Mapping of stakeholder ecosystem

Deliverable D2.1

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Change Log

Version	Description of change
V0.1	Initial version preparation
V1.0	Reviewed and final version

List of abbreviations

Abbreviation/Term	Description
D	Deliverable
G2B2C	Government to business to consumer
k	Thousand
LEZ	Low Emission Zone
LSP	Logistics Service Provider
M	Million
NGO	Non-governmental organization
RASCI	Responsible, Accountable, Supportive, Consulted and Informed
SC	Supply Chain
SUMP	Smart Urban Mobility Plan

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1. Executive Summary

This comprehensive overview of the e-commerce ecosystem examines the roles and interactions of various stakeholders and their contributions to sustainable logistics. It establishes a foundational understanding of the ecosystem to support the project's overarching goal of developing zero-emission logistics solutions aligned with economic, environmental, and social sustainability principles.

The analysis reveals the diverse roles of stakeholders, from those directly involved in operational processes, such as logistics service providers and manufacturers, to indirectly involved entities, including regulatory bodies and NGOs. This nuanced understanding enables a holistic view of their interdependencies and the pressures they face, such as meeting growing consumer demands, navigating regulatory requirements, and advancing sustainability goals.

Operational processes, from order placement to last-mile logistics, are examined in detail, with a focus on optimizing consumer touchpoints and ensuring efficiency. Business models relevant to e-commerce, such as online marketplaces and direct-to-consumer platforms, are also analyzed, emphasizing their adaptability to evolving market conditions and their alignment with sustainability objectives.

To clarify the accountability framework, the RASCI (Responsible, Accountable, Supportive, Consulted and Informed) methodology, a methodology that helps identify roles and responsibilities, is applied, providing a structured framework for effective collaboration within the pilot web shops. This approach enhances transparency and accountability, which are critical for navigating the complexities of the supply chain and ensuring cohesive operations.

The findings serve as a strategic guide for refining processes, fostering collaboration, and embedding sustainability across all aspects of the supply chain. They form a solid basis for advancing project activities, offering actionable insights to address the challenges and opportunities in creating innovative and efficient e-commerce logistics solutions.

2. Introduction

2.1 Aim of the deliverable

This deliverable provides a comprehensive analysis of the e-commerce supply chain (SC) ecosystem, focusing on stakeholders and business models. Consumers, who play a crucial role in e-commerce and form an integral part of the supply chain ecosystem, are excluded from the analysis in this deliverable as their roles are described separately and in detail in deliverable D2.2 Intersectional Analysis where different consumer personas were developed. Together, all deliverables of Work Package 2 constitute the theoretical foundation for the project.

Key objective of this report is to map e-commerce ecosystems as well as identify the relevant stakeholder groups, their roles within the ecosystem, and their mutual interactions and interfaces. This analysis also aims to pre-identify each stakeholder group's needs, preferences, and challenges according to the three pillars of sustainability, thereby supporting the understanding of their actions. The interactions between the SC activities outlined here and the consumer personas identified and detailed in Deliverable 2.2 establish a connection between the two deliverables of Task 2.1.

To provide an initial insight into the activities of the pilot projects, the areas of their operation are described in chapter 5 of this deliverable. A better understanding of the pilots at this early stage should help subsequent activities and facilitate operations and models analysis.

2.2 Method

The depiction of the business models and individual stakeholder groups was made possible through extensive literature research, primarily conducted online. The findings were then discussed within the relevant expert group, definitions were formulated in accordance with the project objectives, and the limits of investigation were defined.

Furthermore, general internet research was conducted to gain insight into e-commerce (e.g. the structure of e-shops, etc.) or the use of terms in a non-scientific context.

The description of the pilots was carried out using the RASCI matrix method. Additionally, the pilot projects provided data and information that was systematically recorded and processed.

In brainstorming sessions at expert level, elements of the e-commerce supply chain were identified and discussed in the context of internal workshops.

3. Stakeholders' identification and interaction

3.1 Identification of stakeholders

To enable the joint development of zero-emission logistics solutions, it was first necessary to identify the various players in e-commerce. The 'GreenTurn' initiative broadly categorizes all potential participants in the e-commerce ecosystem as stakeholders. Therefore, the process steps in e-commerce were defined and analysed in the framework of an internal workshop to determine the stakeholders, their roles, and their involvement.

The analysis showed that the stakeholders are engaged in the ecosystem to varying degrees and to very different extents. While some are always involved in the operational e-commerce process, others only appear in the set-up phase of an online shop or platform or when certain problems arise. In addition, there are also stakeholders who are not involved in the actual e-commerce logistics process at all, but either feel its effects or influence it through their actions and are therefore also be considered stakeholders. Based on this observation, the following categorization emerged with regard to their specific roles and their contributions to the project goals:

- Stakeholders with direct involvement in the e-commerce logistics process;
- Stakeholders with indirect/occasional involvement in the supply chain;
- Other stakeholder/interest groups.

Each group has distinct interests and needs related to sustainable e-commerce logistics, such as influencing consumer behaviour, understanding environmental footprints or adopting zero-emission solutions.

3.1.1 Stakeholders directly involved in the standard process

This group plays a pivotal role in the e-commerce ecosystem, where all participants collaborate with the aim to deliver a seamless, customer-focused value chain. Each member contributes a distinct function tailored to consumer needs during the customer journey, whether in product provision, logistics, payment processing, or service delivery. (see Table 1)

The group's actions are applied throughout the buying (and return) process and are consumer-driven, with consumers purchasing products online and providing preferences and feedback that drive the development and optimisation of the entire e-commerce supply chain. This consumer-centric approach places them at the centre of design thinking, with their needs shaping the development of supply chain processes.

Stakeholders are deeply interconnected, united by a shared goal of delivering a superior customer experience through efficiency, innovation, and adaptability. Together, they prioritize customer-centricity, sustainability, digital transformation, and cross-functional collaboration to meet the ever-growing demands of the e-commerce market.

