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Evaluating Logistics Companies' Readiness towards Adopting Synchromodality in the Flanders Region

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Abstract: The transport sector accounts for approximately a quarter of the EU's total greenhouse gas emissions, with freight transport alone accounting for about one-third of the overall transport-related emissions. Mitigating the sector's environmental impact is crucial for tackling climate change and achieving sustainable development goals. Modal shift is one of the main solutions to address this challenge; however, many companies have yet to realize its full potential. This paper presents a survey conducted in the Flanders region of Belgium, aiming to identify the challenges and barriers faced by industry players in this key geographical area and to explore the reasons behind the limited implementation of synchromodal transport among them. The survey evaluates the current state of synchromodal transport adoption and offers valuable insights for policymakers and industry stakeholders aiming to enhance sustainability in the logistics sector. The findings emphasize that to overcome the identified challenges, both policy support and the companies' commitment are required. Policy support includes establishing consistent regulations and promoting greener transport modes through providing incentives and technological advancements. This research contributes to the field by examining barriers to the adoption of synchromodality and exploring its application within the context of Flanders. By focusing on this strategic logistics hub, the study provides insights and recommendations tailored to the specific challenges of the region's logistics sector. The challenges faced by industry players in Flanders offer a deeper understanding of modal shift dynamics, facilitating informed decision-making for policymakers and industry stakeholders. Implementing these strategies paves the way for more environmentally friendly, efficient, and integrated transport, benefiting both the industry and the planet.

Keywords: modal shift; freight transport; intermodal transport; synchromodal transport

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1. Introduction

Belgium accounts for 3.3% of the total EU greenhouse gas (GHG) emissions, and the transport sector is responsible for around 21% of the Belgian GHG emissions. In this regard, Belgium aims to achieve a 27% reduction in transport emissions, compared with 2005 levels, by 2030, through focusing on greener modes of transport, incentives for clean vehicles, and the development of electromobility [1,2]. Consequently, logistics companies are required to shift towards more sustainable operations to remain competitive. One key strategy for logistics companies is the adoption of modal shift methodologies, encompassing multimodality, intermodality, and synchromodality. These approaches facilitate a transition toward more sustainable logistics practices and, at the same time, support the achievement of Belgium's climate goals. Multimodality implies transporting goods from origin to destination using a sequence of different transport modes. Intermodal transport is the same concept, but often using the same transport unit throughout the journey in order to minimize material handling at the transfer points [3]. Synchromodal Transport (ST), or synchromodality, is also an advanced form of multimodal freight transport that offers cost-effective, reliable, and sustainable services by integrating multiple modes of transport in combination with real-time updates [4]. Despite the potential benefits, the adoption of modal shift methodologies faces significant challenges. Previous research has identified various critical factors influencing modal shift, such as distance, time sensitivity, cargo characteristics, mode availability, costs, reliability, service levels, customs and border procedures, and security reasons [5–7]. Additionally, studies have explored the barriers hindering the practical realization of modal shift. The most repeated and important factors are the cost of shifting, behavioral barriers (i.e., companies' reluctance), regulatory barriers, financial barriers, lack of coordination, lack of information, lack of transparency and integration, geographic constraints (e.g., mountains, rivers, or urban congestion), risk management (e.g., cargo damage, theft during transit), market competition, equipment availabilities, and trust [8,9]. Although factors and barriers in the process of modal shift have been well-studied, the practical realization of modal shift remains limited. Therefore, this study aims to bridge the gap between the theoretical concept of synchromodality and its practical realization within the logistics landscape of the Flanders region in Belgium. Conducted through a survey, it targets different logistics players, including transport providers, shippers, and logistics service providers (LSPs). While transport providers mainly focus on the physical movement of goods, LSPs offer a broader range of services, including warehousing, distribution, and supply chain management [10]. This paper specifically aims to explore synchromodality and contribute to the field by identifying the reasons behind the limited success that respondents face in their adoption of synchromodal transport practices.

The main questions addressed in this paper are as follows: (1) What are the main barriers to implementing synchromodality in freight transport in Flanders? (2) What are the needs and expectations of logistics companies in mitigating the impacts of these obstacles? By examining the challenges faced by companies transitioning to greener transport modes, this study aims to offer insights that not only assist companies in navigating their obstacles but also inform policymakers to support the transition to a sustainable, flexible, and reliable transport system. The rest of this paper is structured as follows: Section 2 offers an overview of the relevant literature. Section 3 provides a detailed explanation of the case study and data collection and analysis. Following that, Section 4 provides a discussion of the results obtained. In Section 5, a conclusion is provided, and the potential avenues for future research are presented.

2. Literature Review

As discussed in the previous section, synchromodality is an innovative transport planning approach that seamlessly integrates different transport modes into a synchronized network. Synchomodality operates on real-time information, which not only enhances the decision-making processes but also increases the network's robustness and flexibility. This section studies the core aspects of Synchromodal Transport (ST) before examining the barriers, hindering the transition towards synchromodality.

2.1. Main Aspects of Sycnhromodality

2.1.1. Real-Time Planning

Real-time planning is one of the critical aspects of synchromodal transport, which involves dynamic adjustments of transport modes, routes, and handling resources based on the latest information in order to optimize the flow of goods [11]. This feature enables logistics operators to make informed decisions, facilitating collaborative efforts among players in the supply chain. Rentschler et al. [12] support the idea that the real-time aspect of ST enables stakeholders to work collaboratively and adapt the modes of transport dynamically based on real-time information received from other stakeholders, customers, and the logistics network. According to SteadieSeifi et al. [13], real-time mode changes during transport operation will enhance other characteristics of ST, including flexibility and reliability. Yee et al. [14] further support this idea that real-time adaptation offers a better planning flexibility, allowing for the effective management of network disruptions and ensuring that synchromodal transport planning remains responsive while meeting the service requirements for timely delivery.

2.1.2. Synchronization

Synchronization is another aspect of ST that focuses on the coordination of operations and planning for a seamless transport flow. Tavasszy et al. [15] characterize synchromodality as synchronized intermodality, which is an integrated network of interconnected transport modes that effectively address the overall transport demand and has the capability to adapt dynamically to the specific and immediate needs of users within the system. Dong et al. [3] claim that synchromodal transport is not only the synchronization of different modes of transport, it is the synchronization of transport operations with the rest of supply chain activities, such as supply and demand planning, fleet management, inventory management, and production planning. Rentschler et al. [12] define ST as the synchronization of resources, business processes, and the parallel use of modalities in a mode-free manner to offer a more flexible and sustainable means of freight transport. This synchronization serves to optimize transport operations while also facilitating the adoption of environmentally friendly modes such as railways. This alignment with environmental directives enhances the reputation of firms and logistics operators [16]. Moreover, optimized synchronization between different transport modes could promote the implementation of slow operations for ships and trucks, resulting in cost savings and environmental benefits. Overall, by synchronizing operations across various transport modes in real time, synchromodality maximizes resource utilization and minimizes inefficiencies, leading to cost savings and improved profitability. De Juncker et al. [17] support the importance of synchronization efforts in ST networks by emphasizing the sharing of data to enhance the efficiency and sustainability of logistics systems.

2.1.3. Flexible Modal Shift

One of the main characteristics of the ST is its inherent flexibility in modal shifting, allowing for a quick shift to another mode or route. Tavasszy et al. [15] elaborate on this aspect, noting that synchromodality involves the flexible utilization of various modes of transport and the ability to switch between them, resulting in more integrated and efficient transport. By dynamically adapting transport modes based on real-time data, stakeholders can make more precise decisions and optimize their operations [3,18]. Such flexibility improves companies' responsiveness to the customers' needs, resulting in enhanced service levels. In addition, it increases resilience in the event of disruptions, helping the companies to quickly reroute shipments or switch transport modes to mitigate delays and maintain the supply chain flow [19]. According to Steadieseifi et al. [13], by offering this flexibility to switch transport modes at several nodes on the route, synchromodality meets cost and service level requirements and ensures on-time delivery.

