Business Model (BM) Transformations in Business-to-Business (B2B) Digital Multimodal Logistics Platform Ecosystem: Insights from Prospective Marketplace Sellers and Buyers

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Abstract

Digitalization and sustainability imperatives are transforming the logistics industry; however, the evolution of business models (BMs) in emerging business-to-business (B2B) digital multimodal marketplaces has not been thoroughly explored. This study investigates how one of the first B2B digital multimodal marketplace ecosystems – designed to calculate emissions and promote more sustainable logistics services – might affect the BMs of sellers and buyers. We used a qualitative research design based on the Business Model Canvas (BMC). To gather data, we analyzed the current (AS-IS) and future (TO-BE) BMs. Additionally, we created detailed questionnaires structured around the BMC framework, which were completed by representatives from seller and buyer actor groups. A hybrid deductive-inductive coding approach allowed us to integrate the established BMC framework with emergent themes. Our analysis reveals significant potential transformations in the key activities, followed by potential changes in key resources, channels and revenue streams. Most BM changes centre on adding emission calculation as a new value-proposition element, which in turn triggers adjustments in the other BMC blocks. These insights deepen the theoretical understanding of how digital logistics marketplace ecosystem might drive BM transformation, while also highlighting the anticipated challenges, risks, and necessary adjustments managers in the logistics industry should address when integrating a digital marketplace ecosystem. This study is one of the first to analyze likely changes in the BMs of companies adopting a B2B digital logistics platform ecosystem. Additionally, it is the first to explore a multimodal and environmentally conscious platform ecosystem.

Keywords

business-to-business, digital marketplace, logistics, business models, transformation

1 Introduction

In the past decade, advancements in digital technology have revolutionized the way companies conduct business, interact with customers and compete. Many businesses now operate entirely online, while companies such as Uber, Airbnb, Facebook and others, have achieved remarkable success in selling products and services through business-to-consumer (B2C) and consumer-to-consumer (C2C) models by utilizing digital platforms or marketplaces (Berman et al., 2022; Martín-Peña et al., 2024; Xie et al., 2022).

In the eyes of both academic researchers and practitioners, industrial digital platform ecosystems represent

key developments in pursuing a fully achieved digital transformation as they collect and share data across the ecosystem and commercialize innovations across many partners within the ecosystem (Jovanovic et al., 2022; Pauli et al., 2021; Riemensperger and Falk, 2020). They also offer benefits in low-cost inter-organization information connectivity, real-time visibility, and adaptable partnership configurations (Rios Lam, 2018).

However, while much attention has been given to B2C and C2C platforms, industrial digital platforms that focus on business-to-business (B2B) interactions have also

become a significant part of today's digital ecosystem and modern economy (Eerikäinen, 2020; Verfürth and Helwing-Hentschel, 2025).

A unified classification of B2B industrial digital platforms does not exist. We have decided to take into account the most recent classification by Madanaguli et al. (2023) and Jovanovic et al. (2022) who claim that the classification of industrial digital platforms and the business models (BMs) they adopt depends on the extent of data integration with the platform and the extent of ecosystem integration. The extent of data integration is the extent to which quality data are integrated to create, deliver and capture value. On the other hand, the extent of ecosystem integration is the extent to which BMs of different ecosystem partners are integrated into a digital platform. They highlighted 3 different types of industrial digital platforms:

1. the product service platform,
2. the industrial transaction platform,
3. the industrial digital platform ecosystem.

Their categorization is strong, but it may not entirely account for brand-new, innovative platform ecosystem types like the one we study in this paper.

A digital or e-platform ecosystem is a virtual platform that connects multiple sellers and buyers, facilitating the exchange of goods, services, and information (Cano et al., 2023; Hein et al., 2020; Martín-Peña et al., 2024; Pidun et al., 2022). This ecosystem includes a platform owner who implements and maintains governance mechanisms and value creation strategies, as well as complementors that offer various services and solutions such as financing, insurance, customs brokerage, information technology (IT) and analytics tools etc. (Hein et al., 2020; Martín-Peña et al., 2024; Mishra and Tripathi, 2020). Within industrial digital ecosystems there are two primary value creation mechanisms: transaction mechanisms and innovation capabilities. The transaction mechanism enables sellers and buyers to exchange value in a mutually beneficial manner, while the innovation capabilities mechanism relates to the integration of complementary offerings that enhance the overall value of the platform's ecosystem (Hein et al., 2020).

The growing significance of digital platforms has prompted increased research focus. Initially, studies concentrated on B2C markets (Chu et al., 2023; Repenning and Hardaker, 2024), while research on B2B platforms started to develop but has so far received less attention (Dolata, 2024; Verfürth and Helwing-Hentschel, 2025). Although there is a broad consensus among researchers that digital platforms

have emerged as engines of BM innovation for companies using them to sell or buy services – offering fresh value streams beyond traditional sales channels and revenue models (Madanaguli et al., 2023; Martín-Peña et al., 2024; Veile et al., 2022) – the understanding of how digital B2B platform ecosystems are transforming the BMs of participating organizations, both in logistics and other sectors, remains limited (Madanaguli et al., 2023). Consequently, very few owners of B2B platforms have been able to successfully establish viable BMs for their offerings, largely due to numerous deficiencies. Moreover, future research is needed on the role of sustainability in platform-based BMs (Kohtamäki et al., 2019).

As Pidun et al. (2022) observed, many platform providers struggle to fully capitalize on the value and opportunities presented by digital marketplaces. This challenge arises primarily from the high complexity of industrial digital platform ecosystems and the rapid pace of technological development (Foss and Saebi, 2016; Troise et al., 2022). Managing such marketplaces effectively is not straightforward, as platform providers must ensure their BM components are aligned with those of all the other partners within the ecosystem to maximize value for all participants in the ecosystem – including themselves, sellers, and buyers. Unlike B2C platforms, industrial digital platforms often have a more specialized (or narrowly targeted) set of customers and complementors.