Name (in alphabetic order)	Description and area of operation
Financial Institutions (as backend service providers)	These pivotal entities facilitate secure, efficient, and seamless transactions between customers and merchants. They focus on user-centric innovation, offering payment solutions that prioritize convenience, trust, and adaptability to diverse customer preferences. Features such as digital wallets, buy-now-pay-later options, and fraud protection play a key role in enhancing the customer experience and supporting the smooth operation of the e-commerce supply chain.
Logistics Service Providers transport and delivery	Within the e-commerce supply chain ecosystem, logistics providers handling transport and delivery are the players responsible for moving goods efficiently from sellers to end-users. They optimize delivery routes, ensure timely shipments, and enhance the last-mile delivery experience.
Logistics Service Providers warehousing	They play a critical role in storing and managing inventory. These providers align their operations with customer-centric insights, ensuring inventory availability, efficient storage solutions, and streamlined order fulfilment processes. Their focus on adaptability and innovation supports supply chain efficiency by reducing delays and optimizing resource use.
Manufacturers	Manufacturers are the producers of goods who transform raw materials or semi-finished products into finished products. Their collaboration with other supply chain stakeholders supports seamless integration from production to the end-user, enabling efficient and customer-centered supply chains.
Retailers	They are responsible for offering products to customers and bridging the gap between suppliers (or manufacturers) and end consumers. They adapt their processes based on customer insights and preferences and work with logistics service providers. Due to their knowledge of sales figures, their feedback and engagement are essential to aligning innovations in the supply chain with market demands. E-commerce platforms or online shops are responsible for order processing, customer service and, to some extent, inventory management.
Wholesaler/Supplier	These entities are responsible for providing products in bulk to retailers or directly supporting inventory needs. They contribute by ensuring product availability, quality, and timely delivery, aligned with the requirements identified through customer insights. Their role is pivotal in enabling flexible and responsive supply chain processes that support innovative e-commerce practices, such as sustainable sourcing and efficient logistics.

Table 1 Stakeholder with direct involvement

3.1.2 Stakeholders with indirect/occasional involvement in the supply chain

The common denominator of this group in e-commerce is its supporting role in enabling and optimising the broader e-commerce ecosystem, even if their involvement is indirect or occasional. These companies provide specialised services and solutions that facilitate

important aspects of the supply chain, logistics, compliance, customer experience and market reach. (see Table 2) These solutions may either be needed for the platform to function, without being involved in the sales process (e.g. technology or marketing), provide indispensable framework conditions (e.g. regulatory bodies) or only be used for special requirements (e.g. customs).

Their shared focus is on improving efficiency, reliability and compliance with e-commerce operations. Whether through technological innovation, regulatory advice, logistical coordination or customer engagement, they contribute to the smooth functioning and growth of e-commerce by addressing specific operational requirements and challenges that go beyond the core activities of product provision and sales.

Name (in alphabetic order)	**Description and area of operation**
Customs Broker	Specialist who helps importers and exporters meet federal requirements governing imports and exports.
Customer Service Provider	Company or department handling customer inquiries, complaints, and returns.
Freight Forwarder	Company that organizes shipments for individuals or corporations to get goods from the manufacturer to a market, customer, or final point of distribution.
Marketing (Agency)	Firm or department that assists e-commerce businesses in promoting products and connecting with their target audience. They develop strategies to increase brand visibility, drive sales, and enhance customer engagement.
Packaging Supplier	Company providing packaging materials and solutions to ensure products are safely transported.
Regulatory Body	Government agencies setting and enforcing regulations related to e-commerce, such as data protection and consumer rights.
Technology Provider	Company enabling seamless e-commerce operations through tools like platforms, payment gateways, supply chain management software, etc.
Third-Party Logistics (3PL) Provider	Company offering outsourced logistics services, including warehousing and transportation.

Table 2 Stakeholder with indirect/occasional involvement

3.1.3 Further stakeholder/interest groups

The common thread connecting this group in e-commerce is their influence on shaping the ecosystem through external pressures, advocacy, or internal contributions. While usually not involved in e-commerce operations, these stakeholders significantly impact the strategic direction, ethical standards, innovation, and operational practices within the industry.

This group (see Table 3) drives progress by addressing critical areas such as competition, sustainability, workforce welfare, regulatory compliance, risk management, and innovation. Their roles foster accountability, ensure stakeholder interests are balanced, and contribute

to the development of a more sustainable, competitive, and efficient e-commerce ecosystem. Their positions influence design thinking in e-commerce by shaping priorities and introducing constraints or opportunities that impact how solutions are developed and implemented.

Name (in alphabetic order)	Description and area of operation
Academic and Research Institutions	Universities or other research units that contribute research and innovation to improve supply chain practices.
Environmental Agencies	Organizations ensuring that supply chain practices comply with environmental regulations and promote sustainability.
Insurance Companies	Firms providing coverage for goods in transit, protecting against losses due to damage, theft, or other risks.
Investors	Individuals or companies providing capital expecting returns on their investments.
Local authorities	Regions that are affected by the processes and practices in the supply chain but also have the power to control them to a certain extent through regulations.
Non-Governmental Organizations (NGOs)	Groups that advocate for sustainable and ethical practices within the supply chain. They influence policies, promote corporate responsibility, and encourage environmentally and socially conscious operations.
Trade unions	Organisation that stands up for the rights of employees and represent their interests.
Trade Associations	Business organisations (chambers of commerce, industry, business or professional organisations etc.) that represent industry interests and advocate for favourable policies.

Table 3 Further stakeholder/interest groups

3.2 Stakeholder interactions

3.2.1 Interactions with consumers

The key interfaces in the e-commerce ecosystem are evolving around the seamless exchange of goods, information and feedback between consumers and stakeholders. The physical flow of goods, from manufacturer to last-mile delivery, is driven by consumer expectations of speed and environmentally friendly options. The flow of information includes real-time order updates and visibility. Feedback loops enable merchants and service providers to adapt to consumer needs and innovate based on consumer insights.

Stakeholders directly involved in the standard process have the most points of contact with consumers, making their performance crucial for customer satisfaction. Retailers (or - depending on the business model - manufacturers) have direct access to customers through reviews, returns, and preferences that influence product offerings. Their challenge is to operate sustainably despite rapidly changing consumer demands.

Logistics service providers handling transport and delivery are critical touchpoints in online retail as they often are the only ones with direct customer contact. Their focus on sustainability

and responsiveness supports innovative supply chain solutions that meet customer expectations for speed, convenience, and eco-friendly practices. With the increasing use of rating functions, feedback options, and forum posts, the delivery of ordered goods is perceived as a service of the respective online shop. Therefore, the quality of logistics and the last mile significantly impact the classification and quality assessment of the online shop and its products. (DAKO GmbH, 2017)

Logistics service providers that operate in the field of warehousing, wholesalers, suppliers and, above all, manufacturers usually have no direct customer contact. However, they are crucial to ensuring that goods are available as quickly as possible and play a decisive role in aligning production processes with customer and market requirements, focusing on adaptability and innovation, and ensuring that products meet quality expectations, sustainability goals and logistical requirements. Balancing sustainability and efficiency while minimising supply chain issues are their biggest challenges.