2.1.4. Collaboration and Integration

The concept of synchromodality, which proposes the efficiency and flexibility of transport, is built considering cooperation and collaboration among all stakeholders along the transport chain [12,20]. Expanding on this idea, Giusti et al. [21] further discuss that this collaboration is facilitated through sharing information, advanced communication technologies, and the establishment of a robust infrastructure. Collaborations in logistics could be categorized into vertical, horizontal, and integrated forms. Vertical integration traditionally focuses on sequential connections in intermodal transportation. On the other hand, horizontal integration, which is known as synchromodality's distinctive feature, emphasizes the integration of various transport modes to enhance efficiency. It focuses on seamless connections between modes and offers different mode choices, including transport infrastructure and utilization of moving resources beyond what conventional intermodal routing can accommodate [22]. The parallel usage of transport modes or horizontal integration serves as a core assumption for designing synchromodal transport networks. It enables dynamic planning adjustments based on real-time information in intermodal models [15,22,23]. However, while horizontal collaboration is acknowledged as pivotal in synchromodal transport, it is noteworthy that synchromodal transport combines both vertical and horizontal integration [3]. Through working together, stakeholders can leverage their expertise and resources to enhance transport planning, routing, and execution. This collaborative method encourages innovation, ultimately resulting in the creation of more efficient solutions and improved outcomes for all involved parties.

2.2. Barriers in Shifting towards Synchromodal Freight Transport

The practical implementation of synchromodality in real life has found several challenges. However, scholars need to focus more on studying the barriers to the shift toward synchromodality. Nevertheless, due to the conceptual similarities between synchromodal transport and intermodal and multimodal transport, some barriers identified in those contexts could also be generalized to synchromodality. In this section, we initiate our examination by exploring barriers commonly associated with multimodal and intermodal transport, which have been studied by other scholars. Subsequently, we enumerate studies mainly focusing on synchromodality.

Research into barriers for intermodal and multimodal transport has revealed key factors influencing mode selection and adoption. Reis [24] investigate freight modal choice variables, particularly in short-haul intermodal freight transport, utilizing a simulation modeling approach. The study highlights key factors such as price, transit time, reliability, and flexibility as key factors in mode selection. Altuntaş Vural et al. [25] conduct qualitative research, utilizing semi-structured interviews, to classify different barriers to intermodal transport. Their findings underscore the significance of cost, price, transit time, transport capacity, flexibility, and communication in shaping modal choice. Further research explores various facilitators and barriers in intermodal transport. Elbert and Seikowsky [26] investigate intermodal road–rail freight transport, identifying the most influential facilitators and barriers in six main categories: economic aspects (e.g., short-distance transport, small shipment size, low fuel price), quality (e.g., high transit time, restricted transport flexibility), infrastructure (e.g., limited infrastructure, lack of standardization: varying track gauges), management (e.g., lack of information provision, complex coordination), policy, and sustainability (e.g., low environmental demands, low willingness to pay for environmentalism). Hasan et al. [6] focus on the freight shift from road to inland water transport, highlighting cost, time, reliability, flexibility, and environmental considerations as critical factors. Pfoser [27] employs interpretive structural modeling to evaluate barriers and identify facilitators for multimodal transport, classifying them into demand-related barriers, shipment characteristics, infrastructural/supply-related barriers, organizational barriers, and legal/political barriers. Their study also suggests some policy measures to promote multimodal transport, including internalizing external costs, efficient information provision, and education, training, and awareness raising. Raza et al. [28] categorize the barriers to modal shift into seven main categories: service quality (e.g., longer lead times, lower reliability, lower frequency), financial issues (e.g., additional inventory costs for shippers, high labor costs, incompatibility of equipment and ICT systems), technical issues (e.g., complicated custom clearance, absence of integrated management systems, lack of innovation and R&D activities), communication problems (e.g., poor marketing activities, poor communication by firms), service and market-related problems (e.g., poor hinterland connectivity, shortage of vessels), regulatory issues (e.g., inconsistency policies, imposition of taxes within the sector), and administrative issues (e.g., complex document and administrative procedure). Meers [29] employs a choice-based conjoint (CBC) analysis to study the decision makers' preferences in modal choice and to identify barriers to modal shift. The study highlights respondent consensus on three key factors: slow transport speed, low service frequency, and the lack of service offer. Additionally, other obstacles include factors such as lack of reliability and flexibility, costs, insufficient information, additional effort, additional investment, and enduring extra risks. Karam et al. [30] study barriers to multimodal freight transport and propose mitigation strategies. They categorize barriers into terminal-related, network-related, management-related, regulations and subsidies-related, delivery characteristics-related, and interoperability-related barriers, providing valuable insights for overcoming these challenges.

While plenty of studies investigate barriers to intermodal freight transport, there needs to be more analysis of this subject within the context of synchromodality.

Research into synchromodality presents a more specific focus on the practical challenges faced by logistics stakeholders. Pfoser et al. [31] highlight that the key requirements for the successful implementation of synchromodal transport include stakeholder cooperation, a mental shift towards a-modal transport services, technical infrastructure support, smart hubs, pricing considerations, and adherence to legal and political conditions. Jesus et al. [32] conduct a qualitative study in Flanders, focusing on the shift from roads to inland waterways, to investigate the real-life synchromodality challenges. Their findings emphasize challenges such as real-time decision making, limited infrastructure capacity, and the need for stakeholder collaboration. Sakti et al. [33] study the synchronization aspects of synchromodality, emphasizing that without synchronization, the distinction between multimodality and synchromodality becomes negligible. The authors highlight that the main variables that pose challenges in synchronizations are uncertainty, dynamicity of the system, stakeholders' heterogeneity, unstandardized information flow and work processes, and trust issues. Their findings highlight challenges, encompassing the necessity for real-time decision making, limitations in infrastructure capacity, and the crucial need for collaborative efforts among stakeholders. Pfoser et al. [34] present a conceptual examination of synchromodality, identifying its antecedents, mechanisms, and effects. Their research employs systematic and content analysis-based methods for a comprehensive literature review. Within their framework, they classify seven technical factors (e.g., information and communication technology, sophisticated planning systems) and six managerial factors (e.g., building trust, business models, pricing, or liability) that contribute to the functioning of synchromodality mechanisms. Lordieck et al. [35] use a literature analysis and survey to study factors that limit the applicability of synchromodality. They categorize the factors into two main categories: technical variables (e.g., service capacity, infrastructure, disruptions, type of goods, etc.) and organizational variables (e.g., contract type, operator policies, information sharing, legal issues, etc.). Farahani et al. [36] conduct a quantitative study to improve the evolution of synchromodal transport systems in the United States. Their research primarily focuses on identifying optimal routes between origin–destination pairs by integrating various transport modes within a supply chain network. The authors believe that one of the primary reasons for the delayed adoption of synchromodality is the lack of clarity regarding its monetary benefits for carriers and forwarders. In their investigation, they emphasize the key factors influencing the adoption of synchromodality among different stakeholders. For shippers and forwarders, factors such as open departure times, flexible lead times, and the ability to choose routes freely are the most significant. Logistic service providers prioritize free mode shifting and flexible bundle shipments, while customers value open pick-up and delivery times. However, rather than waiting for an ideal synchromodal network design, the authors suggest modifying current intermodal service networks by incorporating certain concepts of synchromodality, especially in their geographical scope.

