture of stone coverings	1	<1%
Refrigeration technology	1	<1%
Production of musical instruments	1	<1%
Ship repair	1	<1%
Wood restoration	1	<1%
Production of wooden parts for the furniture industry	1	<1%
Production of wood products (doors/windows/stairs) and furniture	1	<1%
Embroidery on clothes	1	<1%
Production of houses	1	<1%
Metal coating	1	<1%
Making smoked meat	1	<1%
Metalworking and coating of metal surfaces	1	<1%
Food processing	1	<1%
Production of metal structures and their parts	1	<1%
Production from natural and artificial stone	1	<1%
Manufacture of metal products, including machinery and equipment	1	<1%
Sudoremont	1	<1%
Forest management	1	<1%
Manufacture of textile articles not elsewhere classified	1	<1%
Metal finish, glass ball cleaning	1	<1%
Printing industry - mainly polyester fabric processing	1	<1%

## Appendix 2. Questionnaire.

### **Firm's sustainability awareness and practices**

#### **Firm's sustainability awareness**

1 = completely disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = completely agree

SA1 Increasing environmental pollution (e.g., increase in carbon emissions) is a major threat to our society

SA2 Firms are majorly responsible for environmental pollution

SA3 Firms want to reduce environmental pollution

SA4 Adopting circular (e.g., reduce, reuse, and recycle) initiatives reduce the environmental pollution

#### **Firm's eco-innovation and sustainability practices**

1 = completely disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = completely agree; 6 = Not applicable

EI1 In our company, we have replaced non-recyclable raw materials with renewable, recyclable, or biodegradable inputs

EI2 We work with clients/suppliers for the ecological design of products

EI3 During the design stage, we consider the possibility to reuse products after they have served their initial purpose

EI4 We are using recycled materials as inputs in our processes

EI5 In our company we intentionally make changes to processes to use the least amount of energy and resources

1 = completely disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = completely agree

EI6 In our organisation, we have a strong understanding of the circular economy practices

EI7 In our organisation, we use external help for environmental sustainability support (such as sustainability consultants or support)

### **Stakeholder and government pressure**

1 = completely disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = completely agree

#### **Stakeholder pressure**

SP1 'Management will' is necessary for taking valuable steps supporting effective CE in the firm

SP2 Employees put pressure on our company to pursue sustainable environmental practices

SP3 Investors put pressure on our company to pursue sustainable environmental practices

SP4 NGOs put pressure on our company to pursue sustainable environmental practices

SP5 Competitors put pressure on our company to pursue sustainable environmental practices

SP6 In our company, we are subject to reviews and audits of environmental practices from our suppliers/customers

#### **Government pressure**

GP1 Laws and regulations at the local state level have guided the company on environmental protection and circular production

GP2 The government put pressure on our company to pursue sustainable environmental practices

GP3 We participate in a business network (e.g., chamber of commerce) that supports our environmental sustainability

### **Sample characteristics**

#### **Position of respondent**

## Appendix 2 continued

	Owner
	Production Manager
	Marketing Manager
	Supply chain Manager
	Quality Manager
	Others (specify)
<b>Gender of respondent</b>	Male
	Female
	Prefer not to say
<b>Education level</b>	Doctorate
	Master's
	Undergraduate
	Diploma/certificate
<b>Firm size</b>	
	≤9
	10-49
	50-249
	≥250
<b>Founding year</b>	Insert Text
<b>Business Type</b>	
	B2B
	B2C
	Both
<b>Field of activity</b>	
	Manufacture of food products
	Manufacture of beverages
	Manufacture of tobacco products
	Manufacture of textiles
	Manufacture of wearing apparel
	Manufacture of leather and related products
	Manufacture of wood and of products of wood and cork
	Manufacture of paper and paper products
	Printing and reproduction of recorded media
	Manufacture of coke and refined petroleum products
	Manufacture of chemicals and chemical products
	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	Manufacture of rubber and plastic products
	Manufacture of other non-metallic mineral products
	Manufacture of basic metals
	Manufacture of fabricated metal products, except machinery and equipment
	Manufacture of computer, electronic and optical products
	Manufacture of electrical equipment
	Manufacture of machinery and equipment
	Manufacture of motor vehicles, trailers and semi-trailers
	Manufacture of other transport equipment
	Manufacture of furniture
	Other (Specify)
	<b>Our organization operates on international markets (incl. direct or indirect export, contract or product/ service licensing)</b>

## Appendix 2 continued

Yes

No

Planned

### Environmental Certifications

ISO 14000 family

Eco-Management and Audit Scheme (EMAS)

Other (Please specify)

Don't have

### **Appendix 3. Interview protocol**

Purpose: Gain deeper understanding of the environmental sustainability and eco-innovation practices in internationalized Estonian SMEs.

#### Conducting an interview

1. Welcome participants: Good morning. Thank you for taking the time to join me for this interview today.

2. Introduce yourself: My name is Siret and I'm here on behalf of Tallinn University of Technology, School of Business and Governance, with a study on the environmental sustainability and eco-innovation of Estonian SMEs.

