Exploring the feasibility of Returnable Transport Packaging in the ICT industry

An exploratory study about the drivers, barriers, and enablers of implementing Returnable Transport Packaging in ICT Supply Chains.

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Thank you!

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Master Thesis in Business Administration

Title: Exploring the feasibility of a Returnable Transport Packaging Strategy in the ICT industry - An exploratory study about the drivers, barriers, and enablers of implementing RTP in ICT Supply Chains.

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Key terms: Returnable Transport Packaging, Feasibility, ICT Industry, Reverse Logistics

Abstract

Background: Establishing closed-loop supply chains is essential for the development of a future circular economy. This concept not only applies to the products within the supply chain but also to their packaging. Presently, traditional packaging follows a linear disposal approach, leading to waste production and a heightened environmental impact in numerous supply chains. Consequently, it is critical to examine the factors influencing current decisions on Returnable Transport Packaging (RTP) and to identify factors that can support its adoption while incorporating its context.

Purpose: This thesis aims to explore the barriers, drivers, and enablers of the implementation of RTP in the information and communication technology (ICT) industry.

Method: In this research, an interpretivist inductive research approach is employed. The study involves conducting qualitative semi-structured interviews across five distinct cases. These interviews are meticulously analyzed following the methodology outlined by Gioia et al. (2013), dividing the findings into 1st order categories, 2nd order themes, and aggregate dimensions.

Conclusion: This study provides a comprehensive analysis of the factors influencing the implementation of RTP in the ICT industry. It identifies a majority of barriers over drivers,
with 13 barriers across six categories and seven drivers in three categories. These findings emphasize the need for supply chain managers to address challenges such as process and flow control, environmental issues, cost considerations, company priorities, stakeholder pressure, and decision-making. Additionally, the research highlights the importance of environmental benefits, stakeholder pressure, and competitiveness as drivers for RTP adoption. Key factors for effective RTP implementation include infrastructure, technology, human resources, consistent demand, and appropriate stakeholder engagement. The study underlines the critical role of technological context as a supportive element in integrating RTP within various aspects of the supply chain. This research offers valuable insights for managers seeking to balance environmental, economic, and managerial perspectives in implementing RTP in ICT supply chains.
# Table of Content

## Abbreviations

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
</tr>
</tbody>
</table>

## 1 Introduction

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Background</td>
<td>10</td>
</tr>
<tr>
<td>1.2 Problem Description</td>
<td>12</td>
</tr>
<tr>
<td>1.3 Purpose</td>
<td>13</td>
</tr>
<tr>
<td>1.4 Research Questions</td>
<td>14</td>
</tr>
<tr>
<td>1.5 Terminology</td>
<td>14</td>
</tr>
<tr>
<td>1.6 Delimitation</td>
<td>15</td>
</tr>
</tbody>
</table>

## 2 Literature Review

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Sustainability in Logistics</td>
<td>16</td>
</tr>
<tr>
<td>2.1.1 Circularity in Logistics</td>
<td>18</td>
</tr>
<tr>
<td>2.1.2 Sustainable Packaging</td>
<td>20</td>
</tr>
<tr>
<td>2.2 Returnable Transport Packaging</td>
<td>21</td>
</tr>
<tr>
<td>2.2.1 Tertiary Packaging in the ICT Industry</td>
<td>22</td>
</tr>
<tr>
<td>2.2.2 Economic Context of RTP</td>
<td>22</td>
</tr>
<tr>
<td>2.2.3 Environmental Context of RTP</td>
<td>25</td>
</tr>
<tr>
<td>2.2.4 Managerial Context of RTP</td>
<td>27</td>
</tr>
<tr>
<td>2.2.5 Technological Context of RTP</td>
<td>28</td>
</tr>
<tr>
<td>2.3 Summary of Literature Review</td>
<td>30</td>
</tr>
</tbody>
</table>

## 3 Methodology

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Research Paradigm</td>
<td>31</td>
</tr>
<tr>
<td>3.2 Research Approach</td>
<td>31</td>
</tr>
<tr>
<td>3.3 Research design</td>
<td>32</td>
</tr>
<tr>
<td>3.4 Data Gathering</td>
<td>33</td>
</tr>
<tr>
<td>3.4.1 Secondary data</td>
<td>34</td>
</tr>
<tr>
<td>3.4.2 Semi-Structured Interviews</td>
<td>34</td>
</tr>
<tr>
<td>3.4.3 Desk Research</td>
<td>35</td>
</tr>
<tr>
<td>3.5 Data Analysis</td>
<td>36</td>
</tr>
<tr>
<td>3.6 Data Quality</td>
<td>39</td>
</tr>
<tr>
<td>3.6.1 Qualitative Research</td>
<td>39</td>
</tr>
<tr>
<td>3.6.1.1 Credibility</td>
<td>39</td>
</tr>
<tr>
<td>3.6.1.2 Transferability</td>
<td>39</td>
</tr>
<tr>
<td>3.6.1.3 Dependability</td>
<td>40</td>
</tr>
<tr>
<td>3.6.1.4 Confirmability</td>
<td>40</td>
</tr>
<tr>
<td>3.7 Ethical Considerations</td>
<td>41</td>
</tr>
</tbody>
</table>

## 4 Empirical Findings

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Barriers impacting the feasibility of RTP implementation</td>
<td>43</td>
</tr>
<tr>
<td>4.1.1 Supply Chain Process &amp; Return Flow Control</td>
<td>44</td>
</tr>
<tr>
<td>4.1.1.1 The Global Nature of SCs</td>
<td>45</td>
</tr>
</tbody>
</table>
4.1.1.2 Lack of Controlled Flows ................................................................. 46
4.1.1.3 Long Timeframe of Closed Loop Systems ................................. 47
4.1.2 Environmental Issues ................................................................... 47
4.1.2.1 Unclear Sustainability Gains ...................................................... 47
4.1.2.2 RTP Loss .............................................................................. 48
4.1.2.3 Increased Transport Emissions ................................................ 48
4.1.3 Economic Cost ............................................................................ 48
4.1.3.1 RTP Loss ............................................................................ 49
4.1.3.2 Additional Management Costs ............................................... 49
4.1.3.3 Cost Model Complexity ........................................................... 49
4.1.4 Company Priorities & Resources .................................................. 50
4.1.4.1 Priority in other areas ............................................................... 50
4.1.4.2 Abundant Resources Required ............................................... 50
4.1.5 Stakeholder Pressures .................................................................. 51
4.1.5.1 Increased Customer Costs ....................................................... 51
4.1.6 Goals & Decision-Making ............................................................. 52
4.1.6.1 Lack of Goal and Decision-Making Alignment .......................... 52
4.2 Drivers impacting the feasibility of RTP implementation ................. 53
4.2.1 Environmental Benefits ............................................................... 54
4.2.1.1 Save CO2 Emissions ................................................................. 54
4.2.1.2 Scarcity of Resources .............................................................. 55
4.2.2 Pressures to Adopt RTP From Stakeholders ................................. 55
4.2.2.1 Regulatory Pressures ............................................................... 56
4.2.2.2 Customer Requirements ........................................................ 57
4.2.2.3 Employees Support Environmental Initiatives ....................... 57
4.2.3 Competitiveness ........................................................................ 58
4.2.3.1 Industry leaders pioneering RTP implementation ................. 58
4.2.3.2 Environmental Branding ........................................................ 58
4.3 Factors To Consider When Implementing RTP ............................... 59
4.3.1 Product & Supply Chain Characteristics ...................................... 59
4.3.1.1 Transport Frequency & Product Circulation ............................. 60
4.3.2 Economic & Environmental Perspective .................................... 60
4.3.2.1 Cost & Cost Allocation .......................................................... 61
4.3.2.2 CO2 Emissions .................................................................... 61
4.4 Enablers of RTP Implementation .................................................... 62
4.4.1 Infrastructure, Technology & HR .................................................. 63
4.4.3.1 Quality Control ...................................................................... 63
4.4.3.2 Tracking & Tracing ................................................................. 64
4.4.3.3 Analytics ........................................................................... 65
4.4.3.4 Freight Carrier Base System .................................................. 66
4.3.3.5 Pooling System.................................................................66
4.3.3.6 Management & Skills.........................................................66
4.3.3.7 Supply Chain Structure.......................................................67
4.4.2 Stakeholder Pressure.............................................................67
  4.4.2.1 Customers Supporting Environmental Initiatives.......................67
4.4.3 Product & Supply Chain Characteristics.....................................68
  4.4.3.1 Even Demand...............................................................68

5 Analysis.................................................................................69
  5.1 Managerial Context..............................................................70
    5.1.1 Goals & Decision-making..................................................70
    5.1.2 Process & Flows..............................................................71
    5.1.3 Stakeholder Pressures.......................................................73
  5.2 Economic Context...................................................................75
  5.3 Environmental Context..........................................................78

6 Conclusion.............................................................................82

7 Discussion.............................................................................84
  7.1 Theoretical Framework.........................................................84
  7.2 Theoretical Contributions......................................................86
  7.3 Managerial Implications........................................................87
  7.4 Limitations............................................................................87
  7.5 Suggestions for further research..............................................88

8 Appendix...............................................................................89
  8.1 Interview Questions............................................................89
    8.2 First and Second Order Themes from Quotes...............................91

References.............................................................................104

Figures

Figure 1. The Butterfly Diagram....................................................19

Figure 2. Single-use and Reusable Packaging Circulation....................21

Figure 3. Returnable Transport Packaging Context ............................30

Figure 4. Aggregate findings of barriers, drivers, and enablers.............38

Figure 5. Overview of the Barriers Impacting RTP Feasibility................44

Figure 6. Overview of Drivers Impacting RTP Feasibility....................54
Figure 7. Overview of Factors to Consider When Implementing RTP ………………………59

Figure 8. Overview of Enablers to RTP implementation…………………………………..63

Figure 9. Overview of Contexts When Implementing RTP……………………………………70

Figure 10. Enablers of RTP Implementation in the Managerial Context ………..75

Figure 11. Enablers of RTP Implementation in the Economic Context…………………78

Figure 12. Enablers of RTP Implementation in the Environmental Context……………..81

Figure 13. Enablers of RTP implementation in the ICT industry……………………85

Tables

Table 1. Abbreviations……………………………………………………………………………9

Table 2. Interview Participants…………………………………………………………………34

Table 3. Search parameters for Literature Review…………………………………………36

Table 4. First Order themes, Second Order themes, and Aggregate Dimensions from Quotes.91
### Abbreviations

#### Table 1.

*Abbreviations*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>Circular Economy</td>
</tr>
<tr>
<td>HR</td>
<td>Human Resources</td>
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<td>ICT</td>
<td>Information &amp; Communication Technology</td>
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<td>RTP</td>
<td>Returnable Transport Packaging</td>
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<tr>
<td>SC</td>
<td>Supply Chain</td>
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<td>SP</td>
<td>Sustainable Packaging</td>
</tr>
</tbody>
</table>

*Note.* Abbreviations used in this study.
1 Introduction

In this section, the reader is introduced to the background of the topic, the problem description, the purpose of this study, the chosen research questions, the terminology, and the delimitations of this study.

1.1 Background

With the increasing environmental pressure on the economy, there is a clear need to reconsider the economic paradigm on which we rely to acquire our products (Coelho et al., 2020). Circularity is a well-established concept that can drastically change how we treat supply chains (SCs) and promote more sustainable ways of handling today’s SCs; thus, investigating what is driving the transition to more circular SCs has become relevant. Closed-loop SCs refer to the system that includes the return process of the products that can be reused, repaired, or recycled to extend their lifecycle within the SC (Guide et al., 2003). Reusing is essential for closed-loop systems to reduce the usage of raw materials, minimizing the demand for landfills and land pollution (Chung et al., 2018). Therefore, relying on closed-loop processes may lead to environmental improvements while remaining economically efficient (Zink & Geyer, 2017).

The Information and Communication Technology (ICT) industry is a prime candidate for sustainable improvement and circular practices. Due to the ramping pace at which innovation occurs in the industry, it can be well-equipped to handle the advanced systems that the circular economy would require (Hagelüken & Goldmann, 2022). This industry has an opportunity for value creation through circular initiatives, achieved by establishing an efficient reverse logistics infrastructure that facilitates product reuse, refurbishment, and recycling (Lacy et al., 2020). The current literature suggests that the ICT industry is focusing on four environmental sustainability topics: carbon footprint, carbon pricing, the usage of natural resources, and pollution waste (Charfeddine & Umlai, 2023), which represents an important step toward a more environmentally conscious and responsible technological future.
As consumption increases, so does product packaging, especially with the recent growth of e-commerce, which has generated vast amounts of waste, thus creating a need for practical solutions regarding environmental issues (Escursell et al., 2021). Packaging allows the movement of a product from its point of origin to its point of consumption; thus, it influences many industries directly or indirectly (Meherishi et al., 2019). Packaging consists of three levels or categories: Primary or sales packaging, secondary or grouped packaging, and tertiary or transport packaging (European Commission, n.d.a; Pålsson, 2018). Primary packaging is in direct contact with the product (Pålsson, 2018), thus protecting it; secondary packaging contains several primary packaging (Hellström & Saghir, 2006); and tertiary packaging including pallet and roll containers (Pålsson & Hellström, 2016), is used for bulk handling in warehousing and is vital for transportation (Chung et al., 2018), creating more efficiency in SC distribution networks. It has enabled the large-scale consumption that many people rely on today and assisted in developing the global economy (Chung et al., 2018).

Packaging is getting increasing attention regarding regulations in the European Union (EU). The Packaging and Packaging Waste Directive 94/62/EC (European Commission, n.d.a) and the Circular Economy Action Plan (European Commission, n.d.b) pave the way for packaging to be optimized from a circularity standpoint in the EU. Tackling packaging waste is part of the objectives of the European Green Deal (European Commission, n.d.c) to ensure that all packaging on the EU market is reusable or recyclable in an economically viable way by 2030 (European Commission, n.d.d). Therefore, organizations are seeking to adopt sustainable packaging (SP) to comply with the upcoming regulations, future-proofing their SCs to ensure the viability of their respective businesses.

To close the loop and be able to return transported goods to producers and manufacturers, logistic firms utilize returnable transport packaging (RTP). Firms have increasingly analyzed and evaluated RTP to identify the benefits and costs that could impact their SCs (Taschner, 2023). Nevertheless, RTP is more complex than a closed-loop packaging system as it requires, for example, more accurate forecasts and collaboration between SC members who must be willing to adopt the RTP system (Twede & Clarke, 2004). RTP has proven to be cost-effective (Boubeta et al., 2018), lowering carbon emissions (Carrano et al., 2015) and drastically reducing waste (Katephap & Limnararat, 2015), among many other benefits to make SCs more economically and environmentally sustainable. However, RTP also has the potential to create downsides, such as being economically inefficient, difficult to implement, and requiring vast
investments (Yusuf et al., 2017). If RTP is mishandled, it can also become environmentally costly, potentially increasing the transport required to make the SC function (Ross & Evan, 2003). It is, therefore, vital to understand what factors are required for successful RTP implementation and handling (Glock, 2017).

Due to the negative impacts that packaging causes through generating waste, increasing greenhouse gas emissions, and contributing to climate change (Su et al., 2020), it is vital to adopt a plan to transition from linear to more circular SCs. Organizations must effectively monitor the flow of goods and materials to evaluate their SCs quantitatively and comprehensively understand their current context (Ben-Daya et al., 2019). Implementing the correct tracking technologies and utilizing the generated data is essential for real, sustainable development (Hellström, 2009). The introduction of tracking systems in closed-loop SCs can impact companies differently. Tracking technologies in RTP, such as Radio Frequency Identification (RFID) and the Internet of Things (IoT), allow for better logistics flow coordination and early detection and response to unexpected events (Limbourg et al., 2016).

Furthermore, it helps manage and control RTP locations (Johansson & Hellström, 2007), thus influencing the decrease of lost items. Due to the potential of technologies to promote the efficiency and efficacy of implementing RTP, combined with the fact that novel technologies are evolving rapidly, they can potentially enable more cost-effective ways to implement RTP and contribute to more circular SCs.

The positive and negative impacts of implementing RTP from an economic and environmental point of view vary based on the specific context. Understanding the factors that encourage or inhibit RTP adoption is crucial. Further, deciphering the technologies’ impact on RTP is vital to provide a context in which RTP can be implemented efficiently, leading to economic and environmentally sustainable development.

1.2 Problem Description

Circularity is a relatively novel but essential topic, so research in this area is needed. According to Selvefors et al. (2018), a re-framing of circularity is needed. Circular products must be designed with the customer in mind as a three-part process - obtainment, use, and disposal. Therefore, this study will take the potential user’s perspective on the current feasibility of RTP and how this feasibility could increase by identifying relevant factors. The
perspective of an RTP producer will also be taken into account, providing the intended benefit of implementing RTP. Additionally, more studies of products with circular designs must be conducted in circular business models (van Loon et al., 2021), making RTP crucial to study due to its broad applicability in many industries.

Regarding transport packaging, there is a need for qualitative studies in the context of sustainability and CE (Silva & Pålsson, 2022). Furthermore, incentives need clarification regarding sustaining the purchase decision process of products packaged with enhanced features that promote the CE (Palazzo et al., 2023), such as RTP. Coelho et al. (2020) further emphasize the need to decipher the drivers in implementing returnable packaging while also revealing the need to determine the feasibility of reusable packaging systems for the ICT industry. Analyzing the feasibility of RTP provides a well-needed understanding of the motivating factors for businesses and their SCs when using such products. Determining the feasibility of RTP within the ICT industry in the CE context presents many challenges, such as identifying whether RTP is a strategic choice or merely an operational one (Palazzo et al., 2023), or possibly both. Furthermore, Coelho et al. (2020) also illuminate the need for industry-specific case studies and lessons learned from them. Additionally, research in tracking and reusable packaging should be done with different stakeholders (Ellsworth-Krebs et al., 2022).

This master thesis explores the feasibility of implementing RTP in the ICT industry. More specifically, this study wants to explore the drivers, barriers, and enablers of implementing RTP through multiple case studies on companies involved and an RTP producer. Doing so will provide insights into the current dimensions that drive decision-making for SC managers to drive decisions related to more circular supply chains. Hence, this led to formulating Research Question (RQ) 1. Based on these drivers and barriers, enablers of RTP implementation will provide a set of factors that can assist ICT companies in adopting RTP and facilitate decision-making on whether implementing RTP is feasible in their current SC. Hence, this led to the formulation of RQ 2.