Table 1 provides a summary of the papers studied in this section.

These studies discussed in this section offer valuable insights into the challenges and barriers hindering the implementation of freight modal shifts, primarily focusing on intermodality and multimodality. Building upon this foundation, the primary motivation for this study arises from the need to explore the specific challenges in adopting synchromodality, which is relatively underexplored in the existing literature.

Table 1. Factors impacting on modal shift adoption.

Paper	Type of Studied Network	Geographical Focus	Method	Factors Impacting on Modal Shift Adoption
Reis [24]	Intermodal (Rail, Road)	Portugal	Quantitative, Simulation modeling	Price, Transit time, Reliability, and Flexibility
Altuntaş Vural et al. [25]	Intermodal (Rail, Road, Waterborne)	N/A	Qualitative, Semi-structured interviews and a policy Delphi study	Cost, Price, Transit time, Capacity of transport, Flexibility, and Communications
Elbert and Seikowsky [26]	Intermodal (Rail, Road)	Germany	Qualitative, Interview, and theory-driven analysis	Economic aspects, Service quality, Infrastructure, Management, Policy, and Sustainability
Hasan et al. [6]	Intermodal (Rail, Road, Waterborne)	Bangladesh	Quantitative, Total logistics cost function	Cost, Time, Reliability, Flexibility, Environmental considerations
Pfoser [27]	Intermodal (Rail, Road, Waterborne)	Europe	Qualitative, Interpretive structural modeling	Demand-related barriers, Shipment characteristics, Infrastructural/Supply-related barriers, Organizational barriers, Legal/political barriers
Raza et al. [28]	Multimodal (Waterborne, Road)	N/A	Literature review	Service quality, Financial issues, Technical issues, Communication problems, Service and market-related problems, Regulatory issues, and Administrative issues
Meers [29]	Intermodal (Rail, Road, Waterborne).	Flanders	Quantitative, Choice-based conjoint	Slow transport Speed, Low service frequency, Lack of service offer
Karam et al. [30]	Multimodal (Waterborne, Road)	N/A	Literature review	Service reliability, Service flexibility, Terminal capacity, Technologies, ICTs, Freight loss risks and Damages, Cost, Network and infrastructure, Time, Information sharing, etc.
Pfoser et al. [31]	Synchromodal (Rail, Waterborne, Road)	Austria	Qualitative, Expert panel	Stakeholder cooperation, Technical infrastructure support, Smart hubs, Pricing considerations, Adherence to legal and political conditions
Jesus et al. [32]	Synchromodal (Waterborne, Road)	Flanders	Qualitative, focus groups (FG) and expert interviews	Real-time decision-making, Limited infrastructure capacity, Stakeholder collaboration
Sakti et al. [33]	Synchromodal (Rail, Waterborne, Road)	N/A	Literature review	Real-time decision making, Limitations in infrastructure capacity, Collaborative efforts among stakeholders
Pfoser et al. [34]	Synchromodal (Rail, Waterborne, Road)	N/A	Combination of systematic literature review and content analysis-based approaches	Technical factors (e.g., information and communication technology, sophisticated planning systems), Managerial factors (e.g., building trust, business models, pricing, or liability)
Lordieck et al. [35]	Synchromodal (Rail, Waterborne, Road)	N/A	Literature and Expert survey	Technical variables (Service capacity, infrastructure, disruptions, type of goods, etc.), Organizational variables (contract type, operators policies, information sharing, legal issues, etc.)
Farahani et al. [36]	Synchromodal (Rail, Waterborne, Road)	N/A	Quantitative, Mixed-integer programming (MIP) model of advanced intermodal service network model	For shippers and forwarders: open departure times, flexible lead times, ability to choose routes freely For Logistic service providers: free mode shifting, flexible shipments bundling For customers: open pick-up and delivery times

Although synchromodal and multimodal transport share similarities and the barriers in multimodality likely extend to synchromodality, the latter goes beyond as it deals with data sharing and collaboration [19]. Moreover, given that synchromodality is a relatively new and evolving concept, there may be complexities that still need to be fully understood. By focusing on synchromodality, this research addresses a significant gap in the literature and presents actionable recommendations for enhancing sustainability and efficiency within the sector.

The contribution of this research lies in two main aspects: studying barriers hindering the adoption of synchromodality and exploring its application within the context of Flanders. By focusing on synchromodality, this work provides a comprehensive analysis, offering insights and recommendations tailored to the specific challenges faced by the logistics sector. Additionally, the decision to focus on Flanders is due to its strategic location as a logistics hub in Europe, making it an ideal setting to explore the practical implications and feasibility of synchromodal solutions in a real-world context. The challenges faced by industry players in this key geographical area are expected to yield novel insights, contributing to a more comprehensive understanding of modal shift dynamics and facilitating informed decision-making for policymakers and industry stakeholders.

It is worth noting that the most similar study to ours is conducted by Jesus et al. [32], although with a narrower focus, only on shifting to inland waterways (IWWs). In contrast, this research extends upon this by considering not only IWWs but also railways alongside road transport. As a result, our study provides a more comprehensive analysis of synchromodal strategies.

3. Materials and Methods

3.1. Case Study

This study focuses on the willingness of logistics players (transport providers, shippers, and logistics service providers) to shift towards synchromodal transport in the Flanders region of Belgium. It is located in the northern part of the country, covers 13,624 sq km, and accommodates over 6.5 million inhabitants. The region offers three international seaports (the Port of Antwerp-Bruges (Europe's 2nd-largest port), North Sea Port, and Port of Ostend), three international airports, and more than 650 European distribution centers [37]. The region also offers the world's densest road network and well-connected railroad and inland waterway networks. Hence, logistics companies and distribution centers are able to transport goods from Flanders to most major European markets within a short amount of time. Figure 1 shows the Flanders network of ports, airports, roads, rail, and waterways.

Figure 1. Flanders' network of ports, airports, roads, railways, and waterways (Source: [37]).

Aligned with the goals set by the European Union to double the share of rail freight traffic and boost inland waterways and short-sea shipping by 50% by 2050, Belgium, along with its Flemish region, is seeking strategies to facilitate the modal shift to achieve climate neutrality by 2050 [1,38]. In this regard, this study is conducted to recognize the main challenges and barriers for logistics companies in Flanders and realize their motivations and expectations for shifting toward greener modes of transport.

3.2. Survey Design and Execution

This study employs an online survey targeting logistics players, including transport providers, shippers, and logistics service providers in Flanders, to collect information on the main motivations and challenges associated with the freight modal shift, particularly synchromodal transport. The survey, designed in English, consists of 35 questions covering various aspects, including the profile of the companies, companies' operations type, their primary motivations and obstacles for modal shift, and their expectations from the (overhead) system. The survey takes approximately 15 min to complete. Administrated by VIL, the Flanders Institute for Logistics, the questionnaire was distributed to its members. VIL operates as the single point of contact for the logistics sector in Flanders, and it supports and enhances the competitiveness of the logistics sector in this area. To anticipate the common challenge of a low response rate and ensure a sample that adequately reflects the population of companies in the Flanders region, VIL made efforts to engage with the most pertinent companies based on their operational focus, activities, and size. Through this online survey, representatives from companies affiliated with VIL actively engaged, resulting in the collection of 21 completed surveys. Eventually, the gathered data were analyzed using descriptive statistics in order to explore the behaviors and tendencies of the studied companies, considering their size and operations. This allows us to gain insights into patterns, characteristics, or trends present in the dataset.