3. Purpose: The purpose of the interview is to gain deeper understanding of the environmental sustainability and eco-innovation practices in internationalized Estonian SMEs.

4. Ensure confidentiality: We are committed to maintaining your confidentiality, we are interested in your points of view and not in who said what, you will stay anonymous.

5. Begin with an introduction of the participant – would you like to present yourself briefly?

6. Question 1: How many foreign markets do you operate in? Which are the main countries? How long have you operated abroad? What portion/ percentage of your production goes abroad?

7. Question 2: What is your company's opinion on environmental sustainability? What is your company's motivation behind eco- / sustainable innovations?

8. Question 3: How did expanding to foreign markets change your environmental sustainability? How did expanding to foreign markets change your eco-innovation? How was the change managed?

10. Question 4: What is the role of customers in your environmental sustainability and -innovation? How was consumer involvement on your product design? How did you communicate your sustainability to your consumer? How is the communication happening between your company and consumer?

What is the role of local governments in your environmental sustainability and -innovation?

What is the role of competitors in your environmental sustainability and -innovation?

What is the role of NGOs in your environmental sustainability and -innovation?

11. Thank the participant, and inform him/her about the next steps

Thank you. This was the last question. Would you like to add anything else? Then this finalizes our interview. We will analyse the results and if you are interested, we can send you the summary of the results.

## Appendix 4. Summary of interview transcripts

**Q1:** How many foreign markets do you operate in? Which are the main countries? How long have you operated abroad? What portion/ percentage of your production goes abroad?

- Foreign markets: worldwide markets (2); 13 countries; only operating in foreign markets (3), “We consider our home market the Scandinavian countries”.
- Main countries: Germany (2), the US (2), Finland (8), Sweden (6), Norway (3), Denmark (1); Switzerland (2), Czech Republic (2), Belgium (1), Latvia (1), China (1).
- 10 + years; 5 years; 21 years; 6 years; always – 10 years; 3 years; 8 years; 2,5 years; since the founding – 14 years; since 1991 (32 years).
- 90% of the production goes abroad; 75-80% goes abroad; 55% goes to export; 100% abroad (3); 20-25%; 30-50%; 5%; 70% .

**Q2:** What is your company’s opinion on environmental sustainability? What is your company’s motivation behind eco- / sustainable innovations?

- Considering environmental sustainability very important (8).
- Step-by step implementing different environmental measures; noticing trends towards higher environmental sustainability.
- Aiming to be responsible.
- “The founders of the company are very environmentally minded from the start.”
- Supporting it any way possible but the history and mindset of older workers makes it complicated.
- Reporting and sales in Finland heavily enforcing environmental sustainability.
- “The focus of the company is on sustainability, it's a central topic to us and we believe that every company has to do change the ways they are looking at the resource is the planet provides.”
- “We think about the climate warming and how to protect the nature and avoid climate warming.”
- Trying to keep the environmental impact low.
- It is in the strategy of the company, one of the focus points.
- Understanding on the impact of environmental damage and wanting to contribute for a cleaner world and not harm the environment (3).
- The demand from clients (3).
- To change the mindset of the consumers (2).
- “We would like to be the leaders and motivate others to be sustainable as well.”

**Q3:** How did expanding to foreign markets change your environmental sustainability? How did expanding to foreign markets change your eco-innovation? How was the change managed?

- There is a difference between local and foreign customers, corporate clients tend to pay more attention to environmental sustainability, foreign markets are the driving force towards sustainability.

## Appendix 4 continued

- Sustainability reports are now asked to be filled in by foreign customers more frequently than before.
- No change since the motivation is internal.  
It can be different from market to market in terms of expectations and regulations.
- Foreign markets forced to get a certification (3), without it it would have been impossible to export
- Foreign markets made to think about more sustainable transportation and recycling.
- Depending on the market – China is not a leader in sustainability but Germany, France etc do demand it.
- Change management step-by-step.

**Q4:** What is the role of customers in your environmental sustainability and -innovation? How was consumer involvement on your product design? How do you communicate your sustainability to your consumer? How is the communication happening between your company and consumer?

- Some customers are in big international programs and have high knowledge and interest in sustainability, they also send their questionnaires about sustainability to partners to fill in, there are meetings with new customers where sustainability and environmental information is presented.
- Environmental certificates are always presented to customers.
- Always trying to improve according to customers' needs.
- Customers give their ideas and feedback; + via questionnaires and letters.
- Product label and home page are used to communicate eco-friendliness as well as during sales.
- Customers asking about waste, there is active interest and communication.
- Clients are given tours on premises to see the sustainable processes; they are happy to see that companies take action.
- Certification info is sent out to customers.
- Some customers request producing from only recycled materials.

**Q5:** What is the role of local governments in your environmental sustainability and -innovation?

- Environmental portals and programs such as Rohetiiger, EAS.
- It is important that across EU the rules are similar to facilitate exportation, "Estonia joining the EU in 2004 was the best in this sense."
- Right now, the governmental support is not much felt – they provide "dos and "don'ts" but no guidelines.
- It would be important for governments to implement sustainable practices and provide guidelines.
- Monetary support focus to sustainability from the governments is important to SMEs.
- Currently no significant involvement from government.