According to Xie et al. (2022), although various aspects of how companies use digital platforms have been studied, the capability configuration and BM innovation within digital platform contexts remain largely unexplored. It has not yet been discovered how enterprises are promoting BM innovation through their adoption of digital platforms. Previous research also indicates that findings related to BMs in industrial digital marketplaces cannot be directly applied without careful consideration, due to the diversity of platforms in terms of market types (B2B, B2C), industry variations, and digital marketplace patterns (Repenning and Hardaker, 2024; Veile et al., 2022). Additionally, developing new BMs within digital platforms often requires careful consideration of scalability and flexibility. Future research examining different case studies may yield valuable insights and contribute to the development of innovative frameworks and best practices for creating and managing new BMs in digital marketplace settings (Eerikäinen, 2020).

Recognizing that little research exists on BM transformations in digital logistics marketplaces, this study aims to investigate the type (evolution, adaptation, innovation)

and nature of these transformations – specifically the exact possible changes and interrelationships among value creation, capture, and delivery – of platform sellers and buyers, but not complementors.

In this article, we examine a case company that already operates a digital port-service platform enabling ships, terminals, and other port users discover, order and pay for port-call services such as pilotage, tugs, waste handling, bunkering, and crew or cargo surveys. As part of the Advanced Multimodal Marketplace for Low-Emission and Energy-Efficient Transportation (ADMIRAL) project, the company intends to expand this marketplace into the first multimodal digital platform ecosystem, enabling users to choose the most environmentally sustainable provider by comparing quantified emissions. The developed digital platform ecosystem will facilitate interaction and data exchange among various supply and logistics chain partners, including port authorities, shipping lines, cargo owners, and logistics service providers. The platform will offer real-time visibility and analytics throughout the supply chain (awake.ai, online). A key promise of this marketplace ecosystem is the reduction of greenhouse gas emissions and other resource costs through the identification of more efficient schedules, routes, and usage patterns (awake.ai, online).

The following research questions (RQ) are addressed:
- RQ1: Which type(s) of BM transformations – innovation, evolution, or adaptation – are required for sellers and buyers to effectively use a freight digital ecosystem?
- RQ2: What prospective changes in the creation, delivery, and capture of value to the BMs will marketplace sellers and buyers need to implement to use a freight digital platform ecosystem effectively?
- RQ3: What key risks and challenges might sellers and buyers face in using a digital freight marketplace ecosystem?

Given the inquiry-based nature of this research, we opted for an inductive, multiple-case study (5×) approach instead of a statistical one. This design was chosen to allow for a deeper exploration of BM transformations – an aspect that is often challenging to capture through quantitative methods alone. Specifically, we examined changes in BMs within a digital logistics marketplace ecosystem by analyzing the BMs of five sellers and buyers of logistics services- logistics service providers (three parcel carriers, one transport provider, one freight forwarder and one port services provider).

To guide our analysis, we utilized the Business Model Canvas (BMC) developed by Osterwalder and Pigneur (2010). Data collection involved a comparison analysis of AS-IS BMC (current BMs) and TO-BE (future BMs) BMC of buyers and sellers supplemented by 6 detailed questionnaires with representatives from mentioned stakeholder group. This approach enabled us to capture the changes, adaptations, and innovations in value creation, capture, and delivery that arise within the ecosystem.

This study addresses both a theoretical research gap and an organizational practical problem:
- *Theoretical contribution*: this study seeks to fill a gap in the existing literature by expanding theoretical knowledge about typical and specific BM transformations that occur through the use of environmentally sustainable digital logistics platform ecosystems.
- *Practical contribution*: this paper highlights expected changes in BMs, opportunities, and risks for digital platform partners, serving as a foundation for a basic readiness assessment that evaluates their preparedness for utilizing a platform ecosystem.

The paper is organized as follows: it begins with an introduction (Section 1), followed by a literature review section (Section 2). Section 3 outlines the methodological approach, which is followed by the presentation of the case study on the industrial digital marketplace (Section 4). Next, the results from the questionnaires are presented and discussed in Section 5. The paper concludes with a summary that includes limitations and suggestions for future research (Section 6).

2 Literature reviews
Three literature reviews in Sections 2.1–2.3 inform our research:
- BM transformations,
- industrial B2B digital platform ecosystems,
- their role in transforming the BMs of ecosystem partners.

2.1 Understanding BM transformation
A BM outlines how an organization creates, delivers, and captures value. It describes the key components, often referred to as "building blocks", which include the product or service offering, target audience, revenue streams, and internal operations (activities and resources). Additionally, it explains how these elements work together to generate

value for both the customer and the organization (Demil and Lecocq, 2010; Doz and Kosonen, 2010; Dunford et al., 2010; McGrath, 2010; Saebi et al., 2017; Teece, 2010).

Internal and external factors – such as the need to improve competitive positioning, respond to significant changes in the environment, or other considerations – often force companies to transform their BMs (George and Bock, 2011; Savič et al., 2016). BM transformation represents a change in the logic according to which value is created, delivered, and captured (Frishammar and Parida, 2018). A successful BM transformation can, and often does, involve change in several dimensions.

There are three primary options for BM transformation:
1. BM evolution,
2. BM adaptation,
3. BM innovation.

The simplest alteration is the evolution of the BM, which mostly involves standardizations, replications, and primarily maintenance of the existing BM. BM adaptation involves changes that management makes to the existing BM in response to external factors such as shifts in the competitive environment, advancements in information and communication technologies, customer preferences, and supplier bargaining power (Korneeva et al., 2023; Saebi et al., 2017; Xie et al., 2022). In this case, management aligns the BM with changes or requirements in the external environment.