1.3 Purpose

This study aims to explore the link between RTP and its potential barriers, drivers, and enablers in the ICT industry. It elaborates on the specific contexts in which these barriers and
drivers are present and brings forward a set of enablers and factors to consider to facilitate the implementation of RTP. This knowledge should aid managers in the ICT industry in transitioning to more circular supply chains.

1.4 Research Questions

To meet the purpose of the proposed study, the following RQs have been brought forward:

RQ 1. *What drivers and barriers impact the feasibility of implementing RTP in ICT supply chains?*

The data will be gathered by interviewing an RTP producer and companies operating in the ICT industry, thus allowing us to identify drivers and barriers that positively and negatively influence RTP's feasibility.

RQ 2. *What factors should be considered when implementing RTP in ICT Supply Chains?*

Interviews, coupled with a comparative analysis of existing literature, were used to provide a list of themes and factors affecting the feasibility of RTP in ICT SCs.

1.5 Terminology

*Supply Chain* - The system of people and things that are involved in getting a product from the place where it is made to the person who buys it (Cambridge Dictionary, n.d.).

*Stakeholder* - An employee, investor, customer, etc. who is involved in or buys from a business and has an interest in its success (Cambridge Dictionary, n.d.).

*Returnable Transport Packaging* - RTP includes non-disposable, multi-trip packaging mediums (e.g. pallets, containers, bins, boxes, trays, crates, and dollies) used for the transport of material/components that enable production (Selviaridis et al., 2016).

*Reverse Logistics* - The process of dealing with goods that have been returned to the company by customers (Cambridge Dictionary, n.d.).

*Closed-loop Supply Chain* - The system that includes the return process of the products that can be reused, repaired, or recycled to extend their life cycle within the SC (Guide et al., 2003).
1.6 Delimitation

To ensure the focus and coherence of this study, it is important to delimit the scope of the research. Therefore, this study restricts its analysis to RTP in the business-to-business context, excluding primary and secondary packaging. This study concentrates on the economic and environmental dimensions of sustainability, leaving the social aspect outside its scope. No geographical delimitation is necessary for this study as the respondents operated globally, covering most continents with their SCs. This study focuses on closed-loop SCs and not open-loop, emphasizing the reusability of RTP within a specific context. Furthermore, the study exclusively looks at the implementation of RTP, not the management or usage of RTP.
2 Literature Review

In this section, the reader is introduced to a literature review of existing literature on sustainability in logistics, returnable transport packaging, and a summary of the literature review.

2.1 Sustainability in Logistics

This thesis utilizes Brundtland's (1987) definition of sustainability: "The ability to meet the needs of the present without compromising the same ability for future generations." This term was chosen in this study because it is the most widely accepted definition throughout the sustainable development literature. With the growing awareness to protect the world and ensure life and resources for future generations, the United Nations General Assembly adopted the seventeen Sustainable Development Goals (SDGs) in 2015. One of the primary purposes is to protect the planet and transform economies (United Nations, n.d.). Achieving these objectives necessitates collaborative alignment among all stakeholders. Furthermore, organizations tend to embrace sustainable practices more readily when stakeholders' interests are aligned (Dorobantu et al., 2022). Their relationship becomes essential when achieving SDGs, which include governments, civil society, and businesses. Governments must institute appropriate and effective regulatory frameworks, policies, and performance standards for enterprises to ensure they adopt sustainable operations practices (Borges et al., 2019).

The logistics sector plays an essential role in SDG objective number twelve, which aims to promote sustainable production and consumption patterns, thus mitigating adverse environmental effects on society (Martins et al., 2019). The logistics industry can promote economic growth, but it also causes an increase in energy consumption and carbon emissions, leading to greenhouse gas emissions and air pollution (He et al., 2018). Moreover, the output of logistics activities impacts the three pillars of sustainability: social, environmental, and economic (He et al., 2018). The research conducted by Centobelli et al. (2018) highlights that firms adopting energy efficiency and environmental sustainability initiatives are driven by
regulation drivers and relational drivers, such as customer pressure, which affect their economic, environmental, and operational performance. In the same vein, Governments can contribute to reducing emissions by establishing tax policies to ensure the sustainable development of logistics (Li et al., 2016).

The logistics industry has increasingly committed to developing sustainability goals and objectives. Moreover, targets have been established to measure and monitor progress toward these goals (Tuni et al., 2018). Tuni et al. (2018) conducted a literature review identifying five distinct categories in which SCs measure their environmental performance to attain their respective targets. These categories include utilizing natural resources and energy as environmental inputs into SCs. Various sustainability initiatives have been embraced to address these goals of the logistics industry. For instance, there has been an emphasis on increasing the adoption of alternative fuels, such as electric and hydrogen-powered vehicles. Moreover, investments in renewable energy sources, including solar and wind power, have gained momentum (Hunt et al., 2022). Companies are also exploring innovative technologies and approaches to enhance transportation efficiency and reduce emissions. This includes utilizing autonomous vehicles and optimized routing algorithms (Ma et al., 2019). Despite these efforts, implementing sustainable practices in logistics presents challenges. These include the high costs and complexities of new technologies, difficulty coordinating sustainability endeavors across global SCs, and supplier resistance (Mollenkopf et al., 2010). Consequently, the significance of sustainability in the logistics industry underscores the need to overcome these challenges to progress toward sustainability goals. When senior management is dedicated and committed to sustainability, implementing sustainable practices often results in greater success (Wijethilake & Lama, 2019). Therefore, the managerial role holds significant importance in steering businesses toward achieving sustainable goals, as it can influence stakeholders and foster collaboration and concerted efforts in a unified direction.

One limitation of current sustainability practices in logistics is the need for more standardization and consistency in reporting sustainability metrics and key performance indicators to reach desired sustainability targets. This inconsistency hinders comparing sustainability efforts across companies and industries (Maltz et al., 2016). Furthermore, there is a demand for greater transparency and traceability within global SCs to ensure that sustainability goals are met throughout the SC (Kashmanian, 2017). Additionally, sustainability initiatives in the logistics industry need to be evaluated in terms of their overall
impact on sustainability rather than solely focusing on cost savings or efficiency gains (Gimenez et al., 2012). Addressing these limitations is crucial to ensuring that the logistics industry plays a positive and influential role in achieving the targets set for broader sustainability goals and objectives.

2.1.1 Circularity in Logistics

The circular economy has become increasingly relevant in the recent decade since it allows adding value to existing materials and avoids overexploiting natural resources (Escursell et al., 2021). Thus, it promotes a focus on reducing the consumption of raw materials and resources by reusing them (Govindan & Hasanagic, 2018). The Ellen MacArthur Foundation developed the CE butterfly diagram shown in Figure 1, which illustrates the continuous materials flow in a circular economy; this includes two cycles. First is the technical cycle, where products and materials circulate through reuse, repair, refurbishment, and recycling; the second is the biological cycle, where nutrients from biodegradable materials are returned to Earth to regenerate (Ellen MacArthur Foundation, n.d.). Therefore, it gives companies insights into becoming more circular in their manufacturing processes. Moreover, improving circularity can also contribute to achieving SDGs (Barcelos et al., 2021). Nevertheless, transitioning from a linear economy to a CE is complex and requires a long-term system change (van Buren et al., 2016).
Ellen MacArthur Foundation. (n.d.). *Circular economy systems diagram.* ^1^ According to van Buren et al. (2016), the logistics industry contributes to successfully implementing a sustainable circular strategy since it also encourages its customers to be part of the circular economy through a seamless and convenient take-back model, including prepaid shipping labels and user-friendly return mechanisms. Additionally, logistics and reverse logistics were identified within the business areas highly impacted by CE practices (Barros et al., 2021). Reverse logistics ensures product reusability and redistribution (Sangwan, 2017). Furthermore, it assists in closing the loop; thus, implementing it has become necessary for organizations interested in transitioning toward CE (Mallick et al., 2023). Companies receive pressure from multiple stakeholders, both internal and external. Policy and regulations applied by governments are one type of pressure; however, to be effective, they need to have clear

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^1^ [https://ellenmacarthurfoundation.org/circular-economy-diagram](https://ellenmacarthurfoundation.org/circular-economy-diagram) (March, 2023)
objectives and be constantly evaluated, as well as get support from the industry or community (Winans et al., 2017).

2.1.2 Sustainable Packaging

Over the past few decades, circular economy and sustainability have gained significant traction and garnered heightened attention and interest from various stakeholders, including academics, policymakers, entrepreneurs, and the general public (Keramitsoglou et al., 2023). Thus, understanding the impact of moving towards more SP to create a circular economy becomes crucial.

The advent of the COVID-19 pandemic boosted the growing increase of the e-commerce business in previous years (Viú-Roig & Alvarez-Palau, 2020). This increase in volume also resulted in a rise in the use of different types of packaging. Furthermore, packaging materials directly impact the energy used and CO2 emissions (Hekkert et al., 2000). Therefore, SP has recently taken center stage. SP refers to packaging physically designed to optimize materials and energy, manufactured and transported using clean production technologies and renewable or recycled source materials, being beneficial and safe for the population while meeting the market criteria for performance and cost (Gustavo et al., 2018).

SP design can be challenging and costly since it has to protect the environment and the products (Afif et al., 2022). Nevertheless, SP design could also provide a reduction of costs and maximization of profit by redesigning packaging (Gustavo et al., 2018), potentially obtaining a competitive advantage. The study by Martins et al. (2019) identified the most commonly used sustainable practices in packaging management, highlighting the reuse, recycling, and reverse logistics of packaging and reducing materials in packaging manufacturing. Furthermore, Escursell et al. (2021) emphasize the need to reduce over-packaging by developing effective guidelines and policies. However, on a global level, most legal measures for packaging are applied to primary packaging (McKinsey, 2022), showing the need for more research considering regulations and laws regarding tertiary packaging.
2.2 Returnable Transport Packaging

As illuminated previously, many sustainability issues exist across many industries due to logistics. This pressures societies worldwide to increase the efficiency of reusing resources and reduce the overall environmental impact of daily activities (Coelho et al., 2020). One way to reduce these SC environmental impacts is to adopt RTP in logistics operations (Mahmoudi & Parviziomran, 2020). RTP is an area of application in closed-loop SC Management (SCM), whereby transport packaging is reused for multiple transportation instances (Taschner, 2023). RTP involves the return or recovery of the transport packaging rather than the material it carries within it (Bretzke & Barkawi, 2012). RTP objects include pallets, roll cages, barrels, kegs, trolleys, and refillable liquid or gas containers (Cobb, 2016). Figure 2 explains the difference in circulation between single-use packaging and reusable packaging. Single-use packaging circulation relies on recycling to keep the materials in circulation and not having to dispose of them. On the other hand, reusable packaging circulation relies on the return point of sale to either clean the packaging or send it to wholesalers, depending on their current circulation structure. After that, depending on the condition of the packaging, it can be sent for recycling or back to the retailer or product producer, depending on where the packaging is needed and re-used.

Figure 2. "Single-use and Reusable Packaging Circulation"

It is important to consider that RTP systems work differently depending on the context they are currently employed in. This study will analyze the ICT industry specifically, where RTP has not been employed on a wider scale. Thus, grasping the context within the industry where RTP is already in use is crucial. This leads to the next part of the literature review, providing the current landscape of the different contexts that might emerge across industries.

2.2.1 Tertiary Packaging in the ICT Industry

Tertiary or transport packaging serves to transport goods from their point of origin to their point of destination, facilitating the transit of primary and secondary packaging (Verghese & Lewis, 2007), thus enabling the movement of goods between businesses across the SC. As it stands, the ICT industry utilizes conventional packaging in the form of pallets, containers, and boxes.

Silva and Molina-Besch (2023) evaluate the environmental performance of three distinct transportation packaging alternatives, encompassing the entire lifecycle from production through disposal, within the context of a B2B global SC operating within the ICT sector. This evaluation encompassed packaging composed of plastic-free corrugated cardboard and plastic cushioning inserts, focusing on protection, handling attributes, and transport durability. The study's findings revealed that, despite plastic packaging carrying a heightened risk of waste-related environmental harm, it demonstrated comparatively lower transport-related emissions when contrasted with the corrugated cardboard option. Furthermore, they state that the disparity in emissions arises from the lightweight nature of plastic packaging and reduced emissions associated with landfill disposal. Consequently, it underscores the importance of considering packaging weight as a pivotal variable when analyzing introducing new transport packaging solutions.

2.2.2 Economic Context of RTP

As for any business seeking to remain competitive in a market, an effective cost-thinking approach across an organization is vital to generate value efficiently for itself and its
customers. This thinking should also be applied to RTP, especially due to its environmental context.

An important factor regarding the economic context of RTP is that the cost is owned by one, or sometimes several, parties in the SC (Fan et al., 2019). Therefore, the owners must make investment decisions concerning these RTPs while affecting several SC actors. McKerrow (1996) states that owning packaging parties can be boiled down to four categories: Customer-owned, where customers who receive the products also own the packaging; Joint ownership, where both suppliers and customers own the packaging, often described as pooling packaging; Collectively-owned, referring to packaging shared and standardized across multiple companies to simplify their operations, commonly used in the food industry; and Third-party-owned, where an external entity outside of the primary business is in charge of the packaging.

The research conducted by Taschner (2022) analyzed RTP usage in three scenarios: an RTP system owned by a company, an RTP system shared with a third party, and a fully outsourced RTP system. He found out that implementing RTP has multiple effects on a company's operating costs, such as warehousing, transportation, and labor costs, and the degree of affectation of these costs varies depending on the RTP scenario. Zhang et al. (2015) showed by comparing two different modes of packaging, the shared and dedicated mode, that one of the primary influences on the cost reduction potential of the shared mode is the demand gaps between different areas. The study offered a comparison between dedicated and shared modes through quantitative analysis in the automotive industry. The shared mode can support these variations when there is a significant difference in package demand from one region to another. Efficiently redistributing and utilizing RTPs through the shared mode of handling packaging can mitigate excesses in one region and deficiencies in another, leading to a streamlined operation and subsequent cost savings. The shared mode also provides efficiency due to reduced distances between pick-up and drop-off points, leading to less time spent on transport and, therefore, less fuel consumption. However, the shared mode’s efficiency is challenged by unpredictability, such as loss of packaging in the form of broken, misplaced, or stolen packages.

Katephap & Limnararat’s (2015) case study analyzed RTP’s economic, environmental, and operational costs under different logistics management: single-, round-, and multi-trip
arrangements. The study found that multi-trip arrangements are the most viable option operationally and environmentally, but single-trip arrangements outperform economically. This is due to the payback being the shortest among other arrangements. Moreover, Schneikart et al. (2023) demonstrated that the reverse flow of RTP over extended distances at a minimal volume level exhibits inefficiency when evaluated through economic and environmental perspectives.

Taschner (2023) studied the operational elements influencing the financial attractiveness of adopting an RTP system. His findings underscored that expenses linked to warehousing, transportation, and labor substantially impact the overall operational costs incurred by the organization. Mollenkopf et al. (2005) showed by developing a cost model that the size of reusable containers, the average daily volume of products transported, the distance of delivery, cycle time, the total number of units in a container, and fluctuation in peak volume could affect the costs of reusable containers.

In implementing RTP, which has the potential to yield environmental and economic benefits for companies, various barriers need to be addressed. These barriers have been identified through a survey conducted by Yusuf et al. (2017) among Nigerian and South African businesses across diverse sectors. One key obstacle to implementing RTP is the potential increase in operational costs associated with transportation, sophisticated equipment, and tracking and tracing mechanisms (Yusuf et al., 2017). These additional costs may challenge businesses regarding financial feasibility and resource allocation. The challenges associated with RTP are not solely dependent on the company's annual turnover, as Yusuf et al. (2017) highlighted that these barriers could affect companies of all sizes. This indicates that the barriers to RTP implementation may be pervasive across different organizational contexts. Other potential barriers to RTP implementation identified in the literature include maintenance, storage, and administrative costs (Kroon & Vrijens, 1995). These costs may arise from properly cleaning, sorting, and storing RTP, which can require significant investment in time, space, and resources.

The implementation of an RTP system necessitates a substantial initial capital outlay, encompassing the procurement of returnable packaging units, supplementary expenses associated with transportation, the establishment of infrastructure dedicated to the sorting of empty containers, and the deployment of comprehensive systems for tracking, management,
and quality control (Twede & Clarke, 2004). The frequency of RTP cleaning and repairing highly impacts companies' labor costs (Taschner, 2022) since these tasks require extra work, time, and resources. Additionally, a critical need arises for a clear delineation of the operational and financial responsibilities borne by each respective party involved in the RTP system. Therefore, when contemplating a transition from single-use transport packaging to RTP, it becomes crucial to engage in anticipatory and strategic planning to assess the anticipated impact on the organizational entities involved and to proactively estimate the associated financial implications (Twede and Clarke, 2004). Similarly, Schneikart et al. (2023) suggest that economic feasibility depends on each specific process and its demands, such as RTP product specifications and the IT infrastructure needed for the system. Therefore, all potential cost effects that an RTP system could bring need to be carefully analyzed (Taschner, 2023).

2.2.3 Environmental Context of RTP

Firstly, total energy consumption is often identified as a criterion from several studies regarding the environmental sustainability benefits of using RTP (Ross & Evans, 2003; Singh et al., 2006). Ross & Evans (2003) showed that energy consumption was not as impactful as expected during the transport of RTP through a life-cycle assessment (LCA) on plastic-based packaging systems. This is essential to remember, as an argument against reusable packaging is the additional transportation it must endure compared to single-use packaging (Ross & Evans, 2003). Singh et al. (2006) also performed an LCA on plastic-based containers. However, they did not account for the higher concentration of photochemicals in single-use packaging compared to a reusable and recyclable one, which Ross & Evans (2003) did. Some studies have quantified waste produced by packaging to measure the environmental cost in different industries (Menesatti et al., 2011; Katephap & Limnararat, 2015). This factor was identified through a network analysis tool of the geographic information system (Menesatti et al., 2011) and a case study on an auto parts company (Katephap & Limnararat, 2015). Goudenege et al. (2013) proposed a generic model identifying investment/transportation costs and CO2 emissions as relevant criteria for studying reusable containers. Greenhouse gasses were identified by Goellner and Sparrow (2014) as a contributing factor regarding environmental impacts when comparing single-use and reusable containers for pharmaceutical and biological material transportation while employing these packaging systems in a
cradle-to-grave approach. Furthermore, Accorsi et al. (2019) further cement that CO2 emission reduction can be obtained through different pooling network strategies that can be applied to an SC’s pallet system. Accorsi et al. (2019) analyzed different pool management strategies through tailored software using a geographical information system. They concluded that pollutant emissions can be reduced by 60% while reducing the distance traveled by vehicles by 65%.