**Q6:** What is the role of competitors in your environmental sustainability and -innovation?

## Appendix 4 continued

- Some competitors have high environmental awareness and since there is not much information on ESG in Estonia, monitoring them is helpful for building a sustainability strategy.
- The sustainability of the company gives it a competitive advantage ahead of competitors.
- To stay in the market, there is a need to keep up with the competitors and do what they are doing with regards to foreign countries.
- Some collaboration is being done with others to get new information and support.
- Bigger competitors have more resources to put towards sustainability.

**Q7:** What is the role of NGOs in your environmental sustainability and -innovation?

- Consultants are contacted regarding laws, regulations, guidance.
- Internet materials are being used for free information.
- Chamber of commerce and Rohetiiger amongst other organizations are invited to give presentations to employees.
- Electricity prices going up made the company switch to solar energy.
- University collaboration.

**Q8:** Would you like to add anything else?

- Sustainability awareness is very different among the different-sized companies in Estonia, those operating locally don't pay as much attention to the aspects of sustainability.
- This topic needs more attention.
- It is difficult to get rid of certain types of waste, so this is a challenge.
- We will improve in time if everybody takes their small steps.



## Appendix 5. Means and modes of variables

<b>Firm's sustainability awareness</b>		
Variable	Median	Mode
SA1	4	4
SA2	3	3
SA3	4	4
SA4	4	4
<b>Eco-innovation practices</b>		
Variable	Median	Mode
EI1	4	4
EI2	4	4
EI3	4	4
EI4	4	3
EI5	4	4
EI6	3	4
EI7	2	1
<b>Stakeholder pressure</b>		
Variable	Median	Mode
SP1	4	4
SP2	2	2
SP3	2	2
SP4	2	2
SP5	2	2
<b>Government pressure</b>		
Variable	Median	Mode
GP1	3	3
GP2	2	2
GP3	2	1

## Appendix 6. Mann-Whitney U-test

### Test Statistics<sup>a</sup>

	Increasing environmental pollution (e.g., increase in carbon emissions) is a major threat to our society	Firms are majorly responsible for environmental pollution	Firms want to reduce environmental pollution	Adopting circular (e.g., reduce, reuse, and recycle) initiatives reduce the environmental pollution
Mann-Whitney U	8498.000	8703.500	8386.000	8601.000
Wilcoxon W	18509.000	18714.500	16901.000	18612.000
Z	-1.108	-.755	-1.328	-.957
Asymp. Sig. (2-tailed)	.268	.450	.184	.339

### Test Statistics<sup>a</sup>

	In our company, we have replaced non-recyclable raw materials with renewable, recyclable, or biodegradable inputs	We work with clients/suppliers for the ecological design of products	During the design stage, we consider the possibility to reuse products after they have served their initial purpose	We are using recycled materials as inputs in our processes
Mann-Whitney U	8169.000	7972.000	8585.000	8684.500
Wilcoxon W	18180.000	17983.000	18596.000	18695.500
Z	-1.586	-1.895	-.919	-.766
Asymp. Sig. (2-tailed)	.113	.058	.358	.444

### Test Statistics<sup>a</sup>

	In our company we intentionally make changes to processes to use the least amount of energy and resources	In our organisation, we have a strong understanding of the circular economy practices	In our organisation, we use external help for environmental sustainability support (such as sustainability consultants or support)	'Management will' is necessary for taking valuable steps supporting effective CE in the firm
Mann-Whitney U	8815.500	8312.500	7488.000	9059.500
Wilcoxon W	18826.500	18323.500	16003.000	17574.500
Z	-.576	-1.411	-2.763	-.176
Asymp. Sig. (2-tailed)	.565	.158	.006	.861

## Appendix 6 continued

### *Test Statistics<sup>a</sup>*

	Employees put pressure on our company to pursue sustainable environmental practices	Investors put pressure on our company to pursue sustainable environmental practices	NGOs put pressure on our company to pursue sustainable environmental practices	Competitors put pressure on our company to pursue sustainable environmental practices
Mann-Whitney U	9081.500	8948.500	9051.000	8900.500
Wilcoxon W	19092.500	18959.500	17566.000	18911.500
Z	-.137	-.354	-.184	-.428
Asymp. Sig. (2-tailed)	.891	.723	.854	.669

### *Test Statistics<sup>a</sup>*

	In our company, we are subject to reviews and audits of environmental practices from our suppliers/customers	Laws and regulations at the local state level have guided the company on environmental protection and circular production	The government put pressure on our company to pursue sustainable environmental practices	We participate in a business network (e.g., chamber of commerce) that supports our environmental sustainability
Mann-Whitney U	8294.500	8483.000	8888.500	7718.000
Wilcoxon W	16809.500	16998.000	17403.500	16233.000
Z	-1.403	-1.091	-.443	-2.369
Asymp. Sig. (2-tailed)	.161	.275	.657	.018

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