On the other hand, BM innovation requires management to actively conceptualize and implement new BMs that can respond to new conditions driven by either internal or external factors (Bucherer et al., 2012). This type of BM alteration necessitates changes in the overall configuration of the BM, the diversification with additional new BM that has been created, the acquisition of an additional, already existing BM or the transformation (of the entire BMs or a combination of its value proposition, value creation and deliver, and value capture elements) into another BM (Bucherer et al., 2012; Codini et al., 2023).

2.2 Understanding industrial B2B digital platform ecosystem BM

An industrial digital platform ecosystem usually consists of companies that buy services or products and those that provide them. The real value of the ecosystem comes from a range of complementary services offered by "complementors". Industrial B2B digital platform ecosystem BM, therefore, relies on the active and coordinated contributions of all partners within the ecosystem (Frishammar and Parida, 2018; Vänskä, 2020).

A comprehensive review and critical analysis of the existing literature on B2B industrial digital platforms' BMs was conducted by Madanaguli et al. (2023). Given the depth, extent, and recency of their work, along with the overall scarcity of research on this topic, we rely on this source to present an understanding of industrial B2B digital platform ecosystem BMs rather than conducting a separate literature review. Accordingly, the following discussion is entirely based on their work.

To enable complementors in a B2B digital platform ecosystem to *create value*, platform providers must ensure that their solutions are compatible. When all stakeholders are aligned, it fosters effective value creation and helps retain customers. To meet the evolving needs of customers, platform leaders must not only drive their own digital transformation but also support their partners in adapting to digital environments. This collaboration strengthens trust and encourages closer partnerships (Madanaguli et al., 2023).

The *value delivery* process in B2B is complex and interdependent, requiring strong digital transformation efforts. A robust digital infrastructure is essential for connecting partners, enabling real-time data sharing, and supporting efficient decision-making. Additionally, integrating technologies such as artificial intelligence (AI) and machine learning (ML) fosters further advancements. To effectively create and deliver value, all partners need to adopt and understand the necessary digital technologies. The platform operator plays a crucial role in standardizing processes and providing ongoing support (Madanaguli et al., 2023).

Because B2B platforms typically have fewer customers than B2C platforms, selecting the right revenue model for an industrial platform is especially important, as it can significantly influence the platform's success and profitability. Regardless of the actor type, the platform leader must ensure a fair distribution of value and a transparent allocation of revenues. Consequently, clarifying the flow of revenues as well as each actor's costs and benefits is critical to designing an effective revenue model. Beyond creating revenue models for value capture and fair distribution, platform leaders must also conduct risk assessment and management, especially regarding competition and complementors (Madanaguli et al., 2023).

The dimensions of value creation, value capture, and value delivery within a BM are deeply interconnected. For a business to succeed, it must effectively manage each of these dimensions and ensure their alignment. This requires examining the synergetic effects across these three dimensions, such as the relationships between

value creation and capture, value creation and delivery, and value delivery and capture (Ritter and Lettl, 2018).

Despite existing research, there is still a limited understanding of how co-creation processes, which are integral to B2B platforms' ecosystems, actually unfold in practice (Hein et al., 2020; Parida et al., 2019; Tian et al., 2021).

2.3 The role of digital platforms' ecosystems in the transformation of partners' business models

So far, we have not identified any research examining the transformation of BMs in companies that partner with B2B digital platform ecosystems in the logistics sector, nor have we found studies on the broader influence of B2B digital platform ecosystems. The closest works to our research focus are those by Veile et al. (2022) and Ritter and Lettl (2018), which, while they do not directly address BM transformations, still provide a useful basis for comparing and contextualizing our findings.

According to Veile et al. (2022), the introduction of digital platforms triggers significant shifts in key partners, value propositions, and revenue streams. Notably, digitalization, data, knowledge, and software become major sources of value creation. Offering additional solutions from external providers (IT and other tools developers) results in heightened competition or coopetition, which can enhance customization and generate new forms of value for customers. The study also highlights buyer-supplier relationships and trust as critical factors in driving collaboration and reducing transaction costs. Additionally, coopetition emerges as a notable trend, with companies increasingly including competitors and technology providers as partners – although they often remain cautious about sharing sensitive data.

In contrast, a study of Ruggieri et al. (2018) shows that while startups across various sectors frequently rely on proprietary platforms powered by specialized algorithms and maintain low fixed costs, their value propositions differ. Some prioritize entirely new solutions or network effects, others emphasize cost-effectiveness and custom-tailored services, and still others provide educational or entertainment platforms. Despite their varied offerings, these startups share a reliance on highly qualified teams for platform development and a focus on proprietary channels – customer care via email, phone, and chat-bots – and algorithmic improvements as their core activities.

Another relevant study on BM innovation in Small and Medium-sized Enterprises (SMEs) collaborating with a digital platform is provided by Bagnato and

Giordino (2024). The research shows that such partnerships challenge traditional approaches and foster new ideas, products, or services by offering SMEs access to external networks, resources, and expertise. This collaboration facilitates knowledge exchange, improves operational efficiency, and extends market reach beyond geographical boundaries, enabling SMEs to refine their BMs, reduce waste, and strengthen community ties – thus creating both economic and social value.

Moreover, incorporating digital strategies into SMEs' overall objectives enhances digital skills, data-driven decision-making, and alignment with emerging market trends. These partnerships also broaden market access, allowing SMEs to achieve economies of scale, develop new revenue streams, and bolster financial stability. By leveraging resources from digital marketplaces and collaborating on joint ventures, SMEs can streamline operations, lower costs, and continuously innovate – ultimately strengthening and sustaining their BMs (Bagnato and Giordino, 2024).