Financial institutions interact with customers through payment systems (e.g., digital wallets, credit cards, or buy-now-pay-later services). Their services must be secure, convenient and flexible; customers expect their background applications to work and to be protected against fraud. The same applies to technology providers who provide e-commerce platforms, apps, and customer service portals and are not directly involved in online processing but enable it.

Customer service, though not involved in all transactions, plays a vital role in resolving complaints and occasionally handling returns and inquiries. As the direct representative of the web shop to the outside world, it requires timely and empathetic responses to maintain consumer satisfaction. Consumers are reached indirectly through marketing efforts, where agencies or departments use targeted advertising and digital channels to interact with them. These interactions must remain relevant and non-intrusive to ensure effective engagement.

Interest groups work to ensure compliance with or improvement of environmental standards or consumer rights. Transparency regarding products, the purchase process and compliance with legal requirements are demanded by NGOs, environmental agencies or trade associations, and inconsistencies are made public. By facilitating access to information and highlighting weaknesses, these organizations influence consumer behaviour.

3.2.2 Elements of online business and touchpoints

The key consumer touchpoints involve any step where consumers make a decision, experience service, or interact with the logistics process. These include mainly (but not exclusively) delivery options, delivery points, fees, speed, re-routing options, notifications, packaging, return options, and return features.

To provide a clearer overview of the elements of the last mile and return in online business, including various consumer touchpoints, two matrices of attributes and their levels were created. The overview on the elements of the last mile — titled "Last Mile Logistics Characteristics with Consumer Touchpoints"— is presented in Table 4, whereas the overview on the return elements – titled "Return Logistics Characteristics with Consumer Touchpoints" was presented in Table 5. These matrices serve as an initial draft and may be refined as the project progresses.

It should serve as a framework for businesses to design consumer-friendly last-mile and return logistics systems, considering flexibility, cost, and accessibility for both delivery and return processes.

Last Mile Logistics Characteristics with Consumer Touchpoints

Attributes		Attribute Levels					
LAST MILE DELIVERY							
A1	Delivery options	transport by logistics service provider (LSP) (direct delivery to the consumer)		transport by LSP and consumer (handover at an (agreed) location)		transport by consumer (pick up, p.e. click-and-collect)	
A2	Means of transport	van/car (conventional)	van/car (alternat. drive)	bicycles	drones	walking couriers (at times using public transport)	autonomous vehicle / robot
A3	Delivery points	parcel locker	consumer's address (home, workplace or similar)	local shop	curbside pickup		
A4	Access to delivery points	restricted		24/7			
A5	Delivery	last mile delivery directly to the point of destination		last mile delivery with transhipment point (e.g.micro-hubs)			
A6	Pricing schemes for delivery	free for the consumer	fixed price per delivery	flexible price (depending on lead times ...)	suscription (monthly etc.)	depending on conditions (loyalty programme, product price/treshold)	
A7	Delivery speed	within hours	same day	next day	selected time slots (auch: Abosystem)	more than 1 day	
A8	Scope for customers influencing logistics	rerouting	change of time slot	choice of delivery vehicle	ability to choose/disclose a carrier	consolidated delivery (one delivery per order)	request for contactless delivery
A9	Handover options	delivery without announcement	delivery with prior notification	more than one attempt of delivery	single attempt of delivery with limited storage for pickup		
A10	Packaging	returnable		one way/disposable packaging			

The consumer chooses if he takes over parts of the transport. These options directly influence the customer experience.

Certain modes can become touchpoints when consumers interact with them (e.g., retrieving items from a robot or drone).

Delivery points are all touchpoints since the consumer retrieves or receives items at these points.

Access options influence consumer interaction and satisfaction at these touchpoints.

Consumers only notice the difference when micro-hubs in city centres are used to cover the last mile on foot or by bike.

Delivery fees are touchpoints because consumers directly experience these costs during checkout.

Consumers often select delivery times (e.g., within hours, same day, or time slots), making this a direct touchpoint.

These options are critical touchpoints where consumers control the process.

The moment of handover the consumers engage with the logistics process.

It affects the consumer's experience when receiving or returning goods.

Table 4 Morphological box: last mile delivery

Return Logistics Characteristics with Consumer Touchpoints

Attributes		Attribute Levels					
RETURN LOGISTICS							
B1	**Return options**	**via the CEP-provider that did the delivery**	**via a CEP-providerpre-defined by the webshop**	**via any CEP-provider**	**no returns possible (p.e. food)**		
B2	**Cost of Returns**	**free of charge**		**free of charge to a limited extent (loyalty programme, price of the product/threshold)**		**fixed price**	
B3	**Return features**	**shipment tracking**	**easy return labels**	**return window notifications**	**instant refunds**	**support chat**	**feedback collection**

Consumers interact with the return process.

The cost of the returns affects the consumers and their decision-making process.

These featuresare all touchpoints that shape the consumer experience during returns.

Table 5 Morphological box: return logistics

3.3 Stakeholders' needs, preferences and challenges

Conflicts between stakeholders in the e-commerce ecosystem often arise from competing priorities and different operational pressures. Price disputes arise as retailers and wholesalers push manufacturers to reduce costs, while manufacturers are seeking to maintain profitability. In addition, the financial and operational burden of adopting sustainable practices, such as environmentally friendly technologies or emissions reductions, can lead to resistance from various sides and discussions on how to divide the costs.

Logistics service providers face major challenges in their business, including rising costs in all areas and the growing importance of alternative technologies that they have to deal with. Meeting high delivery expectations puts pressure on margins, legal restrictions often complicate operations, and as e-commerce grows, so does logistical complexity.

To ensure that online retail runs smoothly, logistics service providers need clear communication with all parties involved. Long-term contracts with predictable shipping volumes stabilise operations and partnerships with multiple customers help to diversify risk.

For retailers, consistent pricing and reliable availability of stock at wholesalers is essential to avoid over- or understocking. A broad range of competitively priced products and efficient logistics are crucial for timely and accurate deliveries. Pressure is increasing for fast deliveries, seamless returns processes and competition from manufacturers' direct-to-consumer models, which poses an additional challenge to competitiveness.

Managing high rates of returns presents challenges for both retailers and logistics service providers and leads to disputes over who bears the associated costs.

Wholesalers and suppliers face the challenge of ensuring reliable access to goods at competitive prices from manufacturers to ensure constant supply. They rely on strong partnerships and flexible contracts that take into account seasonal fluctuations, and benefit from volume discounts and stable prices. At the same time, they need to minimise warehousing costs, avoid unsold stock and maintain relationships with manufacturers and other players. The increasing demand for faster deliveries, particularly in the e-commerce landscape, further complicates these tasks.