4. Data Analysis and Findings

This section presents a comprehensive analysis of the surveyed data, providing a detailed overview of the essential findings and patterns observed. As previously mentioned, 21 responses were collected from the survey conducted among participants. Among the respondents, 33.3% are transport providers, 38.1% are shippers, and the remaining 28.5% are logistics service providers. As presented in Figure 2, 62% of the surveyed companies are categorized as large companies with over 250 employees, 24% fall into the medium-sized category, consisting of 50 to 250 employees, and the remaining 14% are classified as small companies, having less than 50 employees. Although these demographic distributions differ from the European transport market, where the majority of companies are small and medium-sized enterprises (SMEs) [39], it is important to note that this deviation does not impact the analysis. Synchromodality is not inherently limited to SMEs, and companies of any size can benefit from implementing synchromodality.

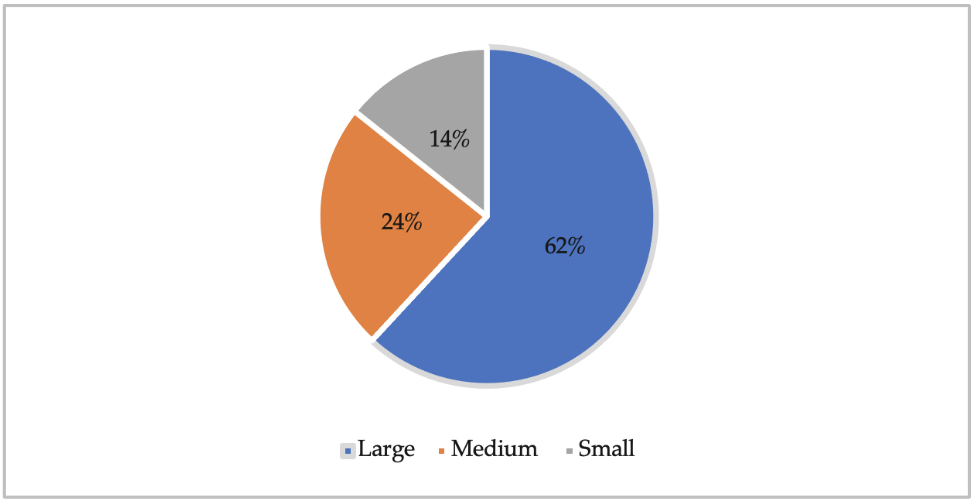

Figure 2. Company size distribution, according to European definitions [40].

The survey's questions can be categorized into the following five scales/major areas: intermodal transport, adaptability, disruptions, external costs, and synchromodality (see Appendix A). Each scale implies a specific aspect of the journey toward sustainable transport.

4.1. Intermodal Transport

In this subsection, the companies' current state, as well as their (future) tendency and approach concerning intermodality is discussed. While the modal split in the EU indicates that in 2021, 17% of freight was transported by rail, 6% by inland waterways (IWWs), and approximately 77% by road [41], this survey captured a notably different distribution among the surveyed companies: in our study, rail transport is being used by approximately 43% of the companies, and around 53% of the respondents use inland waterways and/or short-sea shipping. Moreover, all the surveyed companies use road transport as one of their modes of transport, while 33% make use of alternative modes for their logistics needs. This distinction between the respondents and the market highlights the active involvement of surveyed companies in multimodal transport, highlighting their flexibility and adaptability in addressing diverse logistical needs. Additionally, more than 85% of the surveyed companies incorporate intermodal transport in their operations. According to the data presented in Figure 3, around 67% of respondents utilize intermodal transport for less than 25% of their shipments. Additionally, 14% opt for this approach for 25–50% of their shipments, with approximately 4.8% choosing intermodality for 50 to 75% and 9.5% employing it for more than 75% of freight shipments.

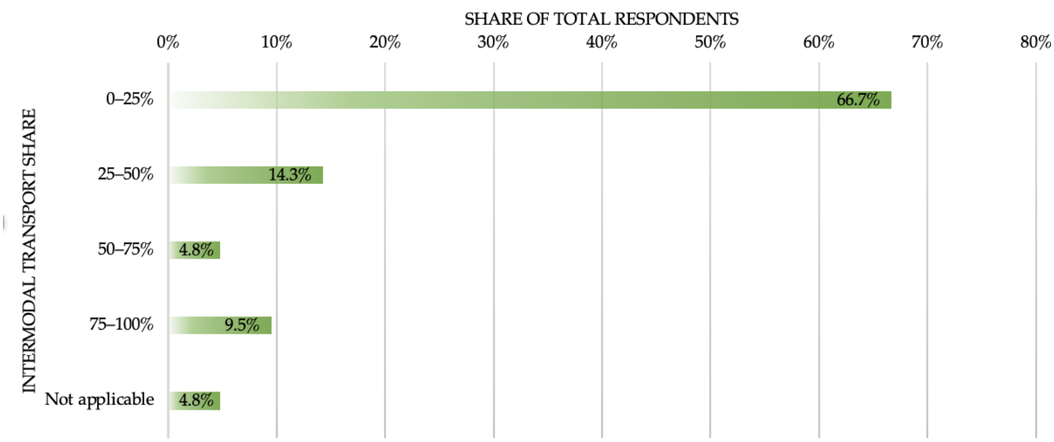

Figure 3. Share of intermodal transport compared to the companies' total amount of freight transport.

Moreover, the majority of the companies appear to consider multiple logistics providers when making decisions regarding their transport operations (when it comes to comparing different service providers' offers). Around 81% of the companies consider multiple providers, whereas the remaining 19% do not. Concerning the choice of service providers, 23% of the surveyed companies stated that they opt for multiple transport providers for less than 25% of their shipments. A total of 29% of the companies choose multiple transport providers for 25 to 50% of their shipments, while 18% of them consider multiple transport providers for 50 to 75% of their shipments. Moreover, 30% of them rely on multiple transport providers for more than 75% of their shipments. The primary motivations behind opting for intermodal transport are financial reasons (cost considerations) (86%), followed by the aim of lowering carbon footprints (57%), prioritizing reliability (43%), and valuing speed (24%). Figure 4 illustrates the main obstacles that companies are facing in using intermodal transport. The most frequent obstacle mentioned by the respondents is rigid service departure schedules (52%), followed by extra planning efforts (43%), speed (43%), reliability (43%), costs (33%), availability of other alternative modes (33%), and capacity reservations long in advance (29%). It is important to note that respondents were presented with predefined options and asked to select the main obstacle they faced. Nevertheless, they were also given the opportunity to specify their own primary obstacle if it was not listed among the provided choices. Approximately 24% of respondents also opted for obstacles not initially presented, citing reasons such as lack of knowledge, the cost of changing pickup depots, specific types of operations, and lack of long-term vision among other players. Comparing these findings to the existing literature indicates a thorough alignment between the literature and this work. The factors posed by the respondents have been extensively explored by scholars in the context of intermodal transport challenges. It is important to highlight that the diligent responses provided by the respondents, especially those not initially presented as options contribute valuable insights, complement the understanding of challenges in intermodal transport. It is noteworthy. that many of the obstacles identified in intermodal transport, mentioned earlier, can be effectively addressed by synchromodality. By offering real-time coordination, flexibility, and optimization across multiple transport modes, synchromodality has the potential to enhance efficiency, reliability, and cost-effectiveness in freight transport operations [18], thereby addressing the key concerns of the key sector's players.