Research by Vänskä (2020) indicates that digital platform ecosystems offer SMEs lower coordination and operational costs, resource-sharing benefits, and new opportunities for value co-creation. However, realizing these advantages requires a shared vision, collaborative capabilities, and daptable processes, while challenges such as data-sharing risks, underdeveloped alliance management skills, outdated systems, and power imbalances can hinder success.

According to Xie et al. (2022), digital platforms also help firms innovate existing BMs – often via capability reconfiguration – enabling rapid shifts in how they create and capture value. In a study of four SMEs, Korneeva et al. (2023) found that limited digitalization skills can facilitate basic BM evolution, but more advanced capabilities (e.g., agility, knowledge management, and networking) are crucial for substantial transformation.

Lastly, de Oliveira and Cortimiglia (2017) emphasize the importance of identifying each stakeholder's unique resources, continuously monitoring co-creation dynamics, and focusing on scalable revenue streams – especially for platforms reliant on user-generated data. Ensuring equitable value distribution among participants not only fosters sustainability but also strengthens the overall viability of the platform BM.

2.4 Identified research gap and contributions

Despite numerous studies examining digital platforms and their impact on BM transformation, there has been a lack of research focusing specifically on how B2B industrial platform

ecosystem's partners in the logistics sector adapt their BMs to environmentally conscious platform ecosystem. This gap is particularly important because a "one-size-fits-all" approach fails to consider the unique operational complexities and stakeholder dynamics within the logistics industry.

To address this gap, our study investigates how B2B digital logistics platform ecosystem developed within ADMIRAL project might transform BMs of its buyers and sellers. Through a comparative analysis of various prospective ecosystem buyers and sellers, we identify commonalities and differences in value creation, delivery, and capture.

3 Methodology

3.1 Research design

There is a lack of insights concerning BMs transformation when using B2B digital marketplace ecosystems, suggesting the need for a theory-building approach. We therefore employ a qualitative case study method (Eloranta and Turunen, 2016), following a two-step approach:

1. Analyzing the BMs of several companies from two actor groups in a B2B digital platform ecosystem, to identify expected modifications and any inter-group differences and similarities;
2. Using a questionnaire-based method to explore and understand in detail the dynamics of BM transformations within this context of B2B (Fig. 1).

By investigating multiple partners rather than a single company within one group of the platform's ecosystem partners, we capture diverse perspectives and variations, enabling us to compare and contrast different examples, identify common patterns and unique features (Baber et al., 2019, Miles et al., 2014). This approach enhances the generalizability and offers stronger evidence compared to single-case study.

Our analysis applies the BMC, which covers three BM dimensions (value creation, value offering and value capture) divided into nine building blocks (key partners, key activities, key resources, value propositions, customer relationships, customer segments, key resources, channels, cost structure and revenue streams) (Osterwalder and Pigneur, 2010). Although various methods for BM analysis exist (e.g., Value proposition, Interface, Service platform, Organizing model, Revenue (VISOR) model, Service, Technology, Organization, Finance (STOF) model, etc.) we chose BMC for its simplicity in understanding, interpretation, comparison, and data interrelation, as well as its proven effectiveness in prior research (Vokony et al., 2020).

3.2 Data collection

Data collection involved comparing AS-IS (current) and TO-BE (envisioned) BMCs, supplemented with six detailed questionnaires with representatives from various
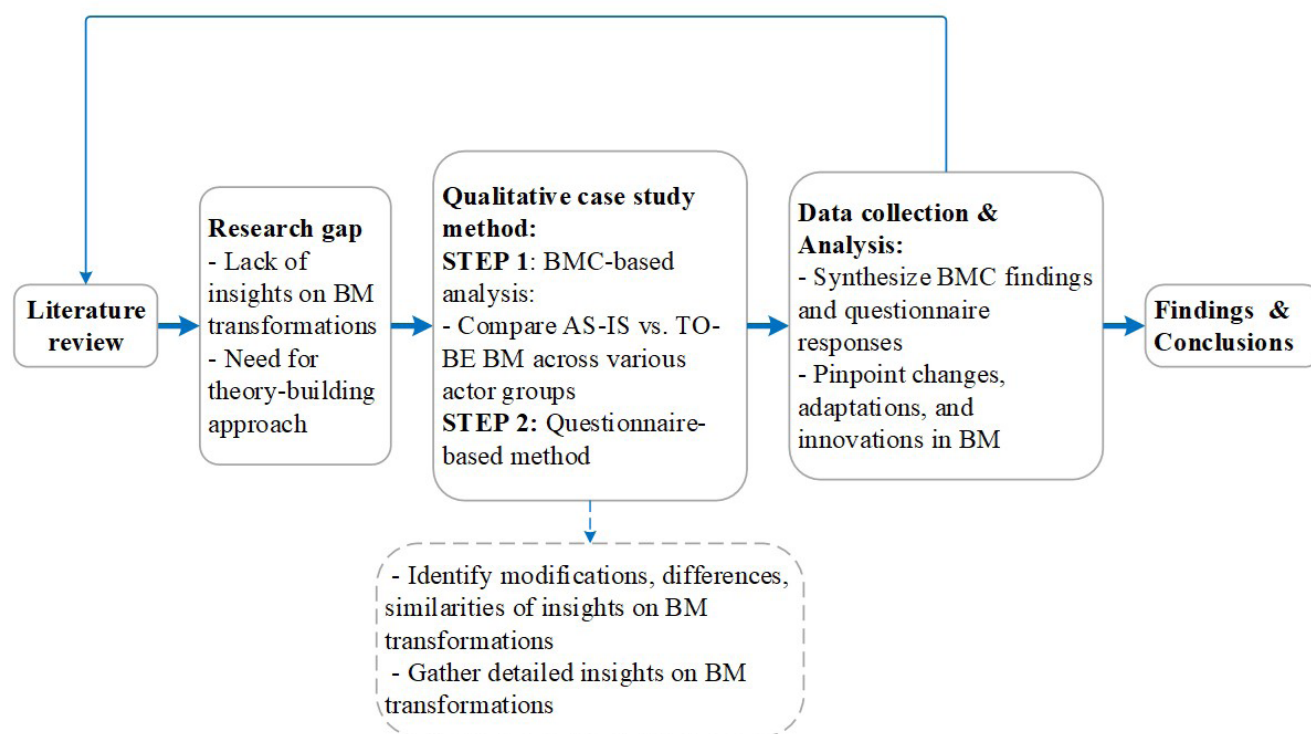

Fig. 1 Overview of the methodological approach

actor groups. This approach captures the changes, adaptations, and innovations in value creation, capture, and delivery within the digital marketplace ecosystem.