Manufacturers in the e-commerce ecosystem thrive on steady demand and large orders to optimise production costs, and they depend on timely feedback to adapt their products to market trends. They value long-term contracts with wholesalers and retailers and transparent communication when planning inventory and demand. However, they face challenges such as fluctuating market demand, increasing sustainability pressure and strong dependency on both upstream suppliers and downstream logistics service providers to ensure operational efficiency.

Data ownership can also trigger conflicts as retailers and manufacturers compete for control of valuable consumer data.

Despite all these partially conflicting challenges, implementing sustainable supply chain practices benefits the environment and society, while establishing partnerships is advantageous for companies by enabling economies of scale and increasing purchasing power.

At the corporate level, sustainable development typically follows the so-called three pillars of sustainability: the environmental pillar focuses on the impact of logistics on biodiversity and natural resources (resource and energy use, waste and emissions, ecological integrity); the social pillar on its impact on society at large (public health, social equity, labour rights); and the economic pillar refers to the creation of added value and financial viability (competitiveness, job creation, cost reduction, long-term profitability). (Gonzalez, 2023)

To promote sustainability, the needs (what they must accomplish), preferences (what they aim for), and challenges (what obstructs their efforts) of stakeholders directly involved in the online retailing process have been identified and are described below, according to:

- ENVIRONMENTAL SUSTAINABILITY (see Table 6);
- SOCIAL SUSTAINABILITY (see Table 7);
- ECONOMIC SUSTAINABILITY (see Table 8).

It is important to bear in mind that these needs, preferences and challenges do not exist in isolation but influence each other, often creating tensions, especially between social and environmental goals on the one hand and economic necessities on the other.

ENVIRONMENTAL SUSTAINABILITY	Needs	Preferences	Challenges
Logistics Service Providers transport and delivery	- Integration of eco-friendly technologies like electric vehicles (EVs), alternative fuels, and renewable energy for transport. - Tools and systems to monitor and reduce carbon emissions. - Infrastructure for reverse logistics to support recycling and sustainable packaging disposal.	- Partnerships with green suppliers and service providers. - Adoption of green certifications and compliance with environmental regulations. - Investments in route optimization software to minimize fuel consumption.	- High costs of transitioning to sustainable technologies (e.g., purchasing EV fleets). - Limited charging or refuelling infrastructure for alternative fuels. - Balancing speed and sustainability in delivery, especially with expedited shipping demands.

ENVIRONMENTAL SUSTAINABILITY	Needs	Preferences	Challenges
Logistics Service Providers warehousing	- Energy-efficient warehouse designs, including LED lighting, energy management systems, and renewable energy sources - Systems for waste manage-ment, such as recycling programs for packaging materials and reducing single-use plastics. - Sustainable storage solutions, including modular shelving and equipment made from recycled or eco-friendly materials.	- Green building certifications to showcase commitment to sustainability. - Use of automated systems like robotics to reduce energy wastage and optimize operations. - Partnerships with eco-conscious suppliers for materials and utilities.	- High upfront costs for adopting energy-efficient technologies and retrofitting existing warehouses. - Balancing sustainability efforts with warehouse optimization. - Limited options for eco-friendly infrastructure in certain regions.
Manufacturers	- Sustainable sourcing of raw materials. - Implementation of energy-efficient production processes, including renewable energy use and waste minimization. - Eco-friendly packaging and product designs that comply with circular economy principles (recyclability and reduced material use).	- Green certifications (e.g., ISO 14001, FSC for materials) to enhance brand reputation. - Adoption of technologies such as cleaner manufacturing equipment or carbon capture.	- High costs of transitioning to sustainable production methods and sourcing eco-friendly materials. - Navigating regulatory compliance across multiple jurisdictions with varying environmental standards. - Balancing production efficiency with sustainability goals, especially for high-volume, fast-moving goods.

Retailers	- Sustainable sourcing of products. - Fostering eco-friendly product designs - Implementation of energy-efficient processes, including renewable energy use and waste minimization. - Eco-friendly packaging that comply with circular economy principles, (recyclability and reduced material use).	- Collaboration with suppliers and logistics service providers who prioritize green practices, such as low-emission transportation. - Green certifications (e.g., ISO 14001, FSC for materials) to enhance brand reputation. - Adoption of technologies such as IoT-driven efficiency monitoring. - SC transparency (all inputs meet environmental standards).	- High costs of sourcing eco-friendly merchandise. - Navigating regulatory compliance across multiple jurisdictions with varying environmental standards. - Balancing sustainability initiatives with maintaining affordability for downstream customers under price pressures by competing retailers.
Wholesaler/ Supplier	- Sustainable sourcing of materials and products. - Efficient logistics and distribution systems to minimize carbon emissions. - Adoption of eco-friendly packaging materials for bulk shipments.	- Collaboration with (suppliers and) logistics service providers who prioritize green practices, such as low-emission transportation. - Implementation of energy-efficient warehousing solutions (e.g., LED lighting, renewable energy integration). - Monitoring tools to track and report on carbon footprints across the supply chain.	- High costs of sourcing eco-friendly merchandise. - Navigating regulatory compliance across multiple jurisdictions with varying environmental standards. - Balancing sustainability initiatives with maintaining affordability for downstream customers (retailers).
Financial Institutions	- Adoption of energy-efficient and eco-friendly data centres. - Encouraging paperless transactions and digital statements to minimize waste.	- Investments in renewable energy sources to power operations, including payment processing infrastructure. - Partnerships with businesses that meet environmental	- High costs of transitioning to green technologies, such as sustainable data centres and energy-efficient infrastructure. - Balancing the need for high-speed, reliable transaction

	- Development of green financing products to support sustainable business practices.	sustainability criteria. - Offering incentives or lower transaction fees for eco-friendly products and services.	systems with sustainability objectives.

Table 6 Environmental Sustainability

SOCIAL SOSTAINABILITY	Needs	Preferences	Challenges
Logistics Service Providers transport and delivery	- Workforce welfare, including fair wages, safe working conditions, and opportunities for upskilling. - Collaboration with communities to minimize disruptions (e.g., noise or congestion in urban areas). - Accessibility and inclusivity in delivery services, ensuring no demographic is excluded.	- Partnering with ethical suppliers and vendors. - Promoting diversity and inclusion within their workforce. - Building transparent communication with consumers about delivery practices and impacts.	- Managing labour shortages while maintaining worker satisfaction. - Ensuring safety standards for drivers amidst tight delivery timelines. - Addressing the social impact of e-commerce expansion in urban areas (e.g., traffic congestion, noise pollution).
Logistics Service Providers warehousing	- Safe and ergonomic work environments for employees, reducing strain and injuries during operations. - Fair labour practices, including competitive wages, benefits, and opportunities for training and growth. - Policies promoting diversity, inclusion, and employee well-being.	- Utilizing technology (e.g., wearables and exoskeletons) to assist workers and improve productivity while minimizing physical strain. - Transparent communication with clients and employees regarding operational practices and commitments to social responsibility. - Community engagement initiatives, such as local hiring and support for nearby small businesses.	- Addressing labour shortages, especially during peak seasons, while maintaining employee satisfaction. - Balancing automation (to reduce costs and improve efficiency) with workforce retention and morale. - Managing social perceptions of large-scale warehousing (e.g., concerns about local congestion or environmental impact).