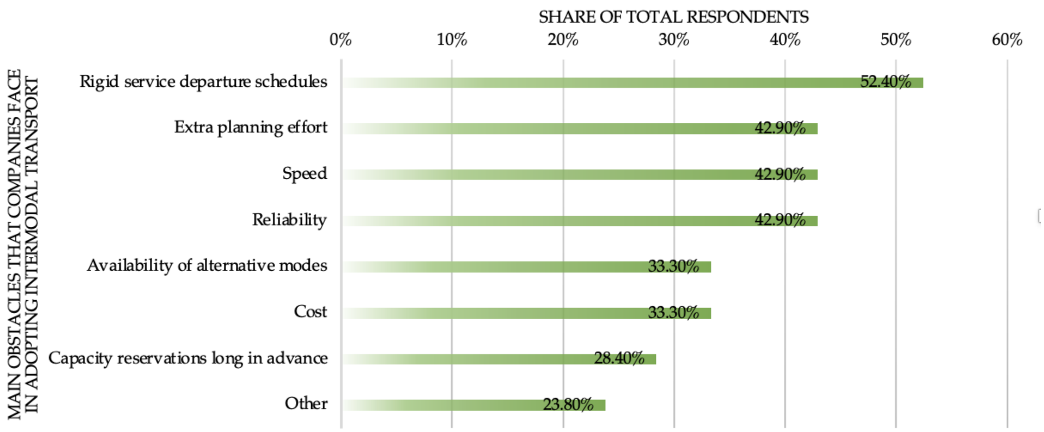

Figure 4. The main obstacles to using intermodal transport.

The findings also reveal that around 38% of the surveyed companies believe intermodal solutions result in 25% lower costs compared to road transport. Conversely, 29% of them believe intermodal solutions have 25% higher costs than road transport, while 33% perceive no cost difference between these two approaches. Although costs depend on different factors such as distance, trans-shipment costs, number of drivers, geographical area, and more, there have been studies conducted by scholars that compared intermodal and unimodal transport in terms of costs. Yee et al. (2021) demonstrate a cost saving of +33.8% for intermodal transport compared to the truck-unimodal transport (for the route of Rotterdam–Milan) [14]. Agamez-Arias et al. (2017) report a 20% cost saving with intermodal transport compared to unimodal road transport (for the same route) [42]. Additionally, de Miranda Pinto et al. (2018) state in their work that intermodal transport can achieve up to 50% higher cost-effectiveness in comparison to unimodal road transport [43]. This shows that the respondents' perceived advantages and strengths of intermodality may not align with actual cost savings, which emphasizes the need for education and awareness among industry players. In addition, when it comes to lead times in intermodal transport, approximately 43% of the surveyed companies believe that intermodal solutions entail 25% higher lead times than road transport. Additionally, 33% perceive the lead times in intermodal transport to be more than 50% longer than road transport. A smaller portion, 9.5% of respondents, hold the view that the lead times are about 50% longer for intermodal transport, while 15% believe there is no difference between the two approaches. Islam et al. (2018) conduct a comparison of total transport time between road-only transport and intermodal rail transport on the route Rotterdam-Busto Arsizio [44]. Their results show that intermodal transport is, on average, 60% slower than road transport. However, it is worth mentioning that the provided numbers are average, and the actual lead time can vary depending on different variables, such as the distance of the shipment, cargo volume, and the specific routes being used. In a study by Lemmens et al. (2019), the average transport time between the two studied points is four days with direct trucking and seven days (75% longer) using intermodal rail [45]. In this regard, the perception of the respondents appears to be realistic.

4.2. Adaptability

This subsection explores the extent to which the surveyed companies are currently employing and expressing a willingness to adopt synchromodality. Also, it addresses the decision-making processes and terms involved in their different operations.

Approximately 38% of the surveyed companies indicate that they have the capability to adopt synchromodal transport, enabling them to seamlessly switch between different transport modes while the shipment is in transit, whereas 62% do not possess this capability. These numbers do not necessarily imply that 38% of the surveyed companies are actively engaged in the ST. Instead, it highlights that they have the infrastructure and facilities to utilize synchromodality potentially. It also indicates that a notable portion of companies may lack the necessary facilities for implementing synchromodal transport, or they may lack interest in doing so because of trust issues, privacy concerns, or other reasons (refer to Section 4.5 for further insights). The survey findings reveal that approximately 24% of the shipment orders are placed or received by the studied companies within one day before the shipments are made, while 33% are processed between 1–3 days, 28% occur between 4–7 days, 5% between 1–2 weeks, and 9.5% between 2–4 weeks. In terms of decisions regarding road transport, 28% of responses suggest that decisions are made in less than a day, while 48% are made between 1 to 3 days, 9.5% between 4 to 7 days, 5% between 1 to 2 weeks, and 9.5% take more than four weeks. Conversely, decisions concerning intermodal transport generally require more time; in 14% of instances, decisions are made in less than a day, while 19% take place between 1 to 3 days. Furthermore, 33% of responses indicate decisions made between 4 to 7 days, with 5% occurring between 1 to 2 weeks, and 29% exceeding four weeks. The analysis of the presented data highlights that while orders and decisions related to road transport occur within shorter time frames, intermodal transport decisions exhibit a notable proportion (in some cases, taking more than four weeks). This firstly emphasizes a need for smoother processes or improved efficiency in decision making for intermodal transport within surveyed companies. Secondly, it highlights the potential benefit of earlier order placement to facilitate intermodal (including synchromodal) operations. Nevertheless, this earlier order placement might only be ideal for some scenarios. For instance, industries that have volatile demand or those employing just-in-time strategies may find it challenging to make their orders far in advance. Moreover, early order placement can have financial risks and penalties associated with order cancellations or modifications [46]. In addition, survey findings show that many companies currently do not utilize tracking technologies in their operations. However, there are several companies that actively employ such technologies, with vehicle location tracking emerging as the most widely utilized technology; this technology is employed in different operation types, including truck shipments, train shipments, barge shipments, and movements within terminals. Real-time tracking technology is utilized more frequently by participants in road transport, followed by inland waterways. Despite progress in adopting such technologies, there is still room to use them more widely across all modes of transport. Synchromodal transport heavily relies on these technologies, enabling companies to make optimal decisions, use resources more intelligently, and make quicker decisions through real-time access to data and information. Thus, encouraging broader adoption of tracking technologies across all transport modes is crucial to maximize the benefits of synchromodal transport and enhance overall logistics network efficiency.

4.3. Disruptions

This subsection studies the main disruptions that the respondents are encountering and discusses how these disruptions impact their operations.

Figure 5 shows the main disruptions encountered by the respondents in their operations, together with the frequency of each disruption; it appears that the disruption types with the highest frequency of occurrence are delayed shipment releases, late vehicle departure, personnel shortage, truck breakdown, road maintenance, water levels in inland waterways, and intra-Europe border crossings. These disruptions occur frequently, sometimes multiple times a week, or even daily. While the observations indicate that the disruptions related to IWWs are frequent, they do not inherently imply that inland waterways are not reliable. Instead, it highlights the specific disruptions faced by respondents in their operations. Reliability involves different factors beyond just the frequency of disruptions, such as overall efficiency, cost-effectiveness, safety, availability, and more [47]. Furthermore, some disruptions are exclusive to the specific modes of transport, yet they can also impact the performance of other modes within an intermodal network. Consequently, the whole intermodal network will be affected. For instance, disruptions related to waterways are also reported by intermodal road-rail companies as a cause of disruption in their operations. This highlights that the performance of each sector not only influences its own operations but also contributes significantly to the success, flexibility, and resilience of the intermodal transport system as a whole. However, this situation is observed to a lesser extent in synchromodal systems. Synchromodality, in particular, is less affected by the disruptions of individual modes since it is characterized by real-time rerouting, which alleviates the impact of disruptions to a considerable extent. Alaei et al. (2024) demonstrate in their research that reliability is higher when employing synchromodal transport planning (real-time rerouting) [19].