3.2.1 AS-IS *vs*. TO-BE BMs

The AS-IS BM describes a company's current BM, while TO-BE BM reflects how the model might transform through the use, management, or development of digital marketplace ecosystem solutions. A comparative analysis of AS-IS and TO-BE BMs was conducted based on completed BMCs from six case companies (Fig. 2). One company, which offers two distinct services, submitted two separate BMCs:

- one for its Roll-On/Roll-Off (RO-RO) operations;
- and another for its freight forwarding services.

A more detailed explanation of the sample is available in Table 1 and Table 2.

3.2.2 Questionnaire protocol development

Given the logistical challenges of scheduling semi-structured interviews with representatives from various departments of selected case companies, we opted to distribute
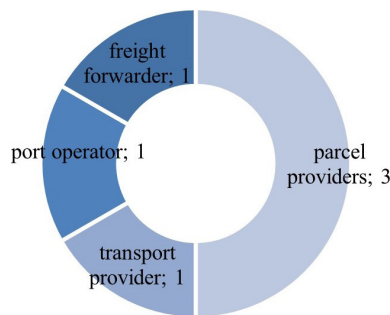
Fig. 2 Types of companies that completed BMCs

Table 1 Descriptive overview of case companies*

Case company	Platform role	Employees	Origin	Maturity	Position/ department of the questionnaire respondent
1	PS	100–500	Lithuania	≥ 11	Head of IT
2	PS/PB	500–1,000	Finland	≥ 11	Controller, financial department
3	PS	0	Croatia	6–10	CEO, logistics specialist
4	PS	> 1,000	Croatia	≥ 11	Project managers
5	PS	> 1,000	Slovenia	≥ 11	Sales department, parcel division, innovations

* Descriptions: PS: Platform Seller; PB: Platform Buyer

Table 2 Description of case companies

Case company	Description
1	Year established: 2009. Company headquarters: Vilnius, Lithuania. Core business: Transport services. Local or international orientation: International. Market share: N/A.
2	Year established: 1848. Company headquarters: Kotka, Finland. Core business: Stevedoring, cargo handling, freight forwarding, freight transporting. Local or international orientation: Both. Market share: They are the largest operator. Other relevant details: Owned by the largest forest industry companies in Finland. Recent major changes/milestones: Russian transit traffic was important before the 2022.
3	Year established: 2016. Company headquarters: Velika Gorica, Croatia. Core business: Providing same-day delivery services through a crowdshipping platform. Local or international orientation: Local, Croatia. Recent major changes/milestones: The company continuously enhances its services to optimize last-mile delivery efficiency.
4	Year established: 1999. Company headquarters: Velika Gorica, Croatia. Core business: Postal services, parcel delivery, logistics services, financial services, digital and IT services. Local or international orientation: Both. Market share: 90%. Recent major changes/milestones: The company strengthens its market position by expanding its logistics and parcel services, maintaining a strong customer focus. It is the leading logistics provider in the market and a pioneer in digital innovation.
5	Year established: 1994. Company headquarters: Maribor, Slovenia. Core business: Post services, parcels delivery, logistics services, IT services. Local or international orientation: Both. Market share: National (40%), international – N/A. Other relevant details: The biggest logistics provider in Slovenia with more than 450 contact points across Slovenia. Universal Service Provider in Slovenia.

the questionnaires digitally. Participants were contacted *via* email, with a personalized invitation explaining the study's purpose, the importance of their participation, and assurances of confidentiality. Follow-up reminders were sent to encourage responses. The respondents were mainly project managers and department managers (financial, sales, IT) (Table 1).

To gather rich, context-specific data, we developed tailored questionnaires for each partner group involved in the ADMIRAL marketplace. The questionnaire was organized into four parts. The first part (introduction) was the same for all companies, while the other parts were

customized for each specific partner group. All questions were open-ended to promote detailed, narrative responses. To ensure clarity, relevance, and logical flow, the draft questionnaires were reviewed by representatives from each stakeholder group. Revisions were made based on their feedback before finalizing the questionnaire. Enterprises were invited to complete the questionnaire between December 18, 2024, and February 15, 2025.

3.2.3 Sampling strategy

We used a purposive sampling strategy to select several representative companies from each of the two main partner groups active in the ADMIRAL project, (see detailed description of the marketplace ecosystem in Section 4). This approach enhances the robustness, accuracy, and generalizability of our findings. We selected six B2B case companies that are consortium partners of the ADMIRAL project to gather quality data (Table 1). None of the five selected companies currently utilizes or manages a similar digital platform ecosystem, although most intend to adopt one in the future. Table 1 and Table 2 provide further details on the case companies.

3.2.4 Data analysis

The responses from the questionnaires were analyzed using a hybrid coding approach that combines deductive and inductive methods. Guided by the BMC, we applied predefined codes corresponding to each of the nine building blocks. This ensured that our analysis remained anchored to established theoretical constructs. Following the initial coding, we conducted a comparative analysis by examining responses within actor group to uncover commonalities and intra-group differences.