Manufacturers	- Ensuring safe, equitable, and inclusive working environments for employees, both in-house and across supplier networks. - Transparent labour practices and compliance with ethical standards, such as fair wages and non-exploitative conditions. - Supporting community development through responsible business practices and contributions to local economies.	- Engaging in partnerships that prioritize ethical labour. - Adoption of automation and robotics to reduce repetitive, high-risk tasks while upskilling the workforce for advanced roles. - Public communication of corporate social responsibility (CSR) initiatives to strengthen stakeholder trust.	- Maintaining ethical labour standards in extended global supply chains with varying regulations and enforcement levels. - Balancing automation adoption with workforce retention and retraining. - Addressing stakeholder scrutiny on social impacts, such as worker conditions and community relations.
Retailers	- Ensuring safe, equitable, and inclusive working environments for employees, both in-house and across supplier networks. - Transparent labour practices and compliance with ethical standards, such as fair wages and non-exploitative conditions. - Supporting community development through responsible business practices and contributions to local economies.	- Engaging in partnerships that prioritize ethical labour across the supply chain. - Adoption of automation and robotics to reduce repetitive, high-risk tasks while upskilling the workforce for advanced roles. - Public communication of corporate social responsibility (CSR) initiatives to strengthen stakeholder trust.	- Maintaining ethical labour standards in extended global supply chains with varying regulations and enforcement levels. - Balancing automation adoption with workforce retention and retraining. - Addressing stakeholder scrutiny on social impacts, such as worker conditions and community relations.

SOCIAL SOSTAINABILITY	Needs	Preferences	Challenges
Wholesaler/ Supplier	- Ethical labour practices, ensuring fair wages and safe working conditions. - Transparency in supplier relationships to ensure compliance with social responsibility standards. - Employee welfare initiatives, including training, upskilling, and career development.	- Partnerships with partners who share a commitment to ethical sourcing and production. - Community engagement efforts, such as supporting local suppliers and initiatives. - Transparent communication about social impact efforts to enhance trust with retailers and end consumers.	- Ensuring social compliance throughout global supply chains, especially in regions with weaker labour laws. - Addressing scrutiny over the ethical practices of upstream suppliers (e.g., raw material providers). - Balancing automation adoption with workforce retention and fair labour practices.
Financial Institutions	- Ensuring secure, inclusive, and equitable access to financial services, particularly for underserved or marginalized communities. - Protecting customer data and privacy through robust security measures. - Promoting financial literacy and education to help consumers and businesses make informed financial decisions.	- Development of financial products tailored to diverse customer demographics (e.g., inclusive digital wallets or micro-loans). - Commitment to ethical practices, including fair lending policies and transparent fee structures. - Collaboration with stakeholders to foster trust and transparency in the financial ecosystem.	- Addressing disparities in access to digital payment solutions in regions with limited internet or banking infrastructure. - Managing the increasing complexity of cybersecurity threats while maintaining customer trust. - Balancing innovation in financial products with regulatory compliance and social accountability.

Table 7 Social Sustainability

ECONOMIC SUSTAINABILITY	Needs	Preferences	Challenges
Logistics Service Providers transport and delivery	- Cost-efficient operations without compromising quality or speed of service. - Investments in technology (e.g., automation, AI, IoT) to enhance efficiency. - Scalable delivery models to handle fluctuating demand, especially during peak seasons.	- Collaborative logistics models - Predictive analytics and demand forecasting to optimize resource allocation. - Value-added services (e.g., real-time tracking, customer support) to retain customers.	- Rising fuel and transportation costs affecting profit margins. - Managing the costs of adopting new technologies and sustainable practices. - Competition in the logistics sector pushing prices down while maintaining service quality.
Logistics Service Providers warehousing	- Cost-effective inventory management systems to reduce overstocking and stockouts. - Scalable warehousing solutions to handle seasonal fluctuations in demand. - Investment in cutting-edge technology (e.g., IoT sensors, AI-driven inventory optimization) to improve efficiency and accuracy.	- Collaborative warehousing models to reduce costs and environmental impact. - Predictive analytics tools for demand forecasting and resource optimization. - Just-in-Time (JIT) inventory models to reduce excess inventory and improve cash flow.	- High competition driving down margins while increasing the need for technological investments. - Rising land and construction costs for new warehouses, particularly in urban areas with high e-commerce demand. - Balancing operational efficiency with customization for different clients and products.

ECONOMIC SUSTAINABILITY	Needs	Preferences	Challenges
Manufacturers	- Efficient resource utilization to reduce costs while maintaining product quality and meeting demand. - Investment in technology to enhance scalability, efficiency, and product innovation. - Robust risk management systems to navigate global disruptions (e.g., pandemics, geopolitical issues).	- Lean manufacturing practices to minimize waste and improve profit margins. - Collaboration with suppliers and logistics partners to reduce production-to-delivery costs. - Diversification of product lines to meet changing market demands and reduce dependence on single markets or resources.	- Rising material and labour costs impacting profitability. - The need for significant capital investment to implement cutting-edge production technologies. - Balancing cost efficiencies with flexibility to adapt to fluctuating consumer demands.
Retailers	- Efficient resource utilization to reduce costs while maintaining product quality and meeting demand. - Investment in technology to enhance scalability, efficiency, and product innovation. - Robust risk management systems to navigate global disruptions (e.g., pandemics, geopolitical issues).	- lean manufacturing practices to minimize waste and improve profit margins. - Collaboration with suppliers/ logistics partners to reduce production-to-delivery costs. - Diversification of product lines to meet changing market demands and reduce dependence on single markets or resources.	- Rising material and labor costs impacting profitability. - The need for significant capital investment to implement cutting-edge production technologies. - Balancing cost efficiencies with flexibility to adapt to fluctuating consumer demands.
Wholesaler/ Supplier	- Cost-efficient operations to provide competitive pricing to retailers and maintain profitability. - Scalable systems to handle fluctuations in demand, particularly during peak seasons: - Reliable technology to enhance inventory management and	- Investments in advanced technologies like IoT for real-time inventory tracking and data-driven decision-making. - Flexibility in contract structures to accommodate different retailer needs, including smaller order volumes.	- Rising costs of transportation, materials, and energy affecting profit margins. - The need for significant investment in technology to remain competitive and sustainable. - Balancing operational efficiency with