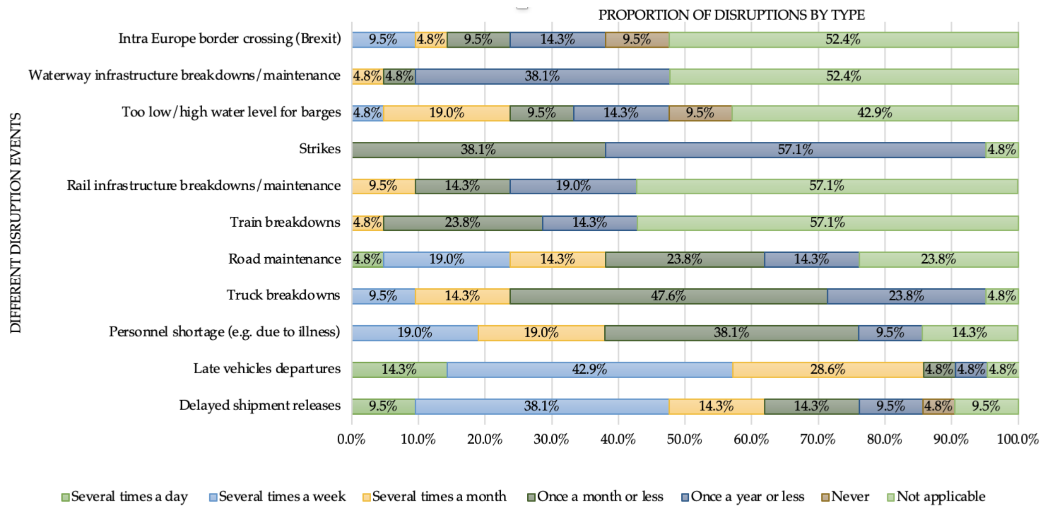

Figure 5. Share of different types of disruptions in companies.

It is worth highlighting that, among the disruptions addressed by the respondents, transport providers seem to experience a greater impact, with the highest number of recurrent disruptions reported. Following closely are shippers and LSPs. According to the respondents, some proactive measures are applied or offered by companies to mitigate the effect of disruptions. These measures are decent (internal and external) communications, as well as communication with customers (inform customers and search for the appropriate alternatives according to their priorities), modal shift, revised schedules, flexible re-planning, changing transport companies, implementing robust forecasting methods, managing delays while actively seeking alternative solutions, ensuring guaranteed backup trucks, handling extra payments, and change staffing. As a result of the above-mentioned disruptions, operational delays occur, impacting the arrival of shipments. Approximately

62% of respondents encounter delays in less than 10% of their shipments, with 24% experiencing delays in 10 to 20% of their shipments and the remaining 14% facing delays in 20–50% of their shipments. Moreover, of the surveyed companies, 19% indicate that the delays affect less than 10% of their truck shipments' lead time. Meanwhile, 42% believe these delays impact 10–20% of their truck shipments' lead time, and 28% report that the impact falls between 20–40% of the truck shipments. In a similar analysis of intermodal shipments' lead time, approximately 10% of companies report that delays influence less than 10% of their intermodal shipments' lead time, while 24% of them indicate that delays affect 10–20% of their shipments, and 35% report an impact falling within the range of 20–50%. While it is challenging to definitively determine which mode is more affected by delays (trucks or intermodal transport), what is evident is that both are experiencing significant impacts. This highlights the importance of implementing strategies to mitigate delays and enhance operational efficiency across all modes of transport. Additionally, it emphasizes the significance of synchromodality as a solution to these issues, offering a more integrated and adaptable approach to managing disruptions in the transport network.

4.4. External Costs

This subsection discusses the respondents' current state and future willingness to integrate social and environmental aspects into their decision-making processes.

Around 81% of the companies reported that they are considering environmental aspects in their freight transport planning. This reflects a growing awareness within the sector of the importance of sustainability in logistics operations. The main environmental indicators considered by the companies are CO_2 emissions reduction, waste reduction, and NOX reduction.

Furthermore, when exploring the motivations behind companies' adaptation of intermodal transport, in Section 4.1, a deeper connection to environmental awareness emerged. At the same time, financial consideration remains the main driver for 86% of the companies employing intermodal transport, a significant 57% highlight the aim of lowering carbon footprint as a key motivation. This highlights a synergy between economic and environmental objectives in transport decision making. In addition, for the remaining 19% of companies who are not considering the environmental aspects in their transport planning, their primary reasons include costs, service quality, and reliability. On the other hand, around 48% of the companies consider social aspects in their freight transport planning. The main social indicators currently considered from the companies' side are minimizing accidents and noise, maintaining balance in crews' working hours, and minimizing traffic jams. However, among those 52% of the companies not integrating social aspects into their decision-making processes, many are reluctant to do so. The main limitations stated by the representatives of the companies when considering the social aspects are costs, lack of infrastructure, lack of knowledge, and lack of support.

4.5. Synchromodality

The importance of synchromodality has been highlighted in the previous subsections as a solution to many challenges in the sector reported by the surveyed companies. These challenges include aspects such as reliability, flexibility, cost-effectiveness, and responsiveness to disruptions (refer to Sections 4.1–4.4). This subsection dives into synchromodality and evaluates the companies' tendency to adopt synchromodal transport as their chosen transport planning approach, the challenges they anticipate in making this adoption, and the expectations they have from the stakeholders to alleviate the challenges and overcome the barriers. About 72% of the surveyed companies show interest in applying synchromodal transport as one of their planning approaches. As highlighted in Section 4.2, approximately 38% of them possess the facilities and capabilities to switch to another transport mode while the shipment is in transit, aligning with the essence of synchromodality. However, despite this openness to adoption, they do have some barriers. The main challenges enumerated by companies are shown in Figure 6. Lack of trust between agents, technical difficulties, and last-minute changes followed by data privacy are the most important ones. Figure 7 illustrates the distribution of these challenges reported by each company type. It appears shippers are most concerned about the loss of freedom/flexibility to run their own operations, followed by a lack of trust and a lack of technological facilities. Transport companies' main concerns are trust and privacy, technical difficulties, and last-minute changes. In contrast, logistics service providers show a broader range of challenges, indicating greater variability in their specific concerns. It is worth highlighting that among the perceived challenges mentioned by the respondents, almost all of these challenges align with observations made by scholars in the existing literature. However, concerns about possible anti-competitive practices reported by transport providers appear to be a novel aspect, implying that transport providers may be worried about some actors engaging in activities that could limit competition, potentially leading to negative consequences such as increased prices or reduced innovation.

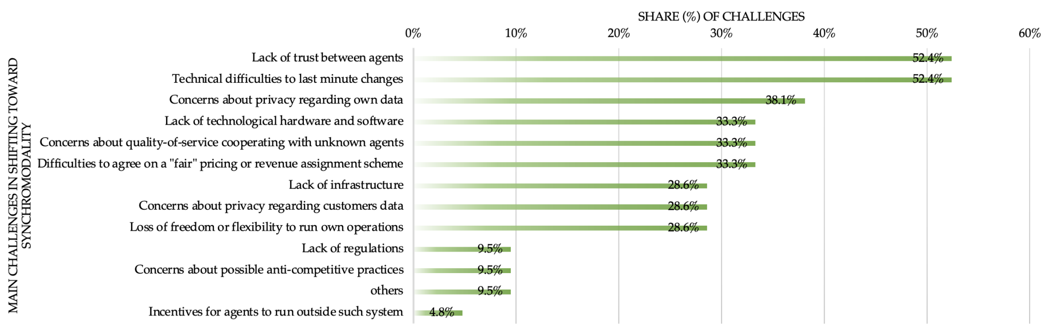

Figure 6. The main challenges that the companies see in the system.