To contextualize our findings, we compared the results with existing research on B2B digital marketplaces and BM innovation in the logistics sector. This comparison:

1. determined areas where our findings align with established literature;
2. highlight gaps;
3. uncover novel insights.

4 Case context: ADMIRAL digital logistics marketplace ecosystem presentation

The ADMIRAL marketplace ecosystem, created within the ADMIRAL project, is built on top of the existing digital Awake.AI data platform (awake.ai, online) which optimizes port and ship operations (Fig. 3; bottom).

Primarily the ADMIRAL marketplace ecosystem (Fig. 3; top) aims to facilitate interaction between sellers and buyers. The sellers (e.g., logistics service providers) such as transport companies, freight forwarders and ports) operating on the platform offer their logistics services according to rules set by the platform operator (platform owner). The buyers (e.g., cargo owners) acquire these services from the sellers via the platform (Kääriäinen et al., 2024).

In addition to the aforementioned marketplace features (transaction platform), the platform aims to provide the ability for application developers and integrators to build and integrate external applications on top of the marketplace platform (innovation platform) to enrich the functionalities of the marketplace ecosystem. Therefore, the marketplace
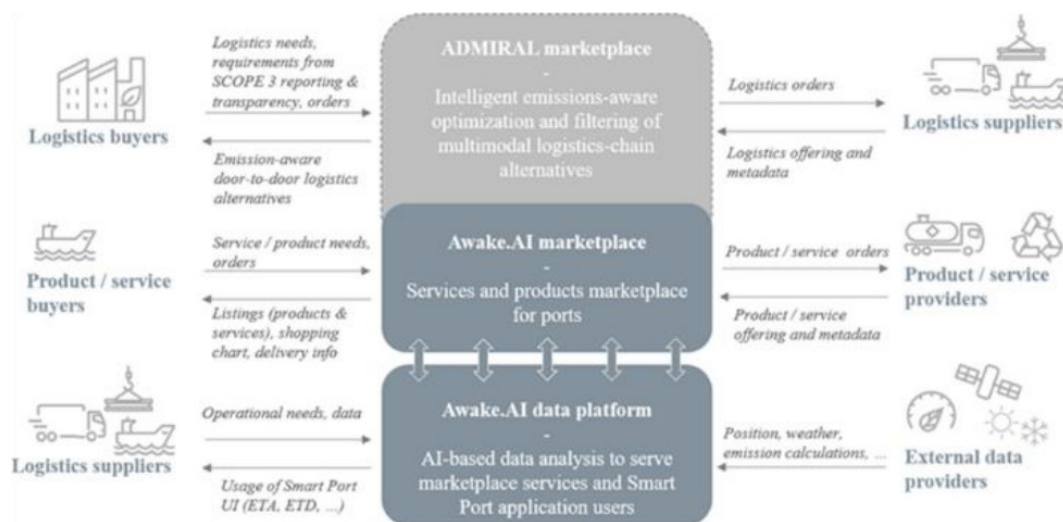

Fig. 3 ADMIRAL marketplace built on top of the existing data platform

involves a rich set of stakeholders or actors that are expected to benefit from the platform (multisided platform).

The ecosystem will promote the selection of low-emission providers by directly calculating and displaying emissions, while also being among the first to support true multimodality.

5 Findings and contextualization with previous studies

Sections 5.1–5.4 present and discuss a comparison of the current and future BMCs, relate these findings to prior studies, and elaborate on the detailed insights drawn from the questionnaire responses.

5.1 AS-IS *vs.* TO-BE BMCs: buyers and sellers

Five companies (potential buyers and sellers) (Tables 1 and 2) provided both the AS-IS (current) and TO-BE (future) versions of their BMC.

A comparative analysis of the AS-IS and TO-BE BMs revealed that companies anticipate changes in all nine blocks of the BMC as also noted by Veile et al. (2022). No building block remains unchanged.

Most changes are related to the options offered by the marketplace ecosystem for **calculating emissions**. This presents an opportunity for case companies to **partner with eco-friendly organizations**, such as transport and crowdsourcing providers, packaging suppliers and renewable energy companies ($n = 4$ case companies) and **attract new customers who care about the environment** ($n = 5$ case companies).

For many case companies, automatic emission calculations represent a new avenue for offering and purchasing solutions ($n = 5$ case companies). The same applies for **real data sharing** which would improve **visibility and transparency**.

Companies on the other hand anticipate **additional costs (fee)** associated with using a marketplace and IT equipment and technologies ($n = 5$ case companies), as well as **the need to train personnel** which would also cause additional costs. However, some believe that they will generate **more revenue** by offering and using more environmentally friendly solutions, such as better pricing for low-emission options and new value stream from offering green services.

Companies recognize that calculating emissions accurately based on real data necessitates **robust data management** and regulatory understanding, as noted by four case companies. Furthermore, two companies highlighted the significance of **supply chain management expertise**, particularly since the ADMIRAL marketplace provides multimodal transport options.

5.2 Insights from the questionnaire survey
5.2.1 Value offering

As for *value proposition*, the study demonstrates that **cost savings** ($n = 4$ case companies) are identified as the primary benefit for both buyers and sellers, confirming the findings of Veile et al. (2022) and Bagnato and Giordino (2024). Three case companies believe that **prioritizing low-emission logistics** will help differentiate their offerings. Two companies highlight **additional benefits** such as **improved tracking** and **more flexible delivery options**. One company emphasizes the benefits of **predictive analytics**, **new transport modes**, and **a reduced manual workload** within the marketplace.