	improve forecasting accuracy.	- Adoption of shared or collaborative logistics models to reduce costs and improve efficiency.	customization requirements for different retailer clients.
Financial Institutions	- Building scalable, efficient systems to handle growing transaction volumes in e-commerce without compromising reliability or speed. - Investing in technology and innovation to support seamless and cost-effective payment processes. - Developing risk management systems to minimize fraud and ensure financial stability.	- Expansion of digital payment solutions like contactless payments, cryptocurrency support, and buy-now-pay-later (BNPL) options to meet consumer demand. - Offering flexible financial products and services that align with varying consumer and retailer needs. - Partnerships with e-commerce platforms and retailers to integrate financial services into supply chain ecosystems.	- Rising operational costs to maintain and innovate secure, efficient transaction systems. - Managing risks associated with emerging technologies like blockchain and decentralized finance. - Balancing the pressure for low transaction fees with profitability and investment in innovation.

Table 8 Economic Sustainability

4. SC Business Models in e-Commerce

To effectively understand business models in e-commerce, it is crucial to define them clearly.

Searching the internet for the term 'business models in e-commerce' revealed that there is a wide range of perspectives on business models. For instance, revenue models such as sales, advertising, commission, and subscription are often used as distinguishing features. Other approaches focus on order fulfilment methods, such as reselling or direct-to-consumer (D2C), or on the nature of the relationship between the seller and buyer. This relationship may involve the type of business transactions (e.g., B2B, B2C, C2C) or the structure of e-business interactions (e.g., many-to-many, one-to-many). Another perspective considers the operational logistics model and distinguishes between dropshipping, e-commerce warehousing and cross-docking.

All these systems only address specific aspects of the e-commerce process and never encompass the full journey from the customer's order to the completion of the purchase.

4.1 Business Models in ecommerce

To explain the next steps, it is important to know that the term 'business model' is not clearly defined. Therefore, the search was carried out using this term, regardless of how it was used by the respective authors. The main criterion for inclusion in the following list was that the models should refer to the entire e-business process.

Numerous models were identified, some of which had different names but little or no difference in content. These models were summarised into one. As a result, 14 different models were identified. (see Table 9)

Name	Description
3rd Party Marketplace / Brokerage model / Online marketplace	These platforms are digital spaces where business transactions occur, connecting multiple independent sellers with potential buyers. Sellers can list and sell their products or services, while buyers—be they consumers or businesses—use the platform to browse, compare, and make purchases. The marketplace operator plays a crucial role as a broker or intermediary, ensuring smooth transactions without directly owning or managing any inventory. Instead, they focus on facilitating the process by providing key services such as payment processing, logistics support, and customer service. The operator typically generates revenue through commissions, subscription fees, or other service charges, making this model a cornerstone of modern e-commerce ecosystems. (Farley, R., 2019)

Advertising model	The web advertising model is an extension of the traditional media broadcast model. The broadcaster, in this case, a website, provides content (usually, but not necessarily, for free) and services (like email, IM, blogs) mixed with advertising messages in the form of banner ads. The banner ads may be the major or sole source of revenue for the broadcaster. The broadcaster may be a content creator, or a distributor of content created elsewhere. The advertising model works best when the volume of viewer traffic is large or highly specialized. (Rappa, n.d.)
Affiliate model	In contrast to the generalized portal, which seeks to drive a high volume of traffic to one site, the affiliate model, provides purchase opportunities wherever people may be surfing. It does this by offering financial incentives (in the form of a percentage of revenue) to affiliated partner sites. The affiliates provide purchase-point click-through to the merchant. It is a pay-for-performance model - if an affiliate does not generate sales, it represents no cost to the merchant. The affiliate model is inherently well-suited to the web, which explains its popularity. Variations include, banner exchange, pay-per-click, and revenue sharing programs. (Rappa, n.d.)
Collaboration platforms	These provide a set of tools and an information environment for collaboration between enterprises. This can focus on specific functions, such as collaborative design and engineering, or in providing project support with a virtual team of consultants. Business opportunities are in managing the platform (membership/usage fees), and in selling the specialist tools (e.g. for design, workflow, document management). (Timmers, 1998)
Community model	The viability of the community model is based on user loyalty. Users have a high investment in both time and emotion. Revenue can be based on the sale of ancillary products and services or voluntary contributions; or revenue may be tied to contextual advertising and subscriptions for premium services. The Internet is inherently suited to community business models and today this is one of the more fertile areas of development, as seen in rise of social networking. (Rappa, n.d.) Examples of successful community models include platforms like Reddit, where niche communities discuss specific interests, and brands like LEGO, which has a strong community of enthusiasts who share their creations and ideas.
E-auction	Electronic auctions replicate traditional bidding mechanisms online, often enhanced by multimedia presentations of goods. Beyond bidding, they integrate contracting, payments, and delivery. Auction providers earn revenue through platform sales, transaction fees, and advertising. Suppliers and buyers benefit from increased efficiency, time savings, and global sourcing, with no physical transport needed until a deal is finalized. Suppliers reduce surplus stock, optimize production capacity, and lower sales costs, while buyers save on purchasing overheads and benefit from lower costs of goods or services. (Timmers, 1998)