Goellner and Sparrow (2014) indicated that when comparing single-use and reusable containers, the reusable option generated less carbon dioxide and had less potential to generate acidification, eutrophication, photochemical ozone, and post-consumer waste. Reusable packaging proved lighter, lowering transportation emissions despite the extra trips a reusable container must make. Ross & Evans’s (2003) study showed that the geographical location of specific processes could significantly alter the environmental costs of a packaging system. Through an LCA, Lee and Xu (2004) showed that packaging weight, length of service life, degree of recyclability, the total number of reusable parts used in the package, and the total amount of products transported per trip could affect SCs economically and environmentally. González-Torre et al. (2004) explained that the size of sectors, distribution system designs, and demand on foreign markets result in increased environmental impacts and reverse logistics policies through a postal survey.

Recent studies have also given insights into RTP’s economic and environmental impact under different management strategies. Carrano et al. (2015) compared single use, reusage by purchasing reusables by the user, and reusage by leasing reusables to the user. The study found that for the reusable strategies, emissions did not vary significantly by the handling conditions if the pallets were loaded with light loads. On the other hand, there was a dramatic decrease in emissions when handling heavy loads compared to single-use packaging. The study also concluded that the end-of-life handling of single-use packaging was the worst strategy implemented.

Returning RTP over long distances in conjunction with the specific characteristics of the materials used to produce RTP may only sometimes be favorable when assessing their comparative advantages against one-way packaging materials, particularly within the context of endeavors aimed at mitigating the environmental footprint of SC operations (Glock, 2017).
2.2.4 Managerial Context of RTP

Organizations' internal and external stakeholders can be enablers or inhibitors in contributing to more circular economies (Munaro & Tavares, 2023). Consequently, the effective implementation of RTP systems necessitates a collective commitment from stakeholders to instigate transformative adjustments in their operational processes. Furthermore, RTP is hard to implement efficiently in global SCs, where long distances and air freights are needed. Schneikart et al. (2023) state that it is an organizational challenge to establish a functional return system for those companies only using one-way packaging.

Zhang et al. (2015) have studied the economic impacts of reusable containers under different management strategies. Two modes are predominant in managing returnable packages: shared and dedicated mode. Shared mode is where packaging can be used interchangeably between suppliers, and dedicated mode is where each supplier uses their packaging. Shared mode reduces the risk of package loss or misplacement due to adopting more centralized management. Still, it requires effective information systems and pressures the collaboration between the different SC players.

Additionally, managing and controlling RTP can present challenges, such as the unavailability of sufficient storage space and difficulties coordinating the sorting and cleaning processes (Yusuf et al., 2017).

As previously mentioned by Accorsi et al.'s (2019) study, drastic environmental savings can be achieved through managing pallets, particularly pooling strategies.

The trend for current SCs to manage their packaging is to adopt a single-setup-multi-delivery policy in global SCs, where a single setup is used between different players, focusing on multiple deliveries being used to deliver products (Sarkar et al., 2019). According to Sarkar et al. (2019), depicting the optimal production delivery policies for a supplier and manufacturer in constrained closed-loop SCs for RTP, this trend contributes to increasing carbon emissions as the transportation frequency increases. On the other hand, single-setup-single-delivery policies exist where a single setup is delivered to the receiving player in a single consolidated batch. Single-setup-single-delivery policies contribute to more inventory holding costs, as the lowered frequency of transportation but an increasing amount of goods mean the retailers have
to hold the inventory instead. Sarkar et al. (2019) also showed the benefits of utilizing self-healing polymers in RTP, improving the packaging’s lifecycle and lowering costs through their study.

An important factor to include when managing RTI is its loss rate in SCs (Fan et al., 2019). Losing RTI results in a mismatch between the amount of RTI available and the product flow, as these are often linked. It is, therefore, essential for SCs to control their RTI flow, and due to the stochastic nature of RTI return times (Kim et al., 2014), the control needs to be engrained by using technological tools to decipher the externalities affecting the randomness generated by the nature of the packaging and support decision-making regarding these RTIs. Fan et al. (2019) study deciphering retailers’ investments in reducing the loss rate of RTIs and developing a model to optimize system performance proves that SCs become more efficient if retailers invest to reduce RTI loss and the system's total cost decreases. Fan et al. (2019) also mention that when manufacturers provide side payments to the retailer, the system can be coordinated, and the optimal costs of both parties are reduced.

The benefits arising from the adoption of an RTP system become evident when the logistical processes of both dispatching and retrieving RTP are efficiently coordinated, along with the proper management of the interactions between RTP and the products needed for shipment, having accurate forecasting RTP returns (Glock, 2017); thus, reducing RTP shortage. Achieving such synchronization necessitates a concerted effort from the top management and involving diverse stakeholders to establish an operational system of optimal efficiency.

2.2.5 Technological Context of RTP

In pursuit of enhanced sustainability, SCs are increasingly digitized to help managers make decisions, track performance, and track materials in real-time (Lasi et al., 2014). For SCs to monitor their materials and performance, tracking technologies must be used to create a link between the products of the SC, the SC systems, and the system users. These tracking technologies can then generate the data necessary to improve SCs' environmental performance and make SCs less prone to risks, improving collaboration, control, and flexibility (Al-Talib et al., 2020). Maleki and Reimche (2011) emphasize the lack of visibility as a significant factor contributing to inefficiencies in managing RTP, leading to increased loss rates. They emphasize tracking technologies as a solution to augment visibility within SCs.
The implementation costs are a large part of the discussion in the literature regarding the barriers to tracking technologies (Ben-Daya et al., 2019). Hellström’s (2009) study brought forward the benefits of RFID in closed-loop systems, showing that payback periods are between 1 and 2 years, depending on the effectiveness of the implementation process. Similarly, Johansson & Hellström (2007) explored the impact of increased asset visibility on RTP management by employing RFID in the RTP management process. Their findings substantiate that integrating RFID technology exhibits the capacity to improve the RTP management process and enhance the overall efficiency of the RTP supply chain network. Nevertheless, this effectiveness needs more research in the literature (Rosenau et al., 1996).

The discussion has not yet tackled the interaction between the SCs that use RTP and its link with environmental and economic goals. As Taschner (2023) explained, RTP systems indirectly affect companies’ economic goals and objectives, but these have not been mapped out as there are no clear causal relationships. Not tracking RTPs can lead to inefficiencies along SCs in the form of loss of goods and increase the chance of goods getting damaged (Taschner, 2023), increasing overall waste generation (Esmaeilian et al., 2020). The tracking and connectivity of transport packaging is a vital cornerstone of the industrial Internet of Things (IoT) in SCs (Esmaeilian et al., 2020). IoT enables multiple devices to be interconnected in the cloud, allowing data exchange to build an integrated, efficient system with minimal human interactions (Esmaeilian et al., 2020).

One of the main issues for companies implementing RTP in their SCs is their inability to manage it effectively. Furthermore, the absence of tracking technologies and lack of visibility increases loss rates, costs, and cycle times (Taschner, 2023). Therefore, it is increasingly important that all stakeholders know the value they provide for sustainable SCs to minimize the increased costs and maximize the value these technologies offer (Meherishi et al., 2019).

Zhang et al.’s (2015) study shows that advanced technological tools are required to implement an effective shared-mode packaging management strategy. Tools such as a comprehensive information system that promotes collaboration and shared information between packaging suppliers, users, and transportation players.
2.3 Summary of Literature Review

The literature review is used in this study to develop a frame of reference regarding the current context of RTP. This frame of reference is used to design the semi-structured interview questions and also for the formulation of research questions. Essentially, the literature review will be considered in all steps of the research process, especially in the analysis, where a comparative analysis of the current literature will be done with the empirical findings of this study. The analysis will utilize this model to provide a categorization of the analysis and findings. Doing so provides a more structured approach, which was also used to gather information from the participants in the interviews as all contexts could be brought up and barriers, drivers, and enablers could be identified systematically.

In summary, figure 3 shows the contexts that will be considered in this study, being the economic, environmental, managerial, and technological contexts.

Figure 3.

_Returnable Transport Packaging Context_

_Economic Context_

_Environmental Context_

_Managerial Context_

_Technological Context_

_Returnable Transport Packaging_

_Note. Context generated from the literature review for RTP_
3 Methodology

This section introduces the reader to the methodology of this study. The research paradigm, approach, design, and data gathering are first introduced. Thereafter, the data analysis, data quality, and ethical considerations are presented.

3.1 Research Paradigm

The research paradigm is the philosophical framework used in relation to the study's methodology. Two main paradigms exist: positivism and interpretivism. Positivism stems from the belief that social reality is objective and independent (Collis & Hussey, 2014), meaning that the researchers do not affect the research with bias or their interpretation of the result. Usually, this paradigm is accompanied by more quantitative methods if gathering data due to the objective nature of these methods. In contrast, interpretivism embraces the idea that social reality is shaped by the researchers' perceptions, which inherently involves more biased and subjective judgments that can potentially cloud the researchers' view (Smith, 1983). The interpretive understanding of researchers is more suited for interviews, as the data is analyzed solely through the researchers' lens, shaping it after their understanding of this data (Smith, 1983). An excellent way to relate these concepts is to think that positivism focuses on the known, and interpretivism focuses on the knower (Smith, 1983). This study utilizes qualitative data gathering, therefore following interpretivism to support this study.

3.2 Research Approach

Famously, there are three research approaches: deductive, abductive, and inductive (Ketokivi & Mantere, 2010). A positivistic research paradigm usually accompanies the deductive research approach. The researcher is detached, objective, and neutral with the study, and the results are often generated through testing a hypothesis. The sample is randomized, and the study aims to test a theory (Ketokivi & Mantere, 2010). Therefore, this approach does not fit this study's current structure and intention. An abductive research approach is often paired with a more interpretivist research paradigm, where researchers are expected to be very reflexive
about how they want to engage with the study (Mantere & Ketokivi, 2013). The results are expected to create new theories, explain mysteries through single case studies, and apply a medium level of theory where reflection has occurred (Mantere & Ketokivi, 2013). This study does not aim to provide a completely new theory with a strong level of reflection. Instead, it wants to describe the link between the current state of the ICT industry and the feasibility of adopting RTP packaging into it. Therefore, that leads us to the third and final option, the inductive research approach. An inductive research approach is often used alongside interpretivist research paradigms (Azungah, 2018). An inductive approach is used to derive themes from the data presented while utilizing single and multiple case studies to create a theory (Mantere & Ketokivi, 2013). There is a constant comparison between the generated data to identify “essential features and the systematic description of interrelationships among them - in short, how things work” (Wolcott, 1994, p. 12). This matches this study’s purpose as it wants to explore the interrelationships between RTP products with how they contribute positively and negatively to the environmental, economic, managerial, and technological feasibility for logistics services customers.

3.3 Research design

The research design refers to the chosen research methodologies and methods made to satisfy the purpose and RQs of the study (Collis & Hussey, 2014). This study uses multiple case studies to be able to compare the similarities and differences of various cases about a particular phenomenon (Gustafsson, 2017). Yin (2009) defines a case study as an empirical inquiry that explores a present-day phenomenon in depth and within its real-life environment. The similarities and differences can develop patterns and themes among the respondents and produce a theory that can be generalized to other cases. The benefits of using case studies are numerous in relation to what this master thesis wants to accomplish. Multiple case studies provide more trustworthy data due to findings grouping themselves in several cases, unlike single case studies that only utilize one perspective (Baxter & Jack, 2008). Baxter and Jack (2008) also argue that multiple case studies enable the analysis of each setting for every case while also drawing attention between the cases. As these settings are different, it is important to use a sampling strategy that considers the differences but contains enough similarities to draw conclusions. The sampling strategy will be further discussed in the data-gathering section of this study.
As previously stated, the aim is to explore new links by exploring the barriers, drivers and enablers affecting the feasibility of RTP in ICT supply chains. This link has not yet been illustrated in the literature for the ICT industry. Due to the novelty of this topic, this study is exploratory.

3.4 Data Gathering

The data collection starts with contacting companies using RTP to interview employees and managers related to RTP, sustainability, and SCM. As RTP is not widely implemented in the ICT industry, companies that had not implemented RTP at a broader scale had to be chosen. Still, knowledge about RTP remained an essential criterion for participation in this study.

Individual company contacts were acquired from referrals and social media, where potential respondents were contacted through e-mail, phone or the platform LinkedIn, depending on the available information. 39 organizations were contacted, and nine interviews were conducted. Unfortunately, one participant booked an interview but did not attend the interview and did not provide any further communication.

This study employed a purposive sampling strategy and this was chosen due to the few amount of people carrying the relevant knowledge to answer the proposed RQs. Both the producer and potential users of RTP were chosen to diversify the answers and generate in-depth knowledge. The potential users of RTP fell under one criterion: they had to be part of the ICT industry. Meanwhile, the producer of RTP is not associated with a specific industry, meaning they operate across industries. The participants needed to be involved or have been involved with RTP projects and should be part of at least one out of two departments: the SC department and the sustainability department for the potential RTP users, while the RTP producer would have to be involved at a strategic level. This led to the formulation of the table below, providing a representation of the participants for the interviews:
Table 2.

*Interview Participants*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Company</th>
<th>Duration</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>A</td>
<td>01:00:32</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P2</td>
<td>A</td>
<td>00:54:09</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P3</td>
<td>A</td>
<td></td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P4</td>
<td>A</td>
<td>00:33:49</td>
<td>Sustainability</td>
</tr>
<tr>
<td>P5</td>
<td>B</td>
<td>00:50:42</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P6</td>
<td>C</td>
<td>01:10:32</td>
<td>Producer, IT</td>
</tr>
<tr>
<td>P7</td>
<td>D</td>
<td>00:46:31</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P8</td>
<td>E</td>
<td>00:30:52</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>P9</td>
<td>C</td>
<td>00:34:43</td>
<td>Producer, Sustainability</td>
</tr>
</tbody>
</table>

*Note.* The attributed number of every participant, along with which company they were part of, the duration of the interview, and which department they worked at.

3.4.1 Secondary data

Before the interviews, the relevant company reports were read online to understand the strategic view of packaging for the case company. This was to improve the quality of the answers generated in the interview once initiated and to build a basis for the interviewee.

3.4.2 Semi-Structured Interviews

First and foremost, interviews were selected due to being able to find out what is in and on a person's mind and to access the perspective of the person being interviewed (Patton, 1990). Furthermore, interviews allow the study to pursue an in-depth exploration of meanings where answers can be clarified, which cannot be done efficiently with self-completing questionnaires (Arksey & Knight, 1999). More specifically, semi-structured interviews are used as a data collection method to provide rich data while exploring the interviewee's understanding of the topic in question (Arksey & Knight, 1999). This collection method was chosen over structured interviews due to its flexibility and to understand the context from which interviewees build their answers. This is especially important because this study wants to explore relationships.
The semi-structured interviews started with the purpose and RQs of the study being listed, along with the option to remain anonymous, if requested, to respect the confidentiality of the answers given. After that, permission to record and transcribe was asked for the researchers to go back and revise the transcription given by the Microsoft Teams Meeting functionality. Thereafter, the actual interview began. Interviewees introduced themselves and their professional positions in the organization. An explanation of the interview structure was given, where the interviewees took part in either one or two of the questions. The interview was divided into two parts - One part was designed to be answered by companies currently employing RTP, and one was designed for those not currently employing RTP. This enabled data gathering from users and potential users, making it possible to provide varied answers. Both parts were subdivided into three separate parts - RTP Feasibility, Aiding Technologies for RTP, and Regulatory Compliance. These themes were derived from the literature review to cover the current problems and opportunities in the ICT industry.

Shortly summarized, if the interviewee’s company was utilizing RTP, the RTP Feasibility Section targeted the environmental and economic strategic goals that RTP fulfills, a comparison between RTP and conventional packaging, and any other factors affecting the feasibility of RTP. If not using RTP, the interviewee would be asked why that is and how implementing RTP would be more feasible. The Aiding Technologies Section would explore what technologies are currently employed in conjunction with the company’s RTP usage and how these technologies contribute to RTP's feasibility if this is used in their company’s SCs today. If not used, the interviewees had to answer how technologies could support RTP in relation to the previously mentioned issues with RTP. The final part, Regulatory Compliance, would ask about the role of regulations today regarding the feasibility of implementing RTP in their respective SCs.

Finally, the interviewees were thanked for their time and asked to contact us if any questions arose or if a withdrawal from the study would be requested.

3.4.3 Desk Research

The literature review provides a frame of reference for earlier research. The purpose is to find relevant literature that ties RTP to the ICT industry and to decipher what context RTP finds itself in regarding the potential drivers, barriers, and enablers of it. Several keywords deemed
relevant to the topic were chosen and used on Primo JU and Google Scholar databases. The researchers extensively searched for peer-reviewed articles and scholarly books, which were narrowed down to the most relevant to this research. The most relevant articles were chosen by skimming through the literature and only selecting the ones correlated with RTP and its current drivers, barriers, and enablers. Articles ten years or less were preferred, but older ones were also accepted if deemed relevant. The chosen timeframe is due to the rapidly changing environment in the ICT industry.

**Table 3.**

*Search parameters for Literature Review*

<table>
<thead>
<tr>
<th>Databases</th>
<th>Primo (JU Library), Google Scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keywords AND/OR</td>
<td>Sustainable Logistics, Circular Logistics, Returnable Transport Packaging, Reusable Transport Packaging, Tertiary Packaging, Industrial Packaging, Environmental Issues, Economic Issues, Barriers, Drivers, Enablers, Closed-loop, Supply Chain</td>
</tr>
<tr>
<td>Sources</td>
<td>Academic Articles, Academic Books, Company Reports, Websites</td>
</tr>
</tbody>
</table>

*Note.* Search parameters for the literature review are divided into databases, keywords, and sources used.

**3.5 Data Analysis**

Several authors have criticized qualitative research for its perceived lack of scientific rigor and validity and its potential for researcher biases to influence data collection, analysis, and interpretation (Borman et al., 1986). The Gioia methodology developed by Dennis Gioia was utilized for data analysis to address these concerns and uphold trustworthiness standards in this study. This methodology assumes that the organizational world is socially constructed and the individuals constructing their organizational realities are knowledgeable, as well as the
researchers who collect and analyze the data (Gioia et al., 2013). Thus, researchers count on the ability to analyze the data correctly, identify patterns, and formulate concepts in theoretical terms (Gioia et al., 2013).