Similar to the findings reported by Xie et al. (2022), all the companies in our case study aim to enhance and diversify their value propositions. They believe that offering greater value than traditional service models will heighten market competition. What is also very important is the fact that three sellers and buyers expect **more frequent and intensive *relationship*** with customers through the marketplace – a trend observed by all case companies in a study of Veile et al. (2022). Closely related to this is also expectation of **greater trust** ($n = 4$ case companies) due to higher transparency and visibility offered by a platform.

A seller representative from case company 4 (CC4) states, *"increased transparency in operations will build trust and strengthen long-term customer relationships"*. Another representative (CC5) adds, *"sustainable practices can foster **long-term relationships** with environmentally conscious customers"*. Similarly, Veile et al. (2022) also noted that higher transparency increases trust and contributes to lasting relationships while study of Korneeva et al. (2023) even claim that trust plays a major role in platform adoption.

As regards *customer relationship*, however, while those companies reported that all communication would be automated, two companies in our case believe that **personalized support** will still be essential as also confirmed by Veile et al. (2022).

In terms of digital communication, interviewees highlighted the importance of strengthening interactions with customers through the platform. For example, one representative (CC3) mentions, *"we will establish direct digital communication with our customers through the platform"*. Another (CC4) anticipates, *"we expect to focus more on stronger online engagement through the platform"*. To enhance collaboration, the ADMIRAL platform ecosystem will create a forum and discussion board for buyers and sellers. This will allow partners to

exchange ideas, provide feedback, and coordinate their activities more efficiently. Additionally, implementing chatbots, as suggested by Ruggieri et al. (2018), could further improve these interactions.

As regards *customer segment* three sellers and buyers consider that lower emissions and emissions calculation features will attract more European, environmentally conscious customers.

5.2.2 Value creation

When asked about *key partnerships*, the majority of respondents (*n* = 5 case companies) indicated that **collaborating with technology firms** is crucial for boosting marketplace adoption. As one representative (CC5) explains, *"external expertise, such as consultant companies, is required to enhance our technological capabilities and ensure smooth integration with a digital marketplace"*. Notably, a study of Veile et al. (2022) also identified data, technology, and IT solutions as key resources – underscoring the pivotal role of digital infrastructure. On the other hand, integrating competitors as partners was not mentioned by the case studies in our research, despite horizontal collaboration being an integral part of platform ecosystems. Four companies plan to partner with **international firms** or subcontractors to expand their **global presence** and streamline cross-border logistics – a finding that aligns with a study of Bagnato and Giordino (2024), which investigated B2C digital marketplaces (as opposed to B2B). One company claimed that such expansion is not possible without leveraging a marketplace. This fact was also highlighted in a study of Ruggieri et al. (2018). Two companies plan to partner with eco-friendly carriers and manufacturers of low-emission vehicles to deliver greener transport options, making reduced-emission services the marketplace ecosystem's key differentiator.

Key resources focus on investing in **data-collection** and **analytics capabilities**, **IT infrastructure**, and **skilled personnel**. Five companies confirm their plans to establish systems for data collection and analysis to enhance decision-making and foster innovation in digital marketplace operations. Notably, a study written by Bagnato and Giordino (2024) – despite its focus on B2C digital platforms – also revealed sweeping changes and innovations across various dimensions of business operations. Two companies highlighted the need for **application programming interfaces (APIs)**, while two others stressed developing **new digital workflows** for handling customer queries and feedback – changes that would require additional employee training. Notably, a study of Veile et al. (2022) similarly identified data, technology, and IT solutions as key resources, underscoring the critical role of digital infrastructure in marketplace operations.

As for *key activities*, three case companies prioritize **low-emission logistics** to attract environmentally conscious consumers. Their plans include incorporating sustainable practices into daily operations, **optimizing delivery routes** to reduce emissions, and **tracking emissions data**. No company in this study mentioned predictive maintenance as a new offering from the platform, even though the platform provider has placed significant emphasis on it.

5.2.3 Value capture

As regards *revenue streams*, two companies indicate that while marketplace owners will determine **pricing strategies**, these must align with existing BMs. One company stresses the need for simplicity for **easy price comparisons**, while the other seeks **new pricing models** to complement current practices. Three companies see potential in **flexible**, **pay-per-use models** for customers with occasional needs. Two companies are considering offering **premium**, **fee-based services** as an additional revenue stream. Notably, the study of Veile et al. (2022) revealed that five case companies have also adopted premium revenue models. Therefore, offering a varied mix of revenue models is essential to meet diverse customer needs.

Four companies anticipate higher costs due to **investments in technology infrastructure**, **sustainable fleets**, **APIs**, **tools for emissions tracking** and **route optimization** and training of employees in using platform features. But on the other hand, three companies believe that the platform could lead to reduced operational (transport) and marketing costs aligning with a research of Vänskä (2020) and Bagnato and Giordino (2024). While the study of Veile et al. (2022) observed a decrease in fixed costs alongside an increase in licensing and subscription fees, our findings show that none of the companies reported rising human costs – aside from the need for training.

5.3 Risks and challenges of using or managing a digital platform ecosystem

Based on the interviews, both sellers and buyers emphasized that the primary risks relate to commission and subscription fees. For example, one seller's representative (CC1) highlights, *"many marketplaces charge a commission on each transaction, which can cut into profit margins"*. Additionally, several sellers are worried about losing control over how their brands are presented on the marketplace, and others fear becoming overly dependent on the ADMIRAL platform.

Finally, the users share concerns about data security and the potential misinterpretation of shared data, correlating with the studies of Veile et al. (2022) and Vänskä (2020). Ensuring robust data protection measures and clear guidelines for data usage will be critical to sustaining trust and encouraging ongoing participation.

One important challenge – not highlighted by the sellers or buyers in this study – is the integration of a logistics marketplace with a company's existing IT infrastructure, which, according to Murtaza et al. (2004), can be highly demanding. However, none of the companies currently operate within a marketplace ecosystem, so it is understandable that they are not yet aware of these risks.