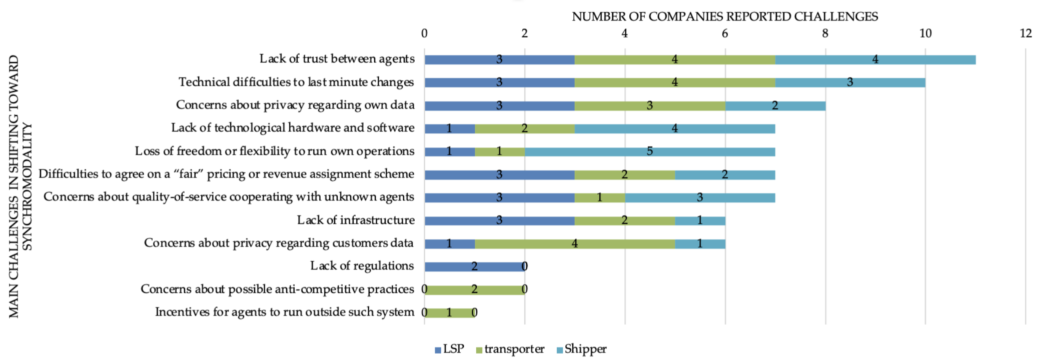

Figure 7. Distribution of challenges reported by each company type.

In this regard, the main important factors that companies expect from such a system are to support seamless interactions between entities and to guarantee reliability, connections and infrastructure, reduced congestion, safety, security, resilience, transparency, neutrality, reduced costs, and data privacy. As highlighted before, data privacy and data sharing are the key components of synchromodality and, at the same time, are among the main hurdles for companies in implementing synchromodality. Figure 8 shows to what extent companies are willing to share their data on different parts of their operations with other companies. As depicted in the chart, between 9.5 and 14.5% of companies are engaging in data sharing across all types of operations. Nevertheless, an openness toward data sharing is evident among certain respondents, particularly in specific operations. For example, 52% of respondents express a willingness (both very willing and rather willing) to share information regarding shipment locations and available capacities, while 43% are open to sharing details about handled shipments, and 37% are inclined to share information related to demand forecasts and available capacity. On the other hand, there are some other operations where a considerable proportion of respondents are not willing or rather not willing to share their data. Cost information sees reluctance from 33% of respondents, inventory levels from 24%, and pricing details from 14%.

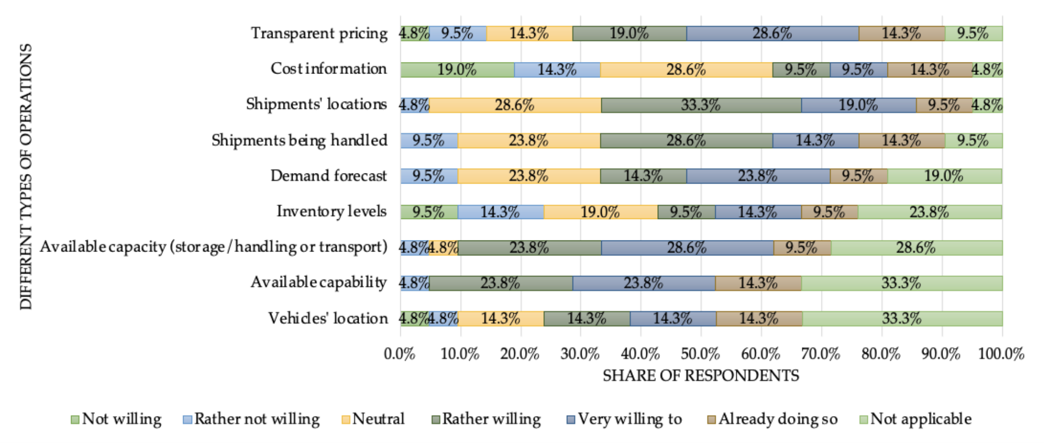

Figure 8. Companies' willingness to share data on different parts of their operations with other companies.

This lack of interest in data sharing for certain operations may be because of companies' concerns over protecting competitive advantages and sensitive business information. Thus, when it comes to sharing data that may reveal their operational efficiency (i.e., cost information), they tend to be more conservative. Likewise, the lack of interest in sharing inventory level information could be explained by companies' desire to protect their supply chain management strategy and meet their customers' demands. Hence, in order to avoid any potential conflicts, adapt to market dynamics, and succeed in a rapidly growing and competitive environment, companies must find a balance between collaboration for synchromodality benefits and protecting their critical information. Moreover, to address these challenges and stimulate data sharing, a privacy-preserving technique could be implemented to protect companies' sensitive data and, at the same time, allow collaboration (interested readers are referred to [48]). Defining standards for data exchange, considering legal aspects, can build trust and encourage collaboration among players in synchromodal operations.

5. Conclusions

This paper studies a group of logistics players within the Flanders region of Belgium, consisting of transport providers, shippers, and logistics service providers. It explores their existing operations, as well as their current and future approach toward employing environmental and social aspects in their decision making. The research also investigates the respondents' main challenges and barriers, as well as their expectations from the system for facilitating their modal shift and adaptation of ST. This work contributes to the literature by offering insights into the factors influencing companies' choice regarding adopting synchromodal transport, with a particular focus on trust and data-sharing considerations. It sheds light on the companies' willingness to share data and identifies the specific activities for which they are open to collaborate. Our findings imply that lack of trust, technical difficulties with last-minute changes, and privacy issues are ranked as the most important barriers by the surveyed companies in moving toward modal shift in general and, more specifically, synchromodality. Among the logistics companies, shippers are particularly concerned about losing operational freedom, followed by trust issues and inadequate technological infrastructure. Transport companies prioritize trust, privacy, and technical difficulties with last-minute changes. In contrast, logistics service providers show a broader range of challenges, indicating greater variability in their specific concerns. However, most of these challenges align with existing scholarly observations. Concerns about potential anti-competitive practices, reported by transport providers, represent a novel aspect, indicating concerns about activities that could impede competition and lead to negative outcomes like higher prices or reduced innovation. The findings also highlight the complexity of the transition toward sustainable modes of transport and emphasize the need for more collaborative efforts from stakeholders. In addition, the results indicate that, although sustainability aspects and environmental issues are understood as important motivators for modal shift, some logistics companies are facing internal resistance and challenges regarding practicality and costs associated with this transition, and in some cases, these internal resistances come from wrong perceptions, which need to be addressed. Overcoming the identified challenges, such as infrastructure limitations and cost implications, will require innovative solutions, policy support, and technological advancements; this is extensively discussed by Wang and Feng [49] in their work. By addressing these barriers and aligning expectations, logistics companies can pave the way for a more environmentally friendly and efficient future by implementing a flexible, integrated, and efficient mode of transport thereby benefiting both the sector and the planet. Moreover, to facilitate a successful and sustainable modal shift, adapting a flexible solution is required; policy-makers play an important role by establishing comprehensive regulations as well as indecisive green modes of transport [50]. As also stated by [51], policies aimed at modal shifts should be thoughtfully incorporated into the broader framework of transport policy, encouraging an approach that harmonizes interventions across different modes of transport. They emphasize ensuring fair competition across these modes and note the necessity of flexible political strategies supported by a balanced set of supportive policies. Such policies should ideally include the regulation of low-carbon fuels and carbon pricing alongside infrastructure development. It is also evident that utilizing innovative solutions, as well as applying operations research and mathematical techniques, will deepen our comprehension of the dynamics involved and expedite the transition towards synchromodality. It is crucial to identify specific groups of stakeholders that certain policies should address to maximize their effectiveness and reduce associated costs.