Primary data is obtained from the interviews conducted with four companies operating in the ICT sector and an RTP producer. Annual reports of these companies are gathered as secondary data to enrich the results of this study. The data analysis process in this study adhered to the recommended steps proposed by Gioia et al. (2013). Initially, the data were subjected to open coding by thoroughly reviewing interview notes and transcripts and finding lower-level meanings, such as quotations that can be found in Table 4 in Appendix 8.2. The researchers recognized 32 factors as a first-order concept. Further, these factors were grouped into 14 categories as second-order themes. The last step involved in this process is connecting the second-order themes to four aggregate dimensions. The model illustrating the aggregate findings can be seen in Figure 4.
Figure 4.

Aggregate findings of barriers, drivers and enablers

Note. Aggregate findings categorized through the Gioia methodology.
3.6 Data Quality

3.6.1 Qualitative Research

Ensuring the trustworthiness of collected and analyzed data is crucial to generating quality findings. In this regard, it is necessary to maintain specific standards regarding the nature and mode of data generation. To this end, the present study has adopted the four criteria proposed by Lincoln and Guba (1985): credibility, transferability, dependability, and confirmability. These criteria serve as a yardstick to assess the reliability and validity of the research findings. The credibility criterion pertains to the degree to which the research data can be deemed plausible and trustworthy. Transferability refers to the extent to which the findings can be transferred to other settings. Dependability is concerned with the consistency of the research procedures and outcomes over time, while confirmability pertains to the neutrality and objectivity of the research findings. The application of these criteria in the present study thus underscores the commitment to ensuring methodological rigor and scientific integrity.

3.6.1.1 Credibility

Credibility in a qualitative study concerns confidence in the truth of the data gathered and its interpretation (Kemparaj & Chavan, 2013). Thus, specific approaches or methods can be applied to establish the credibility of the research findings.

Triangulation considers more than one method to collect and analyze the data because each method reveals different aspects of empirical reality (Patton, 1999). Therefore, this study used data source triangulation by interviewing employees from four different companies operating in the ICT industry to obtain primary data. Moreover, interviews conducted with employees of an RTP-producing company were incorporated to enrich the data. Furthermore, their annual reports were used as secondary data to enrich it. After data collection, the researchers analyzed the data separately and cross-checked the insights to reduce bias and enhance the credibility of this research study.

3.6.1.2 Transferability

Transferability consists of to what extent the findings obtained from a qualitative inquiry can be applied to another similar context and extend the knowledge used (Morse, 1994).
Furthermore, this criterion is met when the results make sense to others not implicated in the research and can associate the findings with their own experiences (Cope, 2014).

This study uses a purposive sampling technique to increase transferability. More specifically, expert sampling since interviewees were selected according to their particular knowledge or experience in RTP or packaging, working in the ICT sector. Furthermore, these individuals held different job positions. Additionally, this study gives a detailed description of the research context. Therefore, it allows for enhancing the applicability of the research results to other similar contexts.

3.6.1.3 Dependability

Dependability deals with the concept of reliability, that is, how stable the findings are over time and if the research would have the same results replicating the study by another individual in a similar context (Bitsch, 2005).

This study applied an audit trail strategy to reach dependability, documenting the data collection process, such as the interview recordings, note-taking, and emails sent to participants. Furthermore, the stepwise replication technique is implemented; thus, researchers analyze the data gathered separately and compare the results afterward. This allows for reducing the subjectivity of the results of the qualitative research.

3.6.1.4 Confirmability

Confirmability deals with the objectivity or neutrality of the data and the interpretation of the findings (Tobin & Begley, 2004); thus, it reduces the researchers involving personal beliefs or values.

In this study, the researchers employed a triangulation approach to enhance the robustness of the data. Triangulation involved the collection of data from diverse sources, including interviewing individuals from different organizations and departments and supplementing this primary data with secondary data sourced from the companies' websites and annual reports. In the analytical phase, both researchers independently conducted data analysis to mitigate the potential pitfalls associated with subjective data interpretation. This approach was
implemented to foster a more objective and rigorous treatment of the collected data, thereby contributing to the study's methodological rigor.

3.7 Ethical Considerations

Ethics deal with the acts of those enhancing and those harming the well-being of others (Paul & Elder, 2003). To protect participants, the ethical implications of this study consider the eleven categories of key principles identified by Bell and Bryman (2007).

Harm to participants: To avoid potential harm to interviewees and the researchers, this study ensured psychological well-being by constructing a respectful and open environment to communicate freely and comfortably.

Dignity: Mutual respect from the interviewers and the interviewees was ensured when conducting semi-structured interviews.

Informed Consent: Before initiating the online interviews conducted through the Microsoft Teams platform, the researchers initiated a comprehensive pre-interview procedure. This procedure involved email communications to each participant, informing the research's objectives and elucidating the participant's anticipated involvement therein. Furthermore, as an essential component of this process, a General Data Protection Regulation (GDPR) document was attached to the email, and participants were respectfully solicited to provide their signature of acknowledgment before the scheduled interview. On the interview day, the researchers requested consent to record the interview session. This meticulous approach ensured that participants were well-informed and that their participation in the research was wholly voluntary and ethically sound.

Privacy: The data obtained from interviewing individuals from different companies, as well as those within the same company, remained private; therefore, it was neither shared nor commented on by other interviewees.

Confidentiality: All meetings were recorded through Microsoft Teams and saved securely to protect the data gathered from interviews with the participants. The researchers and interviewees only have access to the recordings, ensuring that no unauthorized individual has access to the material.
Anonymity: To protect the participants' identities in this research, their names, job positions, and organizations remained anonymous.

Deception: The researchers carefully explained the purpose of the research and the role assigned to each participant. It was executed in two distinct phases: firstly, via email communication before the interviews, and secondly, immediately before starting with the interview questions in the online meetings. This procedure was implemented to ensure transparency, safeguard against ambiguities, and foster a clear and mutual understanding among all participants.

Affiliation: The researchers adequately informed participants that this study is a Master's Thesis at Jönköping University, financed by the authors, avoiding any conflict of interest.

Honesty and transparency: The interviews and surveys were performed in English as the communication medium, giving more transparency and trust to the whole process.

Reciprocity: Discussions with participants were conducted before the interviews to ensure the contribution to the interviewees in this study and the academic contribution of the research, obtaining reciprocal benefits.

Misrepresentation: To avoid misunderstanding or false reporting, researchers analyzed the data separately.
4 Empirical Findings

In this section, the reader is introduced to the empirical findings of the study. The findings consist of four categories: Barriers impacting the feasibility of RTP implementation; Drivers impacting the feasibility of RTP implementation; Factors to consider when implementing RTP; and Enablers of RTP implementation.

4.1 Barriers impacting the feasibility of RTP implementation

Based on the interviews, six themes related to the barriers impacting the feasibility of RTP were identified. This includes SC process and return flow control, environmental issues, economic cost, company priorities and resources, stakeholder pressures, goals, and decision-making.
**4.1.1 Supply Chain Process & Return Flow Control**

The initial theme identified is SC process and return flow control, which highlights three barriers impacting the feasibility of implementing RTP: the global nature of SCs, lack of controlled flows, and long timeframe of closed-loop systems.
4.1.1.1 The Global Nature of SCs

The evolution of the business landscape over recent decades has engendered a perceptible shift, rendering the world increasingly interconnected. Consequently, companies operating on a global scale have been compelled to adapt their operational paradigms. This transformative trend extends to SC management. Historically, companies contended with predominantly local operations, affording more manageability than today. This was attributable to the insignificant amount of specific barriers, including time zones, geographical distances, linguistic variances, cultural distinctions, and currency disparities.

"There are not so many factories in Sweden anymore. So that is why this kind of returnable packaging has gone down quite a lot." - P1.

"Our products are manufactured at a number of locations distributed globally and can then be sent anywhere on the planet." - P3.

Both participants, P1 and P3, agreed that manufacturing processes are globally dispersed across various parts of the world. This shift is a consequential outcome of globalization and evolving business dynamics, presenting tough challenges in managing RTP on a broader scale.

"We are a global manufacturer with, yeah, transports all over the world. That is where it is very difficult." - P2.

"The difficulty lies in when you have a supply chain that goes from ABC to EFGH by JKL, and we span different parts of the world. So for local supply chains, it becomes easier." - P4.

P2 and P4 emphasized the significant challenge companies face dealing with extensive transportation distances in their global operations. This creates substantial hurdles for implementing RTP as it necessitates managing the return of these packaging. Moreover, P1 underscored that these operations incur additional costs.

"When the production is so spread out in the world now, there are higher costs." - P1.

The P1 statement aligns with P7 regarding high cost and goes further by illustrating with two examples.
"A lot of our European manufacturing as well as Asia manufacturing goes to another continent, so all the products we manufacture and purchase for service businesses for example, within Europe 90% or 95% goes outside Europe. So getting them back does not make any sense" - P7.

"We had one case where we used this really strong steel frame ... and we thought about getting them back to the Manufacturing locations in China and India, but eventually the taxation and transportation prices just didn’t make it anyhow beneficial." - P7.

Furthermore, P1 highlighted that these costs encompass not solely the economic aspect but also the environmental perspective.

"They are higher cost and also for the environmental and send it back because if we have a production in China and send it to the supply up here in Sweden, it's not cost efficient to send it back either even with the environmental." - P1.

4.1.1.2 Lack of Controlled Flows

A crucial factor that diminishes the feasibility of RTP in companies is the inability to control the return flows, a pivotal element impacting the efficiency of an RTP system.

P2 and P6 agreed that the absence of a tracking system significantly influences the performance of RTP.

"Since we do not have an internal RTP system, we do not keep track of performance." - P2.

"And normally when it comes to RTP... no one keeps track of where they are." - P6.

Moreover, P1 emphasized that the outbound logistics lack control, reaffirming the significance of controlled flows when adopting RTP.

"If we look at outbound, it is out of the question because it is uncontrolled flows. A returnable packaging system needs a controlled flow." - P2.

Additionally, the absence of monitoring flows might impact the economic side of businesses due to RTPs being stuck in warehouses or lost, resulting in shortages of these packaging in
their operations, thus increasing costs. Moreover, P3 and P6 expressed a concern regarding the low return rates and RTP misuse.

"Low return rates - from what we understand from other actors, return rates are low even in relatively limited closed loop systems." - P3.

"You also see that they (RTP) were being misused, used in other parts of someone else's supply chain. And, the more standardized packaging you have, the bigger is the chance that it goes away somewhere." - P6

4.1.1.3 Long Timeframe of Closed Loop Systems

The last factor in this category identified that detrimentally influences the feasibility of RTP pertains to the prolonged duration between the departure of RTP from one facility and its subsequent return, generating a negative environmental and economic impact.

"Long timeframe and environmental costs of a closed loop system – if we were able to collect packaging from site, the time needed and environmental cost of returning the packaging material to a manufacturing site makes RTP non-viable in most cases." - P3.

4.1.2 Environmental Issues

Interviewees identified three factors within this theme that decrease the feasibility of RTP, negatively impacting the environment.

4.1.2.1 Unclear Sustainability Gains

The potential beneficial effects arising from adopting RTP in companies should be quantifiable or measurable.

"If you have a question mark on the sustainability gains, it's difficult to justify the increased costs as well." - P4.

While RTP might present a promising opportunity for environmental support, the inability of companies to gauge their sustainability performance impedes the assessment of its merit. Consequently, as stated by P4, this intensifies the challenge associated with endorsing an investment to adopt RTP.
4.1.2.2 RTP Loss

Consistent with a prior statement from a participant, the absence of flow control augments the likelihood of experiencing low return rates of RTP. Moreover, P2 supported this by giving an example and emphasizing the economic and environmental costs involved.

"For example, If we start delivery on steel pallets because the product needs a longer life-cycle time and so on. And then we discover we do not get it back. It's leakage. And if we compare the CO2 impact on those heavy steel pallets and half of them do not come back... It does not have environmental benefit or economic benefit." - P2.

4.1.2.3 Increased Transport Emissions

Participants shared thoughts regarding the impact that RTP could potentially have on transport emissions.

"if you don't use the returnable system in the right way in the right context, it will cost CO2" - P2.

P2 expressed concerns about RTP negatively impacting the environment if managed incorrectly. Similarly, P3 noted the environmental considerations and the additional time required to return RTP to a warehouse.

"Long timeframe and environmental costs of a closed loop system – if we were able to collect packaging from the site, the time needed and environmental cost of returning the packaging material to a manufacturing site makes RTP non-viable in most cases” - P3.

4.1.3 Economic Cost

Upon the strategic determination to incorporate a new system or product within an organization's operations, many aspects need to be thoroughly analyzed, with cost typically assuming a predominant role in this process. Three factors regarding this theme were identified: RTP Loss, Management, and Cost Model Complexity.
4.1.3.1 RTP Loss

As stated previously by interviewees, the uncontrolled flows increase the rates of RTP being lost in warehouses or misplaced, making them unable to be appropriately used in a closed-loop system SC. Participants P8 and P1 support prior statements and emphasize the resultant cost implications of RTP loss.

“The only time that we don't see that happen (cost savings) is if they get lost, which unfortunately happens more often than we would like.” - P8.

"When we send them (RTP) out it was a huge cost when they did inventory on the packaging and see how many pallets have been lost or sent out. That was quite a big expense for that." - P1.

Additionally, P6 illustrated an example highlighting the extra resources needed for businesses in such situations, including personnel and packaging replacement.

"If you imagine 700 suppliers and you wanna try to figure out who has the packaging and then you need to call around and ask them... Takes a lot of time, costs a lot of money.” - P6

"They (companies) had issues with steel racks disappearing and not being used and they didn't have enough of them at the main site so they had to buy a lot of one way packaging" - P6

4.1.3.2 Additional Management Costs

"(RTP) It's not a procurement of the packaging itself, but it's more like the management right and the cost you have during the process." - P5.

As articulated by P5, the introduction of RTP transcends mere capital outlay on the packaging itself. it necessitates additional person-hours, training, and establishing a new system to ensure efficiency. This entails a substantial investment, thereby prompting companies to evaluate its implications conscientiously and consequently influencing the feasibility of adopting RTP.

4.1.3.3 Cost Model Complexity

Before introducing a new system, businesses must meticulously conduct calculations and analyze prospective costs comprehensively to facilitate informed decision-making. Following
this estimation, decision-makers are equipped with the requisite information to ascertain the viability of the contemplated investment.

"But if they have a cost model, with the trip cost and so on... it's quite complicated the calculation on how to set that cost, it has to do with the investment of all packaging and then how many times it will circulate during the lifetime and what is the lifetime of the packaging." - P2.

P2 underscored the challenges associated with estimating the cost of RTP adoption for a company. The intricacies of this evaluation and the diverse and complex factors that make difficult quantification contribute to the diminished feasibility of RTP.

4.1.4 Company Priorities & Resources

Elements contributing to RTP's diminishing feasibility are linked to each company's established priorities. Additionally, given the constraints of limited resources, prudent allocation becomes crucial. Two factors were identified in this section: Priorities in other areas and Abundant Resources Required.

4.1.4.1 Priority in other areas

"We all know it is important, but yeah, there's a lot of things next to it, which are putting those projects not on the top of the list." - P5.

Concurring with the perspective of P5, P4 emphasized that, despite ongoing investments in environmental sustainability in their company, the prioritization of RTP currently does not rank among the foremost priorities within corporate agendas.

"We have a really good understanding of a footprint now and we are focusing efforts and investments to where we're gonna see the most impact and packaging just isn't one of them yet." - P4.

4.1.4.2 Abundant Resources Required

As previously mentioned, firms contend with managing limited resources; hence, integrating a new operational expense necessitates meticulous analysis. Although, environmental
competence is sooner or later required in day-to-day operations. Sustainability in general requires abundant efforts to satisfy all needs and provide a well-thought-of approach, as P9 introduces the subject of sustainability when discussing the implementation of RTP.

"When people are recognizing how much work it is, everyone disappears." - P9.

Additionally, companies need to manage their resources in terms of finances, employees, and time.

"You're adding a cost to the organization, and it drains a lot of energy to pursue people to go over that edge." - P5.

Furthermore, P5 expressed that time considerations constitute a pivotal factor influencing RTP's feasibility.

"So time might also be a factor...there's a lot of things to do in a big company and they're all lined up in relation to priorities...so if you would like to implement RTP, it would take a lot of time" - P5.

4.1.5 Stakeholder Pressures

Businesses need to deal with multiple stakeholders' pressures, both internal and external. These include consumer requirements, government regulations, competitors, and owners. In this theme, only one factor was identified.

4.1.5.1 Increased Customer Costs

When adopting RTP, organizations must deliberate and establish consensus regarding allocating additional costs and the degree thereof. P9 indicated that today, limited customers are willing to embrace a sustainable solution if it entails additional costs.

"A very small portion of the customers are willing to pay more (for sustainable solutions), and not so many are thinking about that seriously, so far, but I think in these close coming 2 years, this will be a rapid change and grow." - P9.

Furthermore, P5 highlighted the importance of analyzing competitors' reactions and potential customer's responses to adopting RTP.
"If you're gonna increase your prices and your competition is not right, you're basically making it more complex for yourself to sell your products, right? If customers are going via price" - P5.

Another salient element for consideration is the extent to which customers perceive value in transitioning from one-way packaging to RTP and their willingness to participate in the return of the packaging. As stated by P5, customers may exhibit disinterest in RTP, thereby diminishing the value of such an investment.

"Are you gonna let your end customer pay because your end customer might say...I don't want your packaging anymore, right?... What if the end customer would say OK, I want your product, but I don't want the packaging." - P5.

4.1.6 Goals & Decision-Making

Firms must ensure alignment across each unit to efficiently achieve strategic goals and objectives. This ensures a cohesive organizational direction, fostering employee contributions toward the overarching corporate strategy. The factor identified is the following.

4.1.6.1 Lack of Goal and Decision-Making Alignment

Companies frequently organize themselves into distinct business units, depending on their size. These units often function with a degree of autonomy, formulating independent strategies and objectives, potentially leading to alignment challenges across various units.

"Business Units have their different ways of thinking. They have different thoughts and their own marketing teams. They have their own thoughts about how a product should look like and how it should be presented towards the customers... But there is a movement in the company that we would like to have a more common approach." - P5.

Moreover, P5 accentuated the significance of aligning goals and fostering a comprehensive understanding of organizational objectives throughout the firm.

"Everybody needs to fully understand and support the goals from an environmental perspective... and not everybody is putting their hands together for these projects." - P5.
Furthermore, P2 emphasized that within the company's packaging design process, the focus remains solely on meeting requirements rather than actively working toward environmental goals. Consequently, this highlights a lack of alignment between their environmental and operational goals.