Closely related to technology are hidden costs associated with investments in digitalization and resistance to technological change, both recognized in the literature (Caliskan et al., 2025; Cichosz et al., 2020; Murtaza et al., 2004) but not identified in our study. This could be due to the companies' unfamiliarity with platform ecosystems or the fact that the project has not yet reached the stage where integration with company IT systems is required. After implementation, we plan to conduct additional interviews with the same companies to confirm currents risks and identify further risks and challenges highlighted in past studies, such as data security, privacy concerns, logistics platform reliability, regulatory issues, and others.

5.4 Managerial implications and readiness checklist for digital marketplace adoption

This study partially addresses the need for innovative frameworks and best practices to support the creation and management of new BMs within digital platforms and ecosystems, as called for by Martín-Peña et al. (2024). By highlighting potential changes, risks, and challenges that companies may encounter, it takes an important step toward bridging the gap between BM design and implementation.

To further assist managers in preparing for digital marketplace adoption we propose *a basic readiness checklist* based on the results obtained. This checklist helps evaluate companies' preparedness in several key areas:

1. *Financial Readiness*: Have we allocated sufficient budget to cover marketplace fees, operational and training costs, as well as potential technology investments?
2. *Human Resource Readiness*: Are our employees willing to adapt their workflows and participate in the necessary training for operating within a digital marketplace ecosystem?
3. *Technological Infrastructure Readiness*: Do we have the necessary IT systems and capabilities to integrate smoothly with digital platforms?
4. *Data Collection and Emissions Tracking Readiness*: Do we have plans and systems in place for data collection to accurately assess and report emissions?
5. *Strategic and Competitive Readiness*: Are we prepared to collaborate with competitors within the platform ecosystem? Are we ready for the increased competition that a marketplace model may introduce?

6 Conclusions

Analyzing the changes in BMs leads us to the following conclusions:

- We found that both sellers and buyers expect changes in all nine building blocks of the BMC. Key activities, channels, and revenue streams are likely to undergo significant transformations across all case companies. In contrast, customer segments and customer relationships were the least frequently affected areas. However, buyers and sellers only anticipate minor changes in various building blocks. Notably, only one case company indicated that it would need to implement new processes and workflows.

  The primary objectives of the case companies are to attract more customers, strengthen their market positions, and increase profits by incorporating new technology into their existing BMs, rather than developing entirely new activities or processes – which would necessitate employee training and new equipment development –, a strategy that confirms researchers' statements on BM adaptation (Frishammar and Parida, 2018; Osterwalder and Pigneur, 2010; Xie et al., 2022). Therefore, these changes are viewed as adaptations of BMs rather than full-scale innovations. **These findings provide a direct answer to RQ1.**

- Most changes in the BMs of sellers and buyers primarily focus on emission calculations rather than multimodal transport, revealing an unprecedented degree of BM transformation driven by the possibility of emissions assessment – a novel insight that has never been highlighted or investigated before. However, one logistics provider aims to partner with new air and rail operators, while two others seek to enhance their supply chain management expertise. Nevertheless, for many sellers and buyers, immediate concerns – such as costs, brand control, and

regulatory compliance, particularly regarding emissions – may render multimodality more of a "nice-to-have" feature rather than an essential requirement.

- **These findings address RQ2** by analyzing changes in BM elements across sellers and buyers, highlighting both shared and distinct aspects among these case companies:
  - *Value offering*: the majority of sellers and buyers, prioritize low-emission logistics, flexible delivery options, transparent operations, and expansion into new markets to attract more customers. They also plan to provide detailed emissions data to appeal to environmentally conscious clients. To support this, the platform ecosystem enables emissions prediction and the selection of the most environmentally friendly transport providers. Although very challenging to implement, such a solution does not yet exist in the market. To achieve this goal, the platform provider is designing its own solution and collaborating with two additional complementors who will also support this functionality. However, sellers and buyers place greater emphasis on more frequent and personalized communication with customers as a key driver of value – a point that was found to be less significant for the platform provider.
  - *Value creation*: the platform provider and sellers and buyers acknowledge the potential benefits of additional services, including AI, that are based on reliable data. This necessitates the establishment of robust systems for data collection and analysis. Five out of the six sellers and buyers share the need for high-quality data and collaboration with tech partners.
  - *Value capture*: sellers, and buyers anticipate higher costs for technology and training, but they also recognize opportunities for new revenue streams. They have their own pricing strategy to recover these investments. Nevertheless, most sellers and

buyers intend to invest in new infrastructure to integrate with the marketplace, where cost savings, trust, and sustainability remain key priorities.

- Key risks for sellers and buyers include high commission or subscription fees that can diminish profits, loss of control over how their brand is presented, and increased reliance on the ADMIRAL platform. Additionally, there are shared concerns regarding data security and the potential for data misinterpretation. **These findings comprehensively address RQ3.**

We acknowledge that the findings of this study are limited to the specific context of ADMIRAL project and may not fully apply to other similar digital logistics ecosystems. To improve the generalizability and depth of these insights, future research should be conducted on a larger scale, incorporating a wider range of stakeholders – including complementors – along with a more diverse and extensive sample of both current and potential users of digital platforms. These efforts will be essential for developing a comprehensive understanding of the changes, capabilities, and resources that each stakeholder must consider when managing or engaging with marketplace ecosystems.

Another limitation of this study is the implicit view of the BMC as a relatively fixed structure. In reality, business models, especially within digital ecosystems, are highly dynamic and constantly evolving. Future research would benefit from a more thorough exploration of the interrelationships between different BMC building blocks, as changes in one component – such as the value proposition or customer relationships – often have a cascading effect on others. Investigating these dynamics would offer a deeper and more accurate understanding of how companies adapt and reconfigure their business models over time.

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