As a result of what has been discussed so far, future researchers are encouraged to conduct further quantitative studies. These studies should focus on quantifying costs and travel time implications associated with the real-time switching of synchromodal transport shipments. Researchers could also examine the synchromodal networks' responsiveness in the event of disruptions like truck driver shortages, waterway (IWW) levels, and strikes. Another research venue involves studying the relationships among stakeholders in the synchromodal network to evaluate their interconnections, such as horizontal and vertical collaboration and data sharing. Utilizing an agent-based approach is advisable to enable immediate observation of the impact of specific factors on operations. Additionally, it is advisable to focus on legal considerations and policy definitions within the synchromodal transport system, including topics related to data security and liability clarifications, in order to address regulatory aspects of synchromodal transport.

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Abbreviations

The following abbreviations are used in this manuscript:

ST	Synchromodal Transport
IWWs	Inland waterways
VIL	Vlaams Instituut voor de Logistiek
GHG	Green House Gas
LSP	Logistics Service Provider
CBC	Choice-Based Conjoint
SME	Small and medium-sized Enterprise

Appendix A

Intermodal Transport

1. Which transport modes are used in your organization (multiple answers possible)

- Truck transport
- Rail transport
- Inland waterways transport
- Short-sea shipping
- Other:

2. What is the share of intermodal transport compared to your organization's total amount of freight transport?

Not Applicable	0%	0–10%	10–20%	20–30%	30–40%	40–50%	50–60%	70–80%	80–90%	90–100%

3. Do you consider multiple transport providers when making transport decisions (comparing offerings)?

- Yes
- No

4. (If yes) For which percentage of your shipments do you consider multiple transport providers?

0%	0–10%	10–20%	20–30%	30–40%	40–50%	50–60%	70–80%	80–90%	90–100%

5. What is your main motivation to use intermodal transport? (multiple answers possible)

- Cost
- Carbon footprint
- Speed
- Reliability
- Others:

6. What are the main obstacles to using intermodal transport? (multiple answers possible)

- Rigid service departure schedules
- Capacity reservations long in advance
- Extra planning efforts
- Availability of alternative modes
- Speed
- Cost
- Reliability
- Other:

7. What is your perceived difference in costs of intermodal solutions versus truck transport (on average)? For instance, if you think intermodal solutions are 20% less expensive, your answer is −20%. If you think intermodal solutions are 20% more expensive, answer +20%.

Not Applicable	Intermodal Is Less Expensive	<−50%	−40%	−30%	−20%	−10%	0%	10%	20%	30%	40%	50%	>50%	Intermodal Solutions Are More Expensive

8. What is your perceived difference in lead times of intermodal solutions versus truck transport (on average)? For instance, if you think intermodal solutions are 20% faster, answer −20%. If you think intermodal solutions are 20% slower, answer +20%.

Not Applicable	Intermodal Solutions Are Slower	<−50%	−40%	−30%	−20%	−10%	0%	10%	20%	30%	40%	50%	>50%	Intermodal Solutions Are Faster

Flexibility

9. Which percentage of shipments are booked without fixed transport modes?

Not Applicable	0%	0–10%	10–20%	20–30%	30–40%	40–50%	50–60%	70–80%	80–90%	90–100%

10. Do you have the option to switch to another transport mode while the shipment is in transit?

- Yes
- No

11. How long in advance do you make/receive shipment orders? (on average)

Not Applicable	<1 Day	1–3 Days	4–7 Days	1–2 Weeks	3–4 Weeks	1–2 Months	2–3 Months	3–4 Months	5–6 Months	>6 Months

12. How long in advance do you make shipment volume decisions for truck transport? (on average)

Not Applicable	<1 Day	1–3 Days	4–7 Days	1–2 Weeks	3–4 Weeks	1–2 Months	2–3 Months	3–4 Months	5–6 Months	>6 Months

13. How long in advance do you make shipment volume decisions for intermodal transport (railway/waterway)? (on average)

Not Applicable	<1 Day	1–3 Days	4–7 Days	1–2 Weeks	3–4 Weeks	1–2 Months	2–3 Months	3–4 Months	5–6 Months	>6 Months

14. Considering in-transit shipments, please indicate the usual tracking level that your organization has available for decision-making (select one per row):

	Not Applicable	No Tracking	Location at Entry/Exit Points	Real-Time Tracking
Shipments in truck				
Shipments in trains				
Shipments in barges				
Shipments in terminals				

Distruption

15. On average, how often is your organization faced with the following disruptions in regard to freight transport?

Disruptions	Not Applicable	Never	Less than Once a Year	Less than Once a Months	Several Times a Month	Several Times a Week	Several Times a Day
Delayed shipment releases							
Late vehicle departures							
Personnel shortage (e.g., due to illness)							
Truck breakdowns							
Rail infrastructure breakdowns/maintenance							
Train breakdowns							
Strikes							
Too low/high water level for barges							
Waterway infrastructure breakdowns/maintenance							
others:							

16. Which proactive measures are in place within your organization to temper the effect of these disruptions?

17. What are the common reaction strategies within your organization when these disruptions occur?

18. On average, what proportion of shipments arrive with delay?

Not Applicable	0%	0–10%	10–20%	20–30%	30–40%	40–50%	50–60%	70–80%	80–90%	90–100%

19. On average, how much delay do you perceive in the lead time of your truck shipments?

Not Applicable	0%	5%	10%	20%	30%	40%	>50%

20. On average, how much delay do you perceive in the lead time of your intermodal shipments?

Not Applicable	0%	5%	10%	20%	30%	40%	>50%

Planning Models

21. Are freight transport planning decisions assisted by planning models?

- Yes
- No

22. (If yes is answered) Which decisions are assisted by planning models?
23. (If yes is answered) What software or techniques are used for the planning models?

External Costs

24. Are you considering environmental aspects in your freight transport planning?

- Yes
- No

25. (If yes is answered) Can you specify which environmental indicators are considered and for what decisions?
26. (If no is answered) To what extent are you eager to consider environmental aspects?
27. (If no is answered) What are the main limitations to consider environmental aspects?
28. Are you considering social aspects in your freight transport planning?

- Yes
- No

29. (If yes is answered) Can you specify which social indicators are considered and for what decisions?
30. (If no is answered) To what extent are you eager to consider social aspects?
31. (If no is answered) What are the main limitations to consider social aspects?

Synchromodality

Answer the next questions considering the following definition of a Synchromodal System: "A multimodal transportation planning system, wherein the different agents involved in the supply chain work in an integrated and flexible way that enables them to dynamically adapt the transport mode they use based on real-time information from stakeholders, customers, and the logistic network" [52].

32. Would you be available to participate in the future in a synchromodal system as the one described above?
33. What are the main challenges you see for such a system? (rank the following propositions)

- Lack of regulations
- Lack of infrastructure
- Lack of technological hardware and software
- Lack of trust between agents
- Concerns about quality-of-service cooperating with unknown agents
- Concerns about privacy regarding own data
- Concerns about privacy regarding customers' data
- Concerns about possible anti-competitive practices
- Loss of freedom or flexibility to run own operations
- Incentives for agents to run outside such system
- Technical difficulties to last minute changes
- Difficulties to agree on a "fair" pricing or revenue assignment scheme
- Other:

34. What are the main guarantees you would expect from such a system?
35. In the context of a synchromodal system or a similar collaboration scheme, how willing would be your organization to share data with other players about the following aspects?

	Not Applicable	Not Willing	Rather not Willing	Neutral	Rather Willing	Very Willing to	Already Doing So
Vehicles location							
Available capability							
Available capacity (storage/handling or transport)							
Inventory levels							
Demand forecast							
Shipments being handled							
Shipments locations							
Cost information							
Transparent pricing							

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