"The requirements are just for the design process of how we work, the environmental goals is something we're aiming for in the future." - P2

A similar thought was expressed by P1, explaining the incongruity between operational objectives and overarching organizational goals within the organization.

"It is a bit interesting because we have, on a global level, a net zero emissions goal. But, for our packaging group, we don't work so much with net zero; we work more with reused plastics... Our goals and the global team's goals do not go hand in hand." - P1

Participants agreed that the absence of alignment between operational and company-wide goals would detrimentally affect the feasibility of adopting RTP. This poses challenges to the SC dynamics, introducing the need for new processes in collecting and cleaning returnable packaging. Without a proper alignment among business units, the SC risks fragmentation, which could lead to operational inefficiencies and increased costs.

4.2 Drivers impacting the feasibility of RTP implementation

The decreased feasibility of RTP is vital to consider when implementing RTP, although, the positive aspects should not be understated. Through semi-structured interviews, these aspects were mentioned by the interviewees and should be taken into account when deciphering the potential of RTP in an ICT SC.
Note. These are the factors identified that contribute to increased RTP implementation feasibility, identified from semi-structured interviews.

4.2.1 Environmental Benefits

The first identified theme that contributes positively to the feasibility of implementing RTP is the potential environmental benefits from the usage of RTP. Two factors regarding this theme were identified - The potential to save and mitigate CO2 emissions and reduce unnecessary resource consumption. Pinpointing the importance of clear and measurable sustainability gains is crucial to justify the implementation of RTP, as explained by P4 below.

“A higher price can be justified if the sustainability gains are high enough.” - P4.

4.2.1.1 Save CO2 Emissions

It quickly became apparent that the potential CO2 savings was a major contributing factor to the potential upsides of implementing RTP. Due to CO2 emissions being one of the most discussed topics when fighting climate change today, this could potentially aid the perceived environmental benefits that RTP provides, and reinforce it practically if done correctly. The
interviewees were clear about the fact that only the correct way of handling RTP would provide CO2 emission reductions.

“If you do it right, it will save a lot of CO2” - P2.

This was also confirmed by another interviewee who, when discussing the justification for the higher price of RTP, pointed out the importance of keeping this trade-off into consideration as a driver for RTP implementation.

4.2.1.2 Scarcity of Resources

Regarding the higher pricing that RTP constitutes, P4 was also clear about the fact that there will be a shift in how companies view the current pricing strategy of RTP. The fact that the future might not hold enough resources to support the current packaging landscape in SCs presents the possibility that RTP could become more common.

"I do think that RTP will constitute a certain business design and the business model... and needs to become more common because we might not have the resources for single-use packaging in the future... We need to reuse. So even if it becomes more expensive, we might not have a choice as an industry." - P4.

This line of thinking that resources should be treated as scarce is something that is starting to be reflected in some SCs, especially in the design process of RTP. As this thinking develops, a necessity for creating circular loops within SCs needs additional efforts and needs to be reflected across the SC.

"Originally, a lot of thought was put into designing a corrugated box that would be a one time use packaging concept. Instead of doing that we decided to go with the crate that could be reusable so we get multiple uses out of that crate four or five times at least. By doing so, we don't have to use as nearly as much corrugated." - P8.

4.2.2 Pressures to Adopt RTP From Stakeholders

As RTP is gaining a spotlight in the SC field, there are certain pressures that are exerted from several stakeholders. In the case studies analyzed, two factors were found to support this. Firstly, legislators and regulations are pressuring the current SC landscape in the form of
various laws being implemented in several areas in the world. Secondly, employees were found to support environmental initiatives that are presented within the SC setting.

4.2.2.1 Regulatory Pressures

As previously mentioned, pressure is asserted onto an SC depending on stakeholders in and outside of the company. Regulations are one of the major forces regarding external pressure that can affect how companies are thinking in their current markets. The regulations exerted by governmental bodies are increasingly putting pressure on companies to adopt more environmentally beneficial packaging on many levels.

“Legislations is one of the few tools available to really push companies regardless of industry to make something that isn’t economically sound for them”, also pointing out that “with high enough fines it will be economically viable.” - P4.

Once more, the economic downside of packaging is balanced out as an alternative, conventional packaging does not become economically sound any longer due to increasing fines.

“RTP is starting to pop back up now that legislation is changing, so we need to look into it. But, it needs to be in a controlled way.” - P2.

The exerted pressure to look into RTP is further established by P4, who, when discussing the need to reuse packaging, stated that regulations are a driving factor

“I know the regulations coming in, that’s pushing us in this direction.” - P4.

However, different types of pressure were enacted in implementing RTP on different levels.

“There is legislation about how much packaging material you put on the market.” - P4.

“A lot of question marks regarding legislation for bio-plastics for how it will look like in the future” - P4.

“Last year, the UK implemented an extra tax for companies that cannot show the recycled content of their packaging.” - P9.
Regarding the different levels of regulatory pressure, a national setting presents regulations on a country level. Additionally, some larger areas, such as the EU, are pushing for legislation.

“We will be affected by incoming requirements in the new EU packaging regulations. These will probably include RTP requirements – looks like only pallets for us, and minimum recycled content in plastics (also from Canada and India).” - P4.

“It’s placing requirements on plastic content, recycled plastic content, plastic thickness, reusability, and more.” - P3.

“In Europe, it is pushed and fueled by this legal part. By 2025, a minimum of 50% of packaging material needs to come from recycled sources.” - P9.

“Australia has started to draw the line to plastics quite heavily so there are already customers on other continents that do not accept any plastics in the deliveries.” - P7.

A final note on the importance of regulations for companies is the potential regulation-based goals that companies adopt to become compliant or push ahead of current regulations.

"The recycled plastics that are tied to our goals is legislation-based as well.” - P2.

4.2.2.2 Customer Requirements

Regarding pressures that are formed around reducing the consumption of plastics, customers are playing a role in ensuring that their demand for more environmentally beneficial products is put on the market. Currently, customers are exerting pressure on companies alongside regulations, creating pressure on a multi-faceted front. When asked about where the interviewees were feeling the most pressure, P7 stated that regulations are not necessarily on a country level.

"Reducing plastics is definitely the one. Not necessarily on a country level, but on a customer level.” - P7.

4.2.2.3 Employees Support Environmental Initiatives

This interesting topic brought up by P5 is essential to remember when trying to initiate environmental initiatives, namely employee support.
“I think employees and people have a very big, big role to play in there, and it seems like it's going automatically because people are proud of it...So I think we should not forget their impact.” - P5.

P5 states the importance of employees regarding any environmentally beneficial initiative, no less the implementation of RTP. This supportive pressure should be incorporated and nurtured as employees should always be included as the main stakeholders to make environmental initiatives happen.

4.2.3 Competitiveness

Further exploring the drivers for implementing RTP brings the study to explore the competitive advantage that packaging can bring over its conventional packaging counterpart. Two factors for this theme were Industry leaders pioneering RTP implementation and environmental branding.

4.2.3.1 Industry leaders pioneering RTP implementation

As RTP is currently underrepresented in the ICT industry, a major contributor to change this would be for industry leaders to start adopting RTP and pave the way for other smaller players.

"Let's say that the ICT sector would start implementing RTP...so the big guys like Google, Amazon & HP...they will all move to this type of packaging, and I think that would probably cause a shockwave across the globe." - P5.

Once again, the trade-offs in higher costs had to be justified to remain competitive in the market. The need for a player to pave the path was clearly stated in this case.

"So you need to have a shockwave, and only with the shockwave you can justify that there's an additional cost...you need somebody who starts" - P5.

4.2.3.2 Environmental Branding

Due to the need for more environmentally beneficial initiatives to tackle climate change today, consumers are exerting an increasing amount of pressure on companies in how they operate. Companies can utilize their environmental efforts to gain an edge over non-compliant actors in
the same market if done successfully, resulting in more market share and being able to sell products to customers who are looking to reduce their climate impact.

“If your customers are aware of the fact that you're doing this right and that you are contributing to the environment, and that you do your fair share to make things better, right?... I think that is what we also see from customers and suppliers at this moment, which is very much appreciated. So, in the end, that might be economically in favor.” - P5.

4.3 Factors To Consider When Implementing RTP

Not all factors in implementing RTP should be reflected as inherently positive or negative. Instead, the SC attempting to implement RTP should consider some factors to decipher if RTP is the correct choice of action and can provide environmental and economic benefits, as previously stated. The identified factors from the interviews can be divided into two themes; Product and Supply Chain Characteristics and the Economic and Environmental Perspective, as seen in Figure 7 below.

Figure 7.

Overview of Factors to Consider When Implementing RTP

Note. These are factors that should be considered when implementing RTP, identified through semi-structured interviews.

4.3.1 Product & Supply Chain Characteristics

Specific characteristics are favorable when handling RTP, not only for the products themselves and the flows they require to circulate but also for the SC structure itself. For this theme, three
factors were identified: Transport frequency and product circulation, RTP control flow, and stable demand.

4.3.1.1 Transport Frequency & Product Circulation

Regarding transport frequency and product circulation, the interviews pin-pointed the need to assess the quantity and time required for RTP to circulate in an SC, specifically mentioning the cycle time.

"So, it depends on the cycle time. How long will it take until we get them back? How many pallets do we need in the system?" - P2.

In practice, deciphering how many pallets are required can help level the investment required and avoid unnecessary costs when packaging uses storage space.

"It's a lot about circulation time - Companies can own their packaging or let a third party own the packaging. Then, they have a cost model with trip costs and so on... Setting that cost has a lot to do with investment in packaging and how many times it will circulate during the lifetime of the packaging, and then you get a trip fee on that." - P2.

A factor that quickly became apparent was the understanding of the SC cycles. Cycle time, cycle counts, and their relation to the quantity required in packaging should be taken into consideration when deciphering whether RTP is feasible in an SC. Furthermore, the importance of keeping track of these metrics and analyzing them is vital to further improve the process when implemented.

"And also, if you don't have this circular cycle count, so you know how many cycle the packaging actually survives and where it breaks, then you cannot improve anything." - P6.

4.3.2 Economic & Environmental Perspective

As has been established by previous findings, the economic and environmental benefits need to be clarified, rather they depend on the implementation and usage of RTP. Therefore, other than what has already been shown, there are other factors to consider. The study presents three factors regarding this theme: Cost and cost allocation, CO2 emissions, and customers supporting environmental initiatives.
4.3.2.1 Cost & Cost Allocation

As both senders and receivers in the SC need to be part of the RTP system to make it functional and effective, there will be costs involved that need to be addressed. Deciphering who will carry the costs in the operation, whether shared or owned by one party, is a factor to consider when implementing RTP.

"I'm going to add a cost to the operation...my cost price of the product is growing...Who is going to absorb those costs? ...Are we going to process these costs by adding them to the products on the price list for our customers?" - P5.

Regarding costs, the more actors that share the same cost for the RTP system or packaging, the greater the cost reductions. Even if present in different industries, different companies can potentially create cost reductions as RTP can participate in several SCs if allocated correctly and incorporated into the same system.

"The more people who join, the lower the price gets per person or per company...So different customers in different sectors, they all have to join in...I think that is a key to make costs go down." - P5.

Another important aspect regarding the costs related to packaging is its potential to increase costs or reduce them. In practice, the ability of the SC to maintain RTP in its cycles without them breaking down, getting lost, or stolen results in the potential to save on costs.

"Generally speaking what I've noticed is that returnable packaging is more expensive compared to the consumable ones, but the more times you can reuse that pack, the more cost savings you're going to see." - P8.

"From what we've seen, and more often than not, it (RTP) pays for itself. The only time that we don't see that happen is if they get lost...that's why we looked into implementing trackers.” - P8.

4.3.2.2 CO2 Emissions

Regarding the potential CO2 emissions that are either increased or decreased compared to conventional packaging, the reusability of the packaging needs to be compared to other factors.
An example is the increased transportation required to ship back the used RTP compared to purchasing a new conventional pallet. The context needs to be analyzed in depth to truly understand the value generated by the RTP.

"For instance, if we set up RTP to drive reuse of packaging, it needs to be weighed against the increase in transportation emissions that it would cost...what's important for us is to look at net zero...So even if RTP would provide a lower carbon emission for our packaging, we need to put it in context of what it causes in terms of transportation emissions." - P4.

If proven to be adopted in an inadequate SC context, RTP will be less beneficial than convenient conventional packaging.

"RTP is less environmentally friendly compared to what we use today." - P2.

Disregarding the added transport emissions will not solve the equation to facilitate RTP implementation. So, this needs to be improved upon with efficiency and the creation of systems that can help support lowering transport emissions.

"RTP needs to also show viable... it needs to show a benefit from a transportation emission perspective as well." - P4.

4.4 Enablers of RTP Implementation

The identified factors regarding the RTP implementation enablers can be divided into three themes. These are the required infrastructure, technology, and HR; product and supply chain characteristics; and stakeholder pressure, as seen in Figure 8 below.
Note. An overview of factors that enable and facilitate the implementation of RTP.

4.4.1 Infrastructure, Technology & HR

Further identified through the interviews were the infrastructure, technologies, and Human Resources (HR) required to support the implementation of RTP, some being vital and others making the process more efficient. Within this theme, 6 factors were found. Quality control, tracking or tracing, analytics, freight carrier base system, pooling system, and management & skills were identified tools to improve RTP systems further.

4.3.3.1 Quality Control

Quality control was proposed as a way to analyze the current state of the RTP pallets. These include regular checks on the appearance and functionality of the pallet to provide safe and secure packaging for users to handle.
"We have to do quality control...how are these pallets, how do they look like? Can we reuse them?... Health and safety perspective when using RTP." - P5.

Maintaining regular checks on the pallets enables the possibility of changing out defective pallets and gaining control over the SC's current state.

4.3.3.2 Tracking & Tracing

The second sub-category identified was the importance of tracking, or tracing, RTP to know their current location. An interesting aspect to remember was its relation to quality control.

“To really have this model work you need to have controls...So any technologies to monitor where, when, how many and quality your returns were to people will happen that would really help the planning of packaging of new material and dispatch of that." - P4.

As P4 stated, the structure of tracking provides support for planning packaging in hubs, which lets users know in what location, at what time, in what quantity, and in what state packaging is being shipped. As the quality of the packaging can be incorporated into a tracking system, it is essential to have adequate quality control in the RTP process.

“In my opinion, we really should have tracking on the packaging." - P7.

“You have to keep track of it, know where it is." - P5.

Regarding tracking, a focus on product cycles proved to be present across different companies. The cycles could then be paired with other metrics, further enhancing the tracking capabilities and functionalities, and making the implementation of RTP more efficient.

"So for the tracking... What we're looking at are the cycles, how often they're going through cycles, how often RTP is lost or sent to the wrong location... How much the shock and G-force the trackers are experiencing, which really allows us to evaluate if the different packaging was required or if the new packaging that we designed for cost savings is working properly." - P8.

Regarding the additional capabilities of tracking, the interviewed RTP producer was adamant on the potential benefits associated with tracking. Through tracking packaging, SC can track their CO2 consumption by using connected packaging with CO2 route calculations.
"And then we have the CO2... we can detect and how trucks are doing and how much vessel and the total CO2 consumption for that trip." - P6.

This was further cemented by tracking’s connection to the maintenance of stock levels, where it would be more difficult to keep track of how much packaging is in stock. Therefore, the need for buffers in the SC, which inherently leads to oversized pools. Oversized pools can then lead to unnecessary costs and CO2 emissions.

"One thing is that when you don't keep track of it, you don't really know where the stuff is, right? So you don't have the stock levels. And if you don't know where your stuff is, you need to have buffers everywhere. So you have an oversized pool. Which increased the cost and eventually the CO2 parts as well." - P6.

Furthermore, the role of tracking is directly linked to monitoring costs and reducing the strain on planetary resources by analyzing the amount of packaging in a SC. Additionally, the tracking provides a greater understanding of product cycles.

"Economically speaking, with the tracker, we can determine how much cost savings we're getting by using a returnable crate right? By seeing how many times we can use it. Environmentally speaking, with the trackers, it also helps ... we know that we're not having to purchase as much packaging, individual packaging and going through more material in that aspect." - P8.

4.3.3.3 Analytics

In the case of all data generated from the systems tied to the implementation of RTP, there will be a need to analyze such data. Acquiring tools that can achieve this can optimize the processes involved with the packaging.

“We have the analytics around it to make sure that we understand what is where, and we are currently already using it for products like a tracking and traces system which is on the carton level.” - P5.
4.3.3.4 Freight Carrier Base System

The different types of systems required for a successful RTP implementation should all be considered. A freight carrier system can provide much-needed coordination between different parties in a SC, and be vital for accurate information to be transmitted at the correct place and time.

"We are using a freight carrier base, which is probably consisting of probably around 60 to 75 different freight carriers around the world to help us with tracking, tracing and and sending us the information back to our systems so that our customers can see where their shipments are." - P5.

4.3.3.5 Pooling System

To fight a potential negative aspect of RTP - the potential empty pallets that need to return to their original sender, a pooling system can be used to coordinate between different SC members and create a system in which companies can share RTP pallets, maximizing the usage of pallets between these SC members.

"We need to put a pooling system or a returnable return system basically that you do not let your trucks drive empty with just pallets." - P5.

4.3.3.6 Management & Skills

The skills needed to satisfy the different systems associated with RTP are manifold. Interestingly, the ICT industry could be well-equipped to tackle the greater technical skills required for these systems.

"Since we are an ICT company we have the right people, so I don't see any issues there." - P5.

Skills requiring coordination to maintain and operate systems are vital to enable all actors being up-to-date with the current location of all RTP in the ICT SC.

"So the systems and the maintenance of the systems you have to have people in place to monitor this and you have to have people who pick up the phone or send an email saying hey customer, you still have packaging from us." - P5.
For all employees to work towards the same goals and be coordinated in initiatives such as implementing RTP, they must be aligned with a clear path. Careful preparation should be used to ensure the successful implementation of RTP.

"With your initiatives, projects and business process changes, you would like to plan ahead to make sure that you have the right folks aligned up and the right knowledge aligned up." - P5.

4.3.3.7 Supply Chain Structure

As previously explained, having a global SC can be detrimental to the feasibility of RTP. On the other hand, having a more local SC can improve its feasibility. Interestingly, a factor that became apparent was the difference in use cases between shipments. According to P7, it was primarily used between suppliers and manufacturing locations rather than to customers.