e-Mall	The term e-mall is used inconsistently. For example, it is stated that e-malls can also be managed under a brand name, whereby a coherent identity is created, and the e-mall's reputation helps to attract customers. Here, e-Mall is understood as a platform that merely combines e-shops, which have been grouped together based on a certain characteristic (e.g. shops selling products of a region or a predefined product group), on one homepage. However, customers choose the e-shop of their choice by clicking on it, whereupon all other processes are handled by the e-shop without the involvement of the e-Mall.
E-procurement	Electronic tendering and procurement enable organizations to source goods and services online, offering a broader supplier pool for lower costs, better quality, and improved delivery. Benefits include reduced procurement costs through downloadable tender specifications and enhanced efficiency via electronic negotiation and collaborative specification work. Suppliers gain from increased tendering opportunities, global reach, and lower submission costs, with potential support for smaller enterprises and collaborative bids. (Timmers, 1998)
E-Shop Manufacturer (Direct) Model	This is Web marketing of a company or a shop. In first instance this is done to promote the company and its goods or services. Increasingly added is the possibility to order and possibly to pay, often combined with traditional marketing channels. (Timmers, 1998) Companies benefit from increased demand, cost-effective global reach, and reduced promotional expenses, while customers enjoy lower prices, greater convenience, and 24/7 availability. The direct manufacturer model leverages the web to bypass intermediaries, enhancing efficiency, customer service, and insights into customer preferences.
Infomediary model Information brokerage, trust and other services	Data about consumers and their consumption habits are valuable, especially when that information is carefully analysed and used to target marketing campaigns. Independently collected data about producers and their products are useful to consumers when considering a purchase. Some firms function as infomediaries (information intermediaries) assisting buyers and/or sellers understand a given market. (Rappa, n.d.) New information services are emerging to enhance data from open networks and business operations, offering tools like information search, customer profiling, and investment advice. These services are typically monetized through subscriptions, pay-per-use fees, or advertising.
Value-chain integrators	These focus on integrating multiple steps of the value chain, with the potential to exploit the information flow between those steps as further added value. Revenues are coming from consultancy fees or possibly transaction fees. (Timmers, 1998) An eCommerce platform like Amazon acts as a value chain integrator by managing everything from warehousing and inventory management to order fulfilment and customer service.

Value-chain service provider	A value chain service provider in eCommerce specializes in optimizing specific stages of the value chain, such as payments or logistics, to enhance efficiency and customer satisfaction. Banks and new intermediaries, leveraging networks and expertise in areas like production management, exemplify this model. Revenue is typically generated through fees or percentage-based schemes, with platforms like Shopify offering tools for online store creation, order management, and marketing. (Timmers, 1998)
Virtual Community	Virtual communities derive value from members who contribute information, with revenue generated through membership fees and advertising. They enhance marketing by fostering customer loyalty and feedback. For example, Amazon enables users to customize experiences, write reviews, upload images, and share products. (Timmers, 1998)
Search Agents	Search agents are AI-driven platforms that search multiple e-commerce sites to help customers find products and services, offering a convenient and comprehensive shopping experience. They enable users to compare prices and features on one platform instead of browsing numerous websites. Beyond e-commerce, platforms like LinkedIn use search agents to match employees with jobs and companies with talent based on profiles and preferences. (DIGITALENTERPRISE, n.d.)

Table 9 Business models

In view of the present project, the different business models were subjected to further examination. In doing so, all those were eliminated whose business field revolves exclusively around the transfer of information or data. Five models were identified that affect the trade in physical goods, one of which, e-procurement, applies exclusively to business customers and was therefore not considered suitable for the study.

The four business models relevant to this project are therefore:

- 3rd Party Marketplace / Brokerage model / Online marketplace;
- Community model;
- E-auction;
- E-Shop / Manufacturer (Direct) Model.

4.2 Core elements of the e-commerce ecosystems

Current data shows that online marketplaces are playing a dominant role in e-commerce. According to forecasts, 59% of global online sales will be made via online marketplaces by 2027 (Edge by Ascential, 2022).

Currently more than 75% of the Europeans between 16 and 74 use the internet for purchasing online. (see Figure 1)

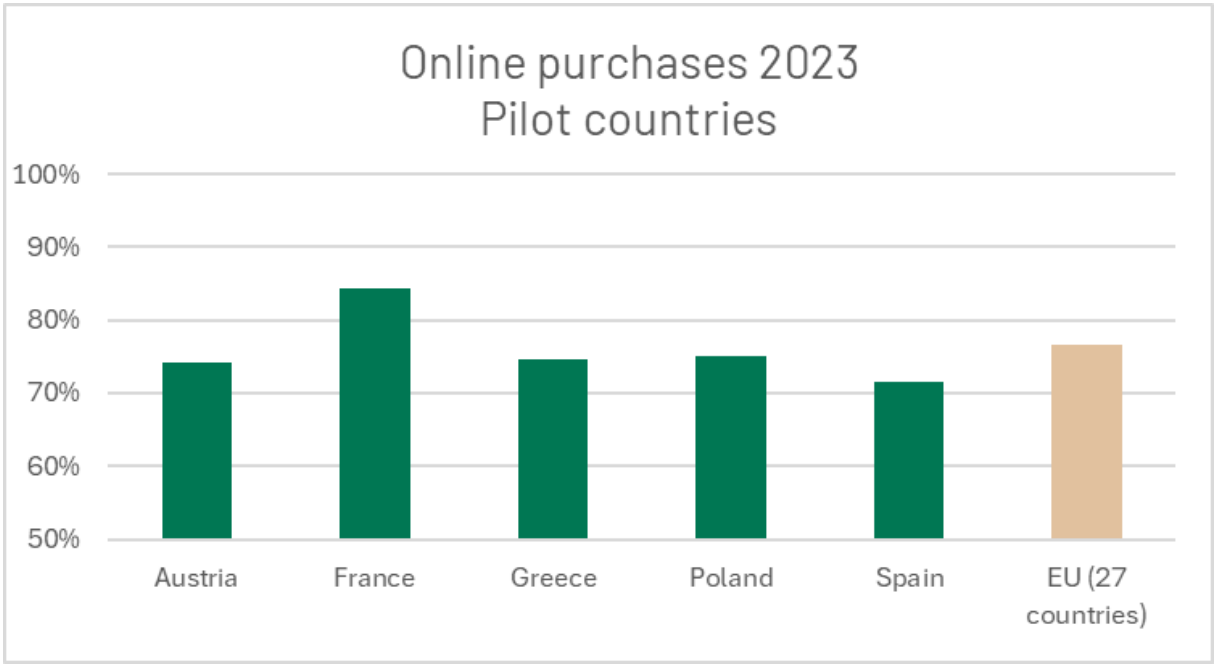

Figure 1 Percentage of 16–74-year-olds having used the internet in the last year

Source: EUROSTAT

In Germany, the 1,000 online shops with the highest turnover generated a total revenue of €68.8 billion in 2020, with marketplaces accounting for a significant share (EHI Retail Institute, 2021).

By comparison, community models, e-auctions and independent e-shops play a minor role in the total volume of online retail. For this reason, the main focus was subsequently placed on the processing of online marketplaces.