"But there are some small routes, especially within Europe, where we do use that kind of returnable packaging and usually those cases are in between a supplier and manufacturing locations, not in service business or customer cases." - P7.

4.4.2 Stakeholder Pressure

Another theme that already has been identified in other aggregate dimensions are stakeholder pressures. In this case, the participants identified customers supporting environmental initiatives as an enabler of RTP implementation in the ICT industry.

4.4.2.1 Customers Supporting Environmental Initiatives

A pressure that cannot be understated is the pressure from consumers and customers. The ability to demand products that are more environmentally friendly is gaining traction, and consumer demand is generating an increasing amount of pressure. Due to the bad reputation that plastic carries, the SC implementing RTP needs to consider this when deciding what materials it should consist of. Furthermore, the rise of fiber-based materials carries an additional worth, as many countries have the infrastructure to recycle this type of material.

"Customers are asking for less plastics, and we know it is difficult to recycle - Many countries have the infrastructure to take care of fiber-based material" - P2.
4.4.3 Product & Supply Chain Characteristics

The last identified theme that is also previously identified is the benefit of having even demand as an SC characteristic.

4.4.3.1 Even Demand

An important aspect to consider regarding the nature of one’s product circulation is the required stable demand, which RTP needs. An even demand provides more control regarding forecasts, both for the circulation of products and for forecasting the amount of RTP required. On the contrary, an uneven demand can lead to RTP stock-out due to high fluctuations and a mismatch of supplied and demanded RTP, leading to the inability to deliver products or having an abundance of RTP in stock.

"If you have products that go in high volume and low volume you don't know how the circulation goes, so you need a production flow that is very even - Even demand and full control of the circulation, then it works quite well." - P2.

Another aspect of the stability required from RTP is the stability of locations that require them. If the location of an SC’s production line keeps changing, this will work against the stability required from the systems associated with RTP. As RTP works better in local environments, this has to be paired with more stable locations that can utilize a pooling system, or allow the analysis of the RTP flow to work.

"It is about product lifetime, how often products are phased out and phased in again. How often the factories are moving around the world. How the mix is between local flows and global flows." - P2.
This section analyses the empirical findings in conjunction with prior research and is divided into three categories. The aim is to identify the drivers, barriers, and enablers associated with implementing RTP.

As delineated in the literature review, the context surrounding RTP is distinguished into four distinct realms, as depicted in Figure 3: managerial, economic, environmental, and technological. A notable distinction emerged from the empirical findings, particularly in the role of technological factors. As illustrated in Figure 9, these factors were found to play a supportive role in the implementation of RTP across other contexts. Consequently, the analytical structure adopted in this study focuses on examining the interplay between each context concerning RTP implementation, with a specific emphasis on the supporting role of the technological context.
Figure 9.

Overview of Contexts When Implementing RTP

Note. Context of RTP generated from the literature review of this study.

5.1 Managerial Context

5.1.1 Goals & Decision-making

An overarching concern identified from the interview responses is the influential role of goals and priorities in determining the feasibility of RTP. Setting clear goals related to sustainability and packaging can support the adoption of RTP. Furthermore, the goals must be company-driven, and the top management must ensure comprehension to garner employees' support (P5). The research underscored the significance of aligning goals across diverse business units, particularly in varied geographical locations governed by distinct regulations, as a critical driver in attaining strategic objectives (P5). Additionally, it emphasized an absence of alignment between operational and organization-wide goals (P1). Hence, top management needs to drive the alignment of operational and strategic goals across all business units, which promotes coherence, efficiency, and a unified direction. Moreover, the level of internal
motivation within an organization holds significance as it influences the management of increased costs and the willingness to invest in other resources to adopt more sustainable packaging (Pålsson & Sandberg, 2022), potentially enhancing the feasibility of RTP adoption. Another identified pressure that drives RTP implementation feasibility is the ability of employees to be more engaged and support environmental initiatives (P5). As employees are vital to making RTP implementation feasible, nurturing and incorporating this support into a strategy should not be underestimated. To the best of researchers’ knowledge, this topic has not yet been discussed.

This study revealed that certain companies lack specific objectives concerning RTP (P2). Moreover, it indicated that while employees acknowledge the importance of RTP (P5), it has not yet ascended to a position of priority for businesses (P4; P5). Resources are limited, and implementing RTP requires substantial human resources and capital investment (P5). Moreover, the time-intensive nature of RTP adoption (P5) diminishes its feasibility, adding a layer of complexity to its implementation.

One exciting factor underlined by the findings is the influential role of industry leaders in implementing RTP. Their adoption of RTP could serve as a trigger, paving the way for other players within the industry (P5). This gives upper management a benchmark, potentially steering them from solely considering cost as the primary factor when evaluating RTP implementation. This factor has not been identified by literature before but opens up a door for an interesting conversation. The concept of paving the way can be put under a lens to identify the amount of risk companies are willing to take for initiatives such as RTP. Environmentally beneficial efforts demand risks to be taken, especially judging the current rate of sustainable development within most sectors.

5.1.2 Process & Flows

Introducing an RTP system into firm operations necessitates establishing a new infrastructure for correct implementation, including the return flow for the packaging.

The empirical findings indicated that companies encounter challenges when managing return flows, especially over long distances (P1; P2; P4); Schneikart et al. (2023) supported this statement, highlighting the organizational challenge businesses face in establishing an effective
return system when solely using one-way packaging, as observed in the companies interviewed within the ICT sector.

One distinguished factor from the findings is the absence of RTP controlled flows (P2; P6), consequently elevating the likelihood of low return rates due to RTP loss particularly (P1; P3; P6; P8), an element identified as the primary problem. Previous literature also expressed concern regarding the RTP loss rates (Fan et al., 2019). Moreover, it is suggested that tracking systems support the management and control of RTP; however, this necessitates robust analysis and reporting capabilities to offer visibility (Johansson & Hellström, 2007). This study underscores this by emphasizing the significance of tracking within the context of RTP (P4; P5; P7; P8) and the required data analytics for efficiently utilizing this system (P5). Additionally, for the RTP system to work properly, individuals with the appropriate knowledge and skills need to be in place (P5). Therefore, merely possessing a tracking system lacks efficacy without thorough data analysis to enhance visibility, essential for improved operational efficiency (Johansson & Hellström, 2007). Hence, professionals with specialized expertise in this domain are critical to increasing the feasibility of RTP.

Another aspect to consider when implementing RTP involves the new processes associated with the returning flow of RTP. This necessitates managerial decision-making and coordinated efforts to establish the infrastructure for RTP adoption. The findings highlighted the collection of the packaging (P3), the establishment of a pooling system (P5), quality control (P4; P5), the cycle time of RTP (P2; P3; P6), its lifetime (P2; P8) and the quantity required to add into the system (P2; P4) as factors to be analyzed. Previous literature also emphasized the importance of these factors. It connected them to the transport distances, directly influencing the cycle times, the quantity of RTP, quality control, and the cleaning process (Taschner, 2023). Yusuf et al. (2017) accentuated the challenges faced by companies related to RTP's sorting and cleaning process coordination. However, the findings did not mention the cleaning process as relevant. Consequently, successfully implementing RTP requires deep analysis by the top management regarding those elements identified in the return flow by the literature and this study that must be implemented for proper functioning.
5.1.3 Stakeholder Pressures

Different types of pressure are always exerted on top of an SC. Change is required to stay ahead of expectations from the market and fully comply with the current ruleset that different regions have adopted over the years.

This study has identified three drivers for stakeholder pressure regarding the implementation of RTP. But also identifying a barrier from stakeholder pressure, decreasing the feasibility of implementing RTP.

Managers must consider stakeholder pressures when deciphering whether RTP should be implemented and respond to them accordingly. The stakeholder pressure drivers are regulatory pressures, customer requirements, and employees supporting environmental initiatives. Although regulations play a unique role alongside customers, the focus is on creating enough negative pressure on conventional methods rather than creating positive incentives through fines and loss of market share (P4). According to Yusuf et al. (2017), RTP enables firms to lessen the environmental impact in conformity with regulations. This means that RTP should be a solution to mitigate some of the external pressures that SCs face today to become more sustainable. While regulations play a vital role in setting the playing field for markets to operate in, numerous regulations affect the feasibility of implementing RTP. An important aspect is the different types of regulations SCs focus on. In this case, the ICT industry’s SCs are focusing heavily on developing plastic regulations in their packaging (P1; P2; P3; P4; P7), and these are being incorporated into firms’ environmental goals as an effect (P2). More specifically, in terms of packaging, regulations focus on the plastic content (P3; P7), recycled plastic content (P2; P3; P4; P9), reusability (P3), and the amount of used packaging put on the market (P4). Yusuf et al. (2017) confirm that regulations are a driver for adopting RTP, although the study does not specify in what form RTP can be affected. Due to RTP potentially being composed of either plastics, bio-based materials, or other materials, it is vital to consider how regulations influence the packaging design. Interestingly, Prajapati et al. (2019) identify regulations as a significant barrier to reverse logistics implementation, while the study participants stated that regulations are shedding light on RTP for future legal compliance (P2, P4, P9).
Over the last few years, regulations have tightened their grip on the environmental aspects of packaging, potentially leading to more apparent opinions of RTP adoption. Prior literature emphasized the importance of legislative pressures influencing the investment priorities in businesses concerning adopting more sustainable packaging (Pålsson & Sandberg, 2022). This statement is supported by the findings, indicating that legislation stands out among the limited tools capable of compelling companies to adopt practices that might not be economically favorable for them (P4). Consequently, this compels companies to focus on achieving more sustainable packaging, setting corresponding objectives, and enhancing the feasibility of implementing RTP.

The contradiction presented by Yusuf et al. (2017) and Prajapati et al. (2019) introduces a fundamental aspect that needs to be incorporated into the design choice of packaging: RTP is not a bulletproof concept that covers all environmental sustainability angles. Observing and analyzing the current regulatory landscape is vital before deciding what RTP to implement. For example, as RTP needs to be sturdier than conventional packaging, more plastics can be used to ensure RTP’s reliability. However, regulations are working against this. Therefore, creating goals tied to upcoming regulations and being able to quantify sustainability aspects in the RTP implementation process is essential to cover all compliance angles.

Other than regulations, customers are exerting pressure to adopt more environmental initiatives. Reducing plastics is being requested (P7) as customers seek to future-proof their SC partners, ensuring compliance with increasingly strict regulations. Yusuf et al. (2017) argue that RTP reduces or eliminates waste for the final customer. Customers seeking to improve their environmental performance must choose SC partners willing to adopt environmental initiatives. Due to the indisputable environmental image that RTP has, customers who are willing to make this greener transition are highly likely to support an idea such as implementing RTP. Gathering support from customers can be decisive in whether a project is implemented or not. This opens the door to a larger question of how intangible assets must be incorporated into investment decisions, such as RTP. Regarding the value that RTP provides, Taschner (2023) does not include the additional environmental branding aspect as a value driver, making this finding interesting to study further.

To summarize what enables RTP implementation in the managerial context refer to Figure 10. These enablers positively impact the feasibility of implementing RTP from a managerial
perspective. There is a need for employees supporting environmental initiatives, strategic and operational goal alignment, a more specialized workforce, industry leaders adopting RTP, legislative pressure, and quality control. Meanwhile, the technological enablers that can support the implementation from a managerial standpoint are an efficient tracking system, data analytics, and a well-functioning pooling system.

Figure 10.

Enablers of RTP Implementation in the Managerial Context

Note. An overview of the enablers in implementing RTP, focusing on the managerial context.

5.2 Economic Context

Based on the empirical findings, the financial perspective is crucial when studying the adoption of RTP within businesses due to its substantial initial capital cost, which is difficult to justify when seen only through an economic lens. Furthermore, there is a degree of ambiguity concerning RTP's positive impact on companies' financial performance (Mollenkopf et al., 2005; Taschner, 2023). Assessing this investment is complex as it requires careful consideration of various elements, including the inherent cost of the packaging, its lifetime, and the duration it remains in circulation in a closed loop SC (P2). Additionally, it is critical to consider the management resources and associated operational costs required to sustain its
functionality (P5). Previous literature underlined that operational costs challenge RTP implementation due to its potential for increasing current operational costs (Yusuf et al., 2017).

Taschner (2023) highlighted that RTP adoption's benefits must be balanced with the initial investment and RTP return flow. Therefore, it is necessary to analyze all potential costs before RTP implementation. The findings suggest that one relevant factor to consider is the transportation distances. Participants agreed on the difficulties that long transport distances present for RTP due to companies' global operations (P1; P2; P3; P4; P7), substantially increasing the costs (P1; P4; P7) and decreasing the feasibility of RTP adoption. Consequently, RTP enhances its feasibility within regional SCs (P4; P7). According to prior literature, transportation distances have also been recognized as a significant factor (Mollenkopf et al., 2005; Taschner, 2023; Twede & Clarke, 2004). This impacts cycle times and RTP quantity, thus, RTP cleaning and quality control (Taschner, 2023), incorporating additional costs to the business (Taschner, 2023; Twede & Clarke, 2004). Likewise, this study underlined relevant factors such as the RTP quantity (P2; P4), the time required for RTP to circulate in an SC (P2; P4), the lifetime of RTP (P2; P8), and quality control (P4; P5). These factors are crucial to consider when implementing RTP, as they are essential in assessing the system's total cost. Notably, RTP's cycle time and lifespan will directly impact the quantity needed, influencing the overall cost estimation. Moreover, quality control measures are pivotal in determining timely repair or replacement needs, preventing potential packaging shortages. Such shortages might force the procurement of one-way packaging alternatives at escalated costs and potentially impede timely deliveries. Previous literature emphasized packaging weight as a cost-influencing factor due to weight impacting fuel consumption in transportation (Lee & Xu, 2004). Similarly, Taschner (2023) highlighted the importance of considering RTP weight as it can lead to cost variations when estimating costs for RTP implementation. One interesting point from the study is that none of the participants considered the packaging weight and the cleaning process as relevant factors when analyzing the adoption of RTP.

Accordingly, transport distances are crucial as businesses incorporating RTP must establish an efficient return flow within their operational framework. Managing this flow holds significant importance, as mishandling it could lead to inefficiencies within the system. RTP's reverse flow over long distances on a low-volume basis demonstrates economic inefficiencies (Schneikart et al., 2023). This situation worsens due to the lack of traceability and tracking mechanisms for RTP in companies, representing another vital factor to consider. Taschner
pinpointed traceability and tracking as cost factors requiring consideration in implementing RTP. The empirical findings underscore a prevalent issue wherein substantial portions of RTP are lost or mismanaged (P1; P3; P6; P8), resulting in escalated costs (P1; P6; P8). Consequently, businesses must procure one-way packaging in those situations (P6). The lack of traceability for RTP generates considerable costs for firms, primarily attributable to inventory shortages leading to delayed shipments or additional costs on new packaging. Hence, integrating tracking systems becomes imperative when implementing RTP.

Another relevant factor involves the skills and knowledge required to implement and operate the RTP system properly. Empirical findings highlighted the importance of having skilled individuals to efficiently manage and control the system (P4; P5), an additional cost that needs to be considered. However, companies operating within the ICT sector have the advantage of having in-house expertise to manage technological tools (P5), thereby mitigating the need for investments in employee training or acquiring new human resources for adopting RTP. Prajapati et al. (2019) identify the phenomenon of a costly workforce as reverse logistics, in general, requiring specialized manpower and training. However, prior literature did not explicitly address the significance of skills and knowledge concerning RTP implementation tied to increased costs.

Collaboration agreements can enhance RTP's efficacy and efficiency (Taschner, 2023). Furthermore, Fan et al. (2019) emphasized that sharing costs among SC participants can help reduce RTP investment costs. The findings also suggested this, underlining that the cost per company decreases as participation increases (P5). Nevertheless, customers and SC partners are often unwilling to pay the additional cost that RTP can carry (P5; P9). Therefore, this potentially generates a barrier regarding the RTP implementation into the shared SC. The systems required for an efficient RTP implementation can require substantial investments from more than one party in the SC. SC managers willing to adopt RTP must also convince SC partners to adopt these costs into their SCs. Taschner (2023) describes that costs must be carefully and systematically analyzed to understand RTP's value and if the context is proper when implementing it. As costs are considered one of the major barriers to reverse logistics (Prajapati et al., 2019), they can be minimized through mutual agreements on cost distribution among stakeholders across the SC.
To summarize what enables RTP implementation in the economic context refer to Figure 11. These enablers positively impact the feasibility of implementing RTP from an economic perspective. There is a need for more regional supply chains, a more specialized workforce, and cost-sharing across supply chain members. Meanwhile, the technological enabler that can help support the implementation from an economic standpoint is an efficient tracking system.

**Figure 11.**

*Enablers of RTP Implementation in the Economic Context*

![Diagram showing enablers of RTP implementation in the economic context.]

*Note. An overview of the enablers in implementing RTP, focusing on the economic context.*

### 5.3 Environmental Context

When analyzing the feasibility of RTP from an environmental perspective, this study identified two direct beneficial drivers. These were the potential of RTP to decrease CO2 emissions and the ability to reuse resources instead of discarding them, reducing resource scarcity if used correctly. This is confirmed by Coelho et al. (2020), who bring up the importance of RTP to solve the challenge of closing material loops in SCs, supporting P4’s concern about RTP needing to become more common due to unavailable resources to support single-use packaging.

On the other hand, RTP could be less favorable environmentally depending on longer geographical distances and lower fill rates (Pålsson et al., 2012). The longer geographical distances were identified as the global nature of SCs in this study (P1; P2; P3; P4; P7), therefore being confirmed from the literature. The longer distances cause RTP to be less feasible from an environmental standpoint due to the increasing transportation emissions that
make the involved shipments travel back to their original starting point again. This is primarily due to reusing crates three times being a requirement for RTP to be environmentally beneficial Tua et al. (2019) and leading to a longer timeframe of closed-loop system, which negatively affects the environmental performance of packaging (P4). This is further confirmed by Albrecht et al. (2013) and Ross & Evan (2003), who identified single-use packaging as usually more beneficial in SCs with longer distances than RTP.

The detrimental environmental effects themselves have been identified as barriers to managing RTP (Mahmoudi & Parvizomran, 2020) and the sustainability performance of RTP (Bradley & Corsini, 2023), but not in terms of the adoption and implementation of RTP. In the studies by Yusuf et al. (2017) and Pålsson & Sandberg (2022), which examine the adoption of RTP in developing countries and Sweden respectively, there is a notable omission, the environmental downsides of RTP were not acknowledged as potential barriers. This absence presents a novel and intriguing aspect not previously highlighted in the literature. The solution tied to this is a simple concept that requires substantial effort to reduce the distances between transports and make SCs more local (P7).

Furthermore, the loss of RTP can be even more impactful on natural resources than losing conventional packaging in an SC, as explained by P2. This is especially the case as sturdier materials are required to withstand the reusability of the alternate conventional design. To fight RTP loss, Glock (2017) argues for pairing an RTP system with accurate forecasts to be able to predict RTP loss. This can be further enhanced by using P4’s quote about tracking, where effective quality control is vital to pair with a tracing platform to monitor where, when, how many, and the quality of packaging in an SC. This can help plan RTP and decipher the necessary quantities to support its function and avoid unnecessary packaging consumption. This is further acknowledged by Taschner (2023), confirming the importance of tracking, forecasting, and managing RTP in his study. Furthermore, P5 identified the importance of using a supportive freight carrier base system where freight carriers support the tracking of packaging and provide the correct triggers to know the location of packaging at the different plants of the SC. Combining these different technologies and systems can provide crucial measurable performance indicators to avoid another factor identified in this study, the unclear sustainability gains (P4). This can be related to Pålsson & Sandberg’s (2022) barriers to RTP adoption in the form of change management restrictions as the lack of sustainability training and the adoption procedures can render it difficult to assess the sustainability gains of RTP.
However, the non-clear sustainability gains are not a factor considered in hindering the adoption of RTP in their study.

The literature review provided an overview of the state of the current literature, presenting several environmental impact factors. Goudenege et al. (2013) supported this study's themes, discussing CO2 emissions as relevant criteria for reusable containers. Accorsi et al. (2019) further developed the notion of reducing CO2 under different pool management strategies, which could reduce pollutant emissions by up to 60% and distance traveled from vehicles by 65% under the right conditions. This supports the findings of this study, where P5 indicated the need for a pooling system while discussing how to reduce the amount of trucks driving with empty pallets. Pairing an RTP system with an effective recycling system could improve the overall environmental performance of the SC, as materials used in plastic packaging can most often be recycled (Koskela et al., 2014.). Additionally, previous literature emphasized the connection between packaging weight and the variability of transport-related emissions (Silva & Molina-Besch, 2023). However, the participants did not identify packaging weight as a significant factor in their discussions.

Another exciting finding not mentioned in the literature was the potential environmental branding (P5). Showing environmental efforts in a SC provides value in terms of the environmental branding companies can use for marketing purposes, both to customers and suppliers. This has the potential to lead to economic benefits, and companies can gain market share over the increasing number of customers who choose more environmentally friendly products. Therefore, increasing the feasibility of RTP due to its additional value.

To summarize what enables RTP implementation in the environmental context refer to Figure 12. These enablers positively impact the feasibility of implementing RTP from an environmental perspective. There is a need for more regional supply chains, a more specialized workforce, and quality control. Meanwhile, the technological enablers include a supportive tracking system, pooling system, freight carrier base system, and forecasting.
Figure 12.

*Enablers of RTP Implementation in the Environmental Context*

*Note.* An overview of the enablers in implementing RTP, focusing on the environmental context.
6 Conclusion

In this section, the key findings are brought forward, and the two research questions are answered accordingly.

This study explored the different drivers, barriers, and enablers of implementing RTP in the ICT industry. Overall, the findings currently indicate a larger amount of barriers than drivers when incorporating RTP. The findings were distributed into their four respective contexts, providing an overview of the current state of the difficulties of implementing RTP in the ICT industry. More specifically, the technological context was applied as a supportive tool to facilitate the implementation of RTP within the three other contexts. The purpose of this study is divided into two research questions, which are answered below.

RQ 1. What drivers and barriers impact the feasibility of implementing RTP in ICT supply chains?

This study identified 13 barriers within six categories, and seven drivers within three categories, regarding the feasibility of implementing RTP in the ICT industry. These drivers, barriers, considerations, and enablers must be incorporated into the assessment of implementing RTP in an SC. When weighing the evidence, the implementation of RTP depends on several factors for it to be environmentally, economically, and managerially effective, and even efficient. The study shed light on the importance for SC managers to address the barriers involved in the implementation process of RTP, such as processes and flow control, environmental issues, associated costs, company priorities and resources, stakeholder pressure, and the lack of goals and decision-making. It is equally important to take into consideration the several drivers of implementing RTP, such as environmental benefits, pressure to adopt RTP from stakeholders, and competitiveness.

RQ 2. What factors should be considered when implementing RTP in ICT Supply Chains?

Regarding the factors to be considered when implementing RTP, this study identified three factors to consider within two categories and nine factors within three themes as enablers of
the implementation of RTP. Managers need to consider the several already existing characteristics of their SCs and the products circulating in them while incorporating the environmental and economic perspective that RTP can provide.

The enablers are equally important to consider, as these factors can provide support and facilitate the implementation of RTP. It is essential to adopt the required infrastructure, technology, and HR to make the implementation effective and efficient. Further, it is important to pair these factors with even demand and improve its feasibility by nurturing the correct stakeholder pressures.
7 Discussion

This section brings up how this study contributes to existing theories and current research followed by a proposed theoretical framework, theoretical contribution, managerial implications, limitations, and suggestions for further research.

7.1 Theoretical Framework

Implementing RTP in ICT SCs is not a definitive solution where the benefits consistently surpass the drawbacks of conventional packaging. Numerous factors must be considered when deciding whether implementing RTP is feasible and efficient. Careful consideration of various factors is essential in determining the practicality and effectiveness of RTP implementation. A significant transformation is required across numerous industries to foster sustainable development and circular practices in daily operations. The principles advocated by RTP are crucial for the emergence of closed-loop SCs, necessitating a comprehensive evaluation of the existing environment in which RTP operates. Consequently, this study offers a theoretical framework that serves as a guide for essential factors in RTP implementation.

Figure 13 represents an overview of the enablers of RTP implementation, categorized and color-coded depending on their respective contextual contributions. This categorization is derived from the analysis, associating existing literature with the data generated from the findings.
Figure 13.

Enablers of RTP implementation in the ICT industry

Note. An overview of the RTP implementation enablers along with their interconnectivity, color-coded depending on which context they contribute to.

The technological context holds a unique perspective, as it can be fully seen as a supporting element towards other enablers. These are pivotal to incorporate if the implementation of RTP should remain efficient and feasible, as the complexity behind implementing RTP can become overwhelming, causing more detrimental effects than intended if technological tools are not used in support of the implementation process. Overall, the technological enablers could be divided into five distinct factors: Freight carrier base systems, accurate forecasting, tracking systems, data analytics, and pooling systems.

The economic context highlights the importance of cost-sharing across the SC, utilizing a specialized workforce, adapting the distance between SC partners to create more regionalized SCs, and incorporating quality control into the implementation process. The economic context
can further be supported by efficient tracking systems, pinpointing areas of potential improvement.

The environmental context focuses on enablers improving the overall environmental footprint of the SC. This corroborates the economic enablers in the form of requiring a specialized workforce, more regional SCs, and using a quality control system. However, the environmental context can utilize technological enablers to a larger extent for the improvement of the feasibility of implementing RTP. These technological enablers are a freight carrier base system paired with accurate forecasting, a tracking system, and an efficient pooling system.

Finally, the managerial context enablers show, such as the environmental and economic context, the importance of a specialized workforce. The managerial enablers also show the importance of employees supporting environmental initiatives, alignment between operational and strategic goals, industry leaders taking responsibility by pioneering RTP implementation, the role of legislative pressure, and quality control. The technological enablers within this category also show the essential tracking and pooling systems that are required to implement RTP, but also pairing these technologies with sufficient data analytics to analyze the implementation process.

This theoretical framework highlights the intricate balance required by managers to adapt themselves to the different contexts: technological, economic, environmental, and managerial - for a successful implementation of RTP. It provides an understanding of the complexity inherently present in the implementation process, but can also be used as a strategic guide for decision-makers wanting RTP to become an economically feasible, more sustainable solution rather than relying on conventional packaging.

7.2 Theoretical Contributions

This study has significantly contributed to the field of circular economy and sustainable supply chain management literature, particularly in the context of RTP within the ICT industry. Addressing the call by Selvefors et al. (2018) for a redefined approach to circularity, our research examined RTP from the perspectives of potential users and a producer, shedding light on its feasibility, practical benefits, and drawbacks.
In line with van Loon et al. (2021), who emphasized the importance of researching circular designs in business models, this study provided insights into a centerpiece of creating closed-loop SCs, being packaging that can be reused continuously. Additionally, it responded to Silva & Pålsson’s (2022) call for qualitative studies in sustainability in the context of transport packaging, exploring the environmental implications and practical aspects of RTP.

Palazzo et al. (2023) highlighted the need for clarity on incentives for products promoting CE, such as RTP. Our study delved into the decision-making processes behind RTP adoption, providing insights into incentives and challenges. Furthermore, this study responded to Coelho et al. (2020), researching the decision-making drivers in implementing RTP.

Our research also fulfilled the need for industry-specific case studies and insights, as suggested by Coelho et al. (2020), and addressed Ellsworth-Krebs et al.’s (2022) recommendation for studies on tracking and reusable packaging involving diverse stakeholders. This comprehensive approach offered a nuanced view of RTP implementation, contributing valuable knowledge to the discourse on sustainable practices in the ICT sector.

This study has filled crucial gaps in the literature regarding RTP implementation, providing a theoretical foundation and practical insights. By incorporating the perspectives of various stakeholders and addressing the aspects of RTP in their respective contexts, the research contributes to the understanding and advancement of circular economy practices within the ICT industry and beyond.

7.3 Managerial Implications

The managerial implications arising from our study correspond to the elements essential for businesses to consider within the ICT sector when evaluating the incorporation of RTP into their operations. These factors serve to facilitate decision-making processes by enabling a comprehensive assessment of anticipated costs, both economic and environmental. Furthermore, the results underscore the critical integration of technological facilitators crucial for optimizing RTP’s efficiency and operational integration.

7.4 Limitations

Several limitations were identified throughout this study. Firstly, this study follows an interpretivist approach. This means that the researchers could have unconsciously influenced
the data collection from the participants. Therefore, the study is limited regardless of the researchers’ approach to upholding the credibility and trustworthiness of the study.

Secondly, a smaller sample size limits the depth and generalizability of the presented data. In this study, despite extensive efforts in trying to find more participants, only nine interviewees were gathered; this can be applied. Furthermore, the sample could have been more diversified, leading to more diverse in-depth data that could have presented richer data.

Thirdly, an aspect that became apparent in the study was the difference between different types of packaging. The study could have focused on one type of packaging to generate more precise findings.

Finally, all interviews except one were conducted via Microsoft Teams. This limited the study in that all participants were required to have a stable internet connection. Due to some connectivity issues, some parts of the transcription were inaudible.

7.5 Suggestions for further research

Regarding further research, there are ample opportunities to explore this subject even further and get more in-depth analyses. Specific RTP categories have the opportunity to be analyzed individually, as they all present unique challenges. This study approached the subject holistically, focusing on the required factors from a SC point of view incorporating different product types in the findings. An example of a further study would be to perform an analysis of steel racks specifically.

A quantitative study could be done to assess the performance of implementing RTP to provide more depth to its feasibility. This can be done in conjunction with the contexts of this study, where the economic, environmental, and managerial contexts can be analyzed.

This study focused solemnly on companies operating in the ICT industry and an RTP producer. Although, there is still a need to analyze RTP implementation across different industries (Coelho et al., 2020). When performing the literature review, the researchers noticed that much of the literature was centered around the FMCG industry due to its wide applicability. Focusing on other industries can provide the depth desperately needed for the development of RTP literature.
8 Appendix

8.1 Interview Questions

Interview Questions

Preamble: Permission to record
Anonymity
Scope of the study

Introduction

● What position do you hold in your company?
● When did you join the company?
● What are your primary responsibilities? How is it connected to sustainability & packaging?
● How do you define RTP? For how long has the company had Returnable Transport Packaging (RTP) in its supply chains?
● To what extent are your transport packaging returnable today? What type of RTP is currently utilised in your supply chain?

RTP Feasibility - If you use RTP today

(see questions further down if RTP is not used)

● Do you have strategic sustainability goals related to your usage of returnable transport packaging?
   ○ If yes, could you please share the environmental sustainability goals that your organisation presently tries to reach? Note: Not only how they are positively affecting them but also negatively. How does the RTP your supply chain uses contribute to these goals?
   ○ If not, how do you think RTP could contribute to the sustainability performance of your supply chain?

● If possible, could you please share how RTP contributes to long-term economic growth compared to more conventional one-time use packaging?
   ○ What are some drawbacks from choosing RTP over more conventional packaging?
   ○ How has RTP impacted these economic sustainability goals?

● How has RTP proven to be more feasible than conventional packaging in your supply chain today?

● Are there any other factors that would make RTP more feasible in your supply chains today?

Aiding Technologies for RTP
● What technologies are presently associated with RTP in your supply chains today? Example - Tracking/tracing, Internal Systems, etc.

● In what way do these technologies make RTP more feasible?

● Are there any technologies currently not employed by your company that would make RTP more feasible? If so, how?

RTP Feasibility - If you do not use RTP today

● What reasons are there for your company not having implemented RTP?

● What factors would make RTP implementation more feasible in your supply chains today economically speaking? What factors would make RTP implementation more feasible in your supply chains today in terms of sustainability performance?

● If possible, could you please share how RTP could potentially impact long-term economic growth compared to more conventional one-time use packaging?

Aiding Technologies for RTP

● How could technologies support your supply chain when implementing/handling RTP? Example - Tracking/tracing, Internal Systems, etc.

● Based on the factors negatively affecting the feasibility of implementing RTP, what technologies could mitigate these problems?

Regulatory compliance

● How are regulations currently pressuring you to change how you handle packaging today?

● In what manner have legal regulations influenced your decision-making process when considering the tracking of RTP? (if applicable)

● How do you see regulations influencing the implementation of RTP in the future?

Thank you so much for participating in our study.
### 8.2 First and Second Order Themes from Quotes

Table 4.

*First Order themes, Second Order themes, and Aggregate Dimensions from Quotes*

<table>
<thead>
<tr>
<th>MINUTE-PERS (P1)</th>
<th>FACTORS CONTRIBUTING TO RTP DECREASED FEASIBILITY</th>
<th>QUOTES</th>
<th>SC PROCESS &amp; RETURN FLOW CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.12-</td>
<td>&quot;There is not so many factories in Sweden anymore. So that's why this kind of returnable packaging have gone down quite a lot&quot;</td>
<td></td>
<td>Global Nature of Supply Chains</td>
</tr>
<tr>
<td>4.20- (P1)</td>
<td>&quot;When the production is so spread out in the world now there are higher costs.&quot;</td>
<td></td>
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<tr>
<td>23.30- (P2)</td>
<td>&quot;we are global manufacturer with, yeah, transports all over the world. That's where it's very difficult.&quot;</td>
<td></td>
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</tr>
<tr>
<td>18.08- (P4)</td>
<td>&quot;The difficulty lies in when you have a supply chain that goes from ABC to EFGH by JKL and we span different parts of the world. So for local supply chains it becomes easier.&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECO- (P3)</td>
<td>&quot;Our products are manufactured at a number of locations distributed globally and can then be sent “anywhere” on the planet&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.12- (P1)</td>
<td>&quot;They are higher cost and also for the environmental and send it back because if we have a production in China and send it to the supply up here in Sweden, it's not cost efficient to send it back even with the environmental.&quot;</td>
<td></td>
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<tr>
<td>5:06- (P7)</td>
<td>&quot;A lot of our European manufacturing as well as Asia manufacturing goes to another continent, so all the products we manufacture and purchase for service businesses for example, within Europe 90% or 95% goes outside Europe. So getting them back does not make any sense&quot;</td>
<td></td>
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<tr>
<td>18.55- (P2)</td>
<td>&quot;If we look at outbound, it's out of question because it's uncontrolled flows. A returnable packaging system needs a controlled flow.&quot;</td>
<td></td>
<td>Lack of Controlled flows</td>
</tr>
<tr>
<td>SEC2- (P3)</td>
<td>&quot;Low return rates - from what we understand from other actors, return rates are low even in relatively limited closed loop systems&quot;</td>
<td></td>
<td></td>
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<tr>
<td>11.55- (P2)</td>
<td>&quot;It is the sub-supplier that needs to keep track of the cycles, economy and so on... The cost for the returnable system there, if it is an advantage, is all managed by the sub-supplier in that case.&quot;</td>
<td></td>
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<tr>
<td>(P2)-12.5 5</td>
<td>&quot;Since we do not have an internal RTP system, we do not keep track of performance and such.&quot;</td>
<td></td>
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<tr>
<td>13.51- (P6)</td>
<td>&quot;And normally when it comes to RTP... no one keeps track of where they are.&quot;</td>
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<tr>
<td>17.06- (P6)</td>
<td>&quot;you also see that they (RTP) were being misused, used in other parts of someone else's supply chain. And, the more standardised packaging you have, the bigger is the the chance that it's goes away somewhere.&quot;</td>
<td></td>
<td></td>
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<tr>
<td>SEC2- (P3)</td>
<td>&quot;Long timeframe and environmental costs of a closed loop system – if we were able to collect packaging from site, the time needed and environmental cost of returning the packaging material to a manufacturing site makes RTP non-viable in most cases.&quot;</td>
<td></td>
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<tr>
<td>15.25- (P4)</td>
<td>&quot;if you have a question mark on the sustainability gains, it's difficult to justify the increased costs as well.&quot;</td>
<td></td>
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<tr>
<td>19.45- (P2)</td>
<td>&quot;For example, If we start delivery on steel pallets because the product needs a longer life-cycle time and so on. And then we discover we do not get it back. It's leakage. And if we compare the CO2 impact on those heavy steel pallets and half of them don't come back... It doesn't have environmental benefit, or economic benefit.&quot;</td>
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<tr>
<td>13.51- (P6)</td>
<td>&quot;And normally when it comes to RTP... no one keeps track of where they are.&quot;</td>
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<td></td>
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<tr>
<td>35.34-</td>
<td>&quot;if you don't use the returnable system in the right way in the Increased transport&quot;</td>
<td></td>
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<tr>
<td>(P2)</td>
<td>right context, it will cost CO2”.</td>
<td>emissions</td>
<td></td>
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<tr>
<td>SEC2- (P3)</td>
<td>&quot;Long timeframe and environmental costs of a closed loop system – if we were able to collect packaging from site, the time needed and environmental cost of returning the packaging material to a manufacturing site makes RTP non-viable in most cases.&quot;</td>
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<tr>
<td>45.50 (P1)</td>
<td>When we send them (RTP pallets) out it was a huge cost when they did inventory on the packaging and see how many pallets have been lost or sent out. That was quite a big expense for that.&quot;</td>
<td>RTP Loss</td>
<td></td>
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<tr>
<td>0:6:42.55 0- (P8)</td>
<td>&quot;the only time that we don't see that happen (cost savings) is if they get lost, which unfortunately happens more often than we would like&quot;.</td>
<td></td>
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<tr>
<td>13.51- (P6)</td>
<td>&quot;(companies, example) they had issues with steel racks disappearing and not being used and they didn't have enough of them at the main site so they had to buy a lot of one way packaging&quot;</td>
<td></td>
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<tr>
<td>17:26- (P6)</td>
<td>&quot;If you imagine 700 suppliers and you wanna try to figure out who has the packaging and then you need to call around and ask them... Takes a lot of time, costs a lot of money.</td>
<td></td>
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<tr>
<td>18.09- (P6)</td>
<td>&quot;If you don't know anything at risk of shortages and stop in production because there is no packaging. Or you have to buy one way packaging even though you actually have packaging and then inventory checks. First of all, it takes a huge amount of time. Had one customer, they spent €6 million per year to do the inventory cheques in one warehouse. And if you have 700 sites, how do you even do that?&quot;</td>
<td></td>
<td></td>
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<tr>
<td>14.57- (P5)</td>
<td>&quot;(RTP) It's not a procurement of the packaging itself, but it's more like the management right and the cost you have during the process.&quot;</td>
<td>Additional Management Cost</td>
<td></td>
</tr>
<tr>
<td>33.45- (P2)</td>
<td>&quot;But if then they have a cost model, with the trip cost and so on... it's quite complicated the calculation on how to set that cost, it has to do with investment of all packaging and then how many times it will circulate during the lifetime and what is the lifetime of the packaging.&quot;</td>
<td>Cost Model Complexity</td>
<td></td>
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<td>Time</td>
<td>Quote</td>
<td>Category</td>
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<tr>
<td>10.03-</td>
<td>&quot;We have a really good understanding of a footprint now and we are focusing efforts and investments to where we're gonna see the most impact and packaging just isn't one of them yet.&quot;</td>
<td>Priority in other areas</td>
<td></td>
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<tr>
<td>(P4)</td>
<td></td>
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<tr>
<td>14.18-</td>
<td>&quot;We all know it is important, but yeah, there's a lot of things next to it, which are putting those projects not on the top of the list.&quot;</td>
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<tr>
<td>(P5)</td>
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<td></td>
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<tr>
<td>11.13-</td>
<td>&quot;If I would present only a project that that would add a cost...it would be beneficial for the environment I would probably have a few folks in there which say &quot;good stuff&quot;. And these folks work in the sustainability teams, and these are guys who are following the goals...you're adding a cost to the organization and it drains a lot of energy to pursue people to go over that edge...It takes you a lot of time and you don't get anything back. So, you don't get a yay from anybody who decides there...I think it's extremely important that it needs to be company-driven.&quot;</td>
<td>Abundant Resources Required</td>
<td></td>
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<tr>
<td>(P5)</td>
<td></td>
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<tr>
<td>27.22-</td>
<td>&quot;So time might also be factor...there's a lot of things to do in a big company and they're all lined up in relation to priorities...so if you would like to implement RTP, it would take a lot of time&quot;</td>
<td></td>
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<tr>
<td>00.20-</td>
<td>&quot;When people are recognizing how much work it is, everyone disappears.&quot;</td>
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<td>(P9)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>17.27-</td>
<td>&quot;If you're gonna increase your prices and your competition is not right, you're essentially making it more complex for yourself to sell your products, right? If customers are going via price&quot;</td>
<td>Increased Customer Costs</td>
<td></td>
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<tr>
<td>(P5)</td>
<td></td>
<td></td>
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<tr>
<td>18.59-</td>
<td>&quot;Are you gonna let your end customer pay because your end customer might say...I don't want your packaging anymore, right? ...What if the end customer would say OK, I want your product, but I don't want the packaging.&quot;</td>
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<td></td>
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<tr>
<td>(P5)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>29.45-</td>
<td>&quot;Very small portion of the customers are willing to pay more&quot; (for more sustainable solutions), and not so many are...</td>
<td></td>
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<td>(P9)</td>
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thinking about that seriously, so far, but I think in these close coming 2 years, this will be a rapid change and grow.

"But since people are very fond of sustainable packaging, and they've heard that RTP is key for everything they start requiring this without understanding the obstacles and benefits and so on."

"Just saying 'just go for RTP, it is the best' and you know nothing about the system and how it works and how to calculate and how to manage it - you need a real professional management of the system."

"Everybody needs to fully understand and support the goals from an environmental perspective... and not everybody is putting their hands together for these projects."

"Business Units have their different ways of thinking. They have different thoughts and their own marketing teams. They have their own thoughts about how a product should look like and how it should be presented towards the customers... But there is a movement in the company that we would like to have a more common approach.

"It is a bit interesting, because we have, on a global level, a net zero emissions goal. But, for our packaging group we don't work so much with net zero, we work more with reused plastics... Our goals and the global team's goals do not go hand in hand."

"The requirements are just for the design process of how we work, the environmental goals is something we're aiming for in the future."

**FACTORS CONTRIBUTING TO RTP INCREASED FEASIBILITY**

<table>
<thead>
<tr>
<th>Time</th>
<th>Statement</th>
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<tbody>
<tr>
<td>36.04-</td>
<td>&quot;if you do it (RTP system) right it will save a lot of CO2.&quot;</td>
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<tr>
<td>(P2)</td>
<td></td>
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<tr>
<td>15.20-</td>
<td>&quot;A higher price can be justified if the sustainability gains are</td>
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**GOALS & DECISION-MA KING**

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<th>Time</th>
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<tr>
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**ENVIRONMENTAL BENEFITS**

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<thead>
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<tr>
<td>20.26-(P4)</td>
<td>&quot;I do think that RTP will constitute a certain business design and the business model... and needs to become more common because we might not have the resources for single use packaging in the future... We might to really concern what we have; we need to reuse. So even if it becomes more expensive, we might not have a choice as an industry.&quot;</td>
</tr>
<tr>
<td>05.17-(P8)</td>
<td>&quot;Originally, a lot of thought was put into designing a corrugated box that would be a one time use packaging concept. Instead of doing that we decided to go with the crate that could be reusable so we get multiple uses out of that crate four or five times at least. By doing so, we don't have to use as nearly as much corrugated.&quot;</td>
</tr>
<tr>
<td>SEC2-(P3)</td>
<td>&quot;We will be affected by incoming requirements in the new EU packaging regulations. These will probably include RTP requirements – looks like only pallets for us, and minimum recycled content in plastics (also from Canada and India).&quot;</td>
</tr>
<tr>
<td>21.18-(P4)</td>
<td>&quot;I think personally legislations is one of the few tools available to really push companies regardless of industry to make something that isn't economically sound for them... with high enough fines it will be economically viable.&quot;</td>
</tr>
<tr>
<td>30-15-(P4)</td>
<td>&quot;I think regulations is going to be the main driver towards pushing our company into looking at RTP and implementing RTP. I think that's the way it will be prioritized in our company unless we reach very quickly our wanted results in our other areas of a global carbon footprint.&quot;</td>
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<td>41.17 (P2)</td>
<td>&quot;It (RTP) is starting to pop back up now that legislation is changing, so we need to look into it. But, it needs to be in a controlled way.&quot;</td>
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<tr>
<td>42.30-(P2)</td>
<td>&quot;The recycled plastics that are tied to our goals is legislation-based as well.&quot;</td>
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Scarcity of Resources

PRESSURES TO ADOPT RTP FROM STAKEHOLDERS

Regulatory Pressure
"Alot of question marks regarding legislation for bio-plastics for how it will look like in the future."

"There is legislation about how much packaging material you put on the market."

"I know that's with the regulations coming in that's pushing us in this direction. (the need to reuse)

"Australia has started to draw the line to plastics quite heavily so there are already customers on other continents that do not accept any plastics in the deliveries"

"In Europe it is pushed and fueled by this legal part. By 2025, a minimum of 50% of packaging material needs to come from recycled sources."

"Last year, the UK implemented an extra tax for companies that cannot show the recycled content of their packaging."

"Regulations that impose like more stringent demands on packaging are increasing across the world, in different parts of the world as well. ...also regulations often constitute a must have to maintain market access...So it becomes a very potent driver towards change and how we manage packaging, it does...the regulations that we're seeing right now on packaging, it's placing requirements on plastic content, recycled plastic content, plastic thickness, reusability, and more.

"Reducing plastics is definitely the one. Not necessarily on a country level, but on a customer level."

"I think employees and and people have a very big, big role to play in there and and it seems like it's going automatically because people are proud of it...So I think we should not forget their impact."

"Let`s say that the IT sector would start (implementing RTP)...so the big guys like Google, Amazon & HP...they will all move to this type of packaging, and I think that would probably cause a shockwave across the globe."
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<tr>
<td>30.15-(P5)</td>
<td>&quot;So you need to have a shockwave and only with the shockwave you all the also able to justify that there's an additional cost...you need somebody who starts&quot;. (implementing RTP)</td>
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<td>36.30-(P5)</td>
<td>&quot;if your customers are aware of the fact that you're doing this right and that you are contributing to the environment, and that you do your fair share to make things better, right?...I think that is at this moment we see also from customers and suppliers that is very much appreciated...So in the end, that might be economically in favor&quot;.</td>
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<td>20.46-(P2)</td>
<td>&quot;So, it depends on the cycle time. How long will it take until we get them back? How many pallets do we need in the system?&quot;</td>
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<td>33:45-(P2)</td>
<td>&quot;It's alot about circulation time - Companies can own their packaging or let a third party own the packaging. Then, they have a cost model with trip cost and so on... Setting that cost has a lot to do with investment in packaging and how many times it will circulate during the lifetime of the packaging and then you get a trip fee on that.</td>
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<td>17.43-(P6)</td>
<td>&quot;And also, if you don't have this circular cycle count, so you know how many cycle the packaging actually survives and where it breaks, then you cannot improve anything.&quot;</td>
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<td>16.57-(P5)</td>
<td>&quot;I'm going to add a cost to the to the operation...my cost price of the product is growing...Who are going to absorb those costs? ...are we going to process these costs by adding it to the products on the price list for our customers?&quot;</td>
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<td>28.24-(P5)</td>
<td>&quot;the more people who join, the lower the price gets per person or per company...So different customers in different sectors, they all have to join in...I think that is a key to to make costs go down&quot;</td>
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<td><strong>FACTORS TO CONSIDER WHEN IMPLEMENTING RTP</strong></td>
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<td><strong>PRODUCT &amp; SUPPLY CHAIN CHARACTERISTICS</strong></td>
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<td><strong>Transport Frequency &amp; Product Circulation</strong></td>
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<td><strong>ECONOMIC &amp; ENVIRONMENTAL PERSPECTIVE</strong></td>
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<td><strong>Cost &amp; Cost Allocation</strong></td>
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"If it is returnable, it also needs to be economically feasible, not only environmentally... Unfortunately, quite often the economic side does not match this combination. In those cases, we try to lower down the sustainability aspects in it."

"So and and generally speaking with I've noticed is that returnable packaging is more expensive compared to the one off consumable ones, but the more times you can reuse that pack, the more cost savings you're going to see."

"From what we've seen, and more often than not, it (RTP) pays for itself. The only time that we don't see that happen is if they get lost...that's why we looked into implementing trackers."

"For instance, if we set up RTP to drive reuse of packaging, it needs to be weighed against the increase in transportation emissions that it would cost...what's important for us is to look at net zero...So even if RTP would provide a lower carbon emission for our packaging, we need to put it in context of what does it cause in terms of transportation emissions."

"RTP needs to also show viable like it needs to show a benefit from a transportation Emission perspective as well."

"It (RTP) is less environmentally friendly compared to what we use today"

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**ENABLERS OF RTP IMPLEMENTATION**

| 27.00- (P7) | "If it is returnable, it also needs to be economically feasible, not only environmentally... Unfortunately, quite often the economic side does not match this combination. In those cases, we try to lower down the sustainability aspects in it." |
| 06.07- (P8) | "So and and generally speaking with I've noticed is that returnable packaging is more expensive compared to the one off consumable ones, but the more times you can reuse that pack, the more cost savings you're going to see." |
| 06.33- (P8) | "From what we've seen, and more often than not, it (RTP) pays for itself. The only time that we don't see that happen is if they get lost...that's why we looked into implementing trackers." |
| 12.57- (P4) | "For instance, if we set up RTP to drive reuse of packaging, it needs to be weighed against the increase in transportation emissions that it would cost...what's important for us is to look at net zero...So even if RTP would provide a lower carbon emission for our packaging, we need to put it in context of what does it cause in terms of transportation emissions."
| 21-51- (P4) | "RTP needs to also show viable like it needs to show a benefit from a transportation Emission perspective as well."
| 10.25- (P2) | "It (RTP) is less environmentally friendly compared to what we use today" |

**REQUIRED INFRASTRUCTURE, TECHNOLOGY & HR**

| 13.40- (P5) | "We have to do quality control...how are these pallets, how do they look like?, Can we reuse them?...Health and safety perspective" (When using RTP) |
| 13.15- (P5) | "You have to keep track of it, where it is" |
| 18.50- (P4) | "To really have this model work you need to have controls...So any technologies to monitor where, when, how many and quality your returns were to people will happen that would really help the planning of packaging of new material and..." |
dispatch of that".

"So for the tracking... What we're looking at are the cycles, how often they're going through cycles, how often RTP is lost or sent to the wrong location... How much the shock and G-force the trackers are experiencing, which really allows us to evaluate if the different packaging was required or if the new packaging that we designed for cost savings is working properly."

"having that technology helps us be more accurate with what we're trying to do in terms of those strategies, keep track of the cycles, keep track of all the returnable packaging and make sure that the packaging works properly essentially."

"Then for all of those different devices, there are a lot of sensors... we can detect almost anything anywhere during transport."

"We built that platform it that's so today I think we have around 85 different devices"

"And then we have the CO2... we can detect and how trucks are doing and how much vessel and the total CO2 consumption for for that trip."

"So we can do this. We need to set up your route as well and see if compare different options and this CO2 consumption."

"One thing is that when you don't keep track of it, you don't really know where the stuff is, right? So you don't have the stock levels. And if you don't know where your stuff is, you need to have buffers everywhere. So you have an oversized pool. Which increased the cost and eventually the CO2 parts as well."

"But if you if you start to keep track we can set the service level so that they will be called in for service every 20 cycles or every six months, or so. And then, also get a lot of statistics on what breaks. When does it break? Where does it break? And then you may not need to scrap them, so you can extend the lifetime."

" What we have seen is that at least 25% you can cut down the size of the actual pool. And that is a modest number you you can cut down your track transport cost and CO2 by at least 25."
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<th>Time</th>
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<tr>
<td>00.34</td>
<td>P8</td>
<td>&quot;You can see the location. You can see the shock values, experience. There's just a lot of things that could be implemented and used with these.&quot;</td>
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<tr>
<td>01.09</td>
<td>P8</td>
<td>&quot;It allows us to properly track the cycles for all the RTP that are being utilised... With that technology, we're able to accurately pinpoint how many times that crate has been used. We're able to accurately calculate how much cost savings we are receiving by utilising returnable packaging.&quot;</td>
</tr>
<tr>
<td>02.21</td>
<td>P8</td>
<td>&quot;Economically speaking, with the tracker, we can determine how much cost savings we're getting by using a returnable crate right? By seeing how many times we can use it. Environmentally speaking, with the trackers, it also helps ... we know that we're not having to purchase as much packaging, individual packaging and going through more material in that aspect..&quot;</td>
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<td>36.08</td>
<td>P7</td>
<td>&quot;In my opinion, we really should have tracking on the packaging&quot;</td>
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<tr>
<td>39.23</td>
<td>P5</td>
<td>&quot;We have data analytics around it to make sure that we understand what is where, and and we currently already using for products like a tracking and traces system which is on the on the carton level.&quot; Data Analytics</td>
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<td>12.30</td>
<td>P7</td>
<td>&quot;The majority of our warehouses are outsourced... so we are relying on third parties to collect the data.&quot;</td>
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<td>39.37</td>
<td>P5</td>
<td>&quot;We are using a freight carrier base, which is probably consisting of probably around 60 to 75 different freight carriers around the world to help us with with tracking, tracing and and sending us the information back to our systems so that our customers can see where their shipments are.&quot; Freight Carrier Base System</td>
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<td>41.41</td>
<td>P5</td>
<td>&quot;We need to put kind of a pooling system or a returnable return system basically that you do not let your trucks drive empty with just pallets.&quot; Pooling System</td>
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<td>26.52</td>
<td>P5</td>
<td>&quot;Since we are an ICT company we have the right people, so I don't see any issues there.&quot; Management &amp; Skills</td>
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<td>&quot;So the systems and the maintenance of the systems you have to have people in place to monitor this and you have to have people who pick up the phone or send an email saying hey customer, you still have packaging from us.&quot;</td>
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<td>48.33- (P5)</td>
<td>&quot;With your initiatives, projects and business process changes, you would like to plan ahead to make sure that you have the right folks aligned up and the right knowledge aligned up.&quot;</td>
<td>Supply Chain Structure</td>
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<td>4:46- (P7)</td>
<td>&quot;But there are some small routes, especially within Europe where we do use that kind of returnable packaging and usually those cases are in between a supplier and manufacturing locations, not in service business or customer cases.&quot;</td>
<td>Product &amp; Supply Chain Characteristics</td>
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<td>35.06- (P2)</td>
<td>&quot;If you have products that go in high volume and low volume you don't know how the circulation goes, so you need a production flow that is very even - Even demand and full control of the circulation, then it works quite well.&quot;</td>
<td>Even Demand</td>
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<td>(P2)-23.04</td>
<td>&quot;It is about product lifetime, how often products are phased out and phased in again. How often the factories are moving around the world. How the mix is between local flows and global flows.&quot;</td>
<td>Stakeholder Pressure</td>
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<tr>
<td>44.00- (P2)</td>
<td>&quot;Customers are asking for less plastics, and we know it is difficult to recycle - Many countries have the infrastructure to take care of fiber-based material&quot;</td>
<td>Customers supporting environmental initiatives</td>
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Note. Quotes generated by the participants of interviews divided into aggregate dimensions, second order themes and first order concepts.
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