Three main application blocks can be distinguished – the process in the online shop, the administration of the customer and the physical procedure of goods' distribution (see Figure **2**):

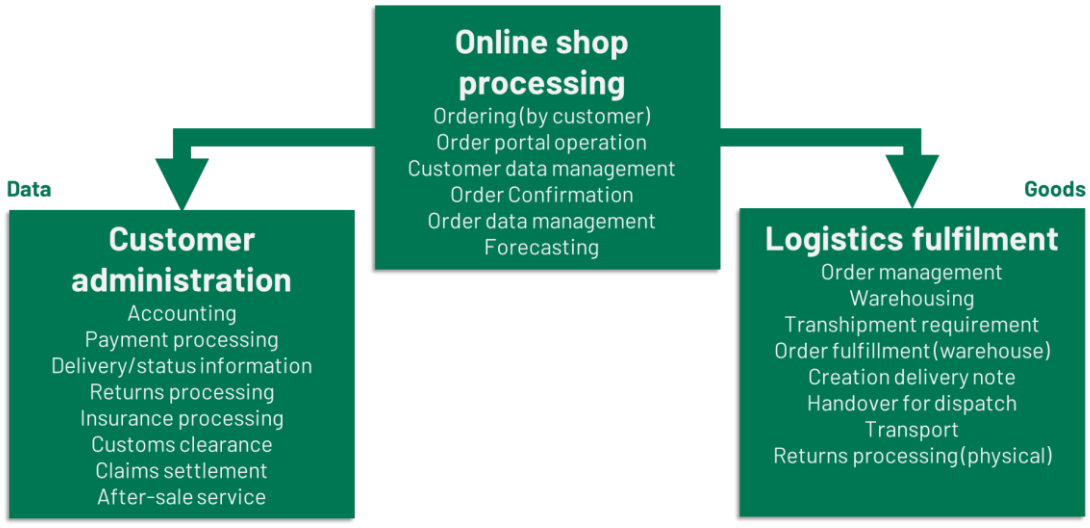

Figure 2 Operational elements of the e-commerce ecosystem

4.2.1 Online shop processing

The e-commerce process begins with the customer placing an order in an online shop. The customer has to select the goods and enter their data. This involves interaction between the online shop and the customer, but no further processing of the order takes place. (see Table 10)

Process element	Description
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc. - – check in as well as check out
Customer data management	Storage and forwarding of personal data for order acceptance and further execution
Order Confirmation	Confirmation to the customer that payment has been made and item is available
Order data management	Storage and forwarding of product-related data to the correct recipients
Forecasting	Quantity estimation for future periods

Table 10 Process steps in online shop processing

The processes in the background are only initiated after the purchase order has been completed. A distinction can then be made between the exchange of information and the flow of goods.

4.2.2 Customer administration

After the purchase, a chain of information flows is set in motion, which, depending on the type of business, includes some or all of the following elements. (see Table 11)

Process element	Description
Financial execution	
Accounting	Financial payment processing in the online shop (crediting, allocation of payment to the order, etc.)
Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses
Logistics processing – Information flow	
Fulfilment status information	Providing information/updates that goods are ready for collection.
Delivery status information	Providing information/updates about the expected delivery date.
Returns processing	Handling the data concerning the return of products from customers.

Further use cases, depending on the type of business	
Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.
Customs clearance	Process of getting goods approved by customs authorities for import or export
Claims settlement	Resolving customer claims for issues like lost or damaged goods
After-sale service	Marketing, customer loyalty programme, product and/or service assessment

Table 11 Process steps in customer administration

4.2.3 Logistics fulfilment

The flow of goods is handled in parallel with the flow of information. This includes: (see Table 12)

Process element	Description
Order management	Processing after receipt of order in the warehouse; order entry and confirmation
Warehousing	Securing the availability of goods through warehousing.
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.
Order fulfilment (warehouse)	Picking, packing, labelling, etc. and confirmation to web shop
Creation delivery note	
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.
Last Mile Transport	
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items

Table 12 Process steps in logistics fulfilment

5. E-commerce ecosystem of the pilots

The project pilots will now be presented in a unified format. This includes: a responsibility matrix based on the RASCI method, which provides insight into the roles and operations of the participating web shops. The elements identified in the previous chapters will be used therefore, among other things; a geographical map illustrating the area of observation; and a comprehensive overview of the legal restrictions applicable to that region, outlining the relevant limitations and regulations.

5.1 The RASCI method

The RASCI method, also known as Responsibility Charting, is an extension of the RACI model, both of which serve as tools to define and clarify roles and responsibilities within teams or organisations and to show mutual interaction and interfaces between the stakeholders involved. This system dynamic approach helps to understand, model and analyse the behaviour of complex systems and focuses on interactions among system components and supports. Changes in systems or organization that will occur during the project can be clearly outlined with the help of the method. In the present project, the matrix could be used to compare the newly developed business models with the previous methods in a standardised and comprehensible way, clearly showing changes in approach and responsibility.

Applying the RASCI method involves a structured and systematic approach to clearly define roles and responsibilities within a workflow. Outlining who is responsible for specific tasks and decisions helps to ensure that all aspects of a process are addressed. It is particularly effective for eliminating ambiguity in processes, promoting accountability and improving communication in cross-functional projects or complex organisational workflows.

The definition of the roles is basically predetermined but can be adapted to the type of organisation in which the RASCI method is applied. For the present project, the abbreviations stand for the following roles (see Table 13):

		Description
R	Responsible	Position or entity **directly executing the task** This position or entity is responsible for the actual realisation/completion of a specific task or activity (implementation responsibility). This is also interpreted as responsibility in a disciplinary sense.
A	Accountable	Position or entity being the **ultimate decision-maker Bears the accountability for the successful completion of a task or activity.** This member is the one who signs/authorizes. Only one accountable member is possible per task, without this role this task is not conclusively defined. The accountable can be the responsible at the same time. In this case use "accountable" for the description.
S	Support	Position or entity **providing necessary resources and assistance** in a task

		Support those responsible for completing a task or project. In contrast to C (Consulted), which primarily contributes knowledge, S (Support) is usually seen as a role that actively takes work off the R (Responsible).
C	Consulted	Position or entity involved in **providing input, feedback, or subject matter expertise** They may not be directly involved in the implementation but have relevant information for the implementation and should or must therefore be interviewed.
I	Informed	Position or entity being **kept updated on progress** Individuals or groups who need to be kept updated on the progress, decisions and outcomes of a project or initiative or who are authorized to get information.

Table 13 Description of competences

The process of using the matrix begins by identifying the key activities or business process steps to be represented in a diagram. This includes listing key tasks, decisions or milestones, which can range from specific project deliverables to routine operational activities. Next, it is important to list the roles or participants involved. Rather than focusing on specific individuals, the emphasis should be on roles, job titles or even institutions to ensure that the diagram remains relevant even when personnel change. Their tasks are clearly defined (by role descriptions, business scope, etc.), which means that tasks continue to be carried out even if the people performing them change.

Once the roles are established, the next step is to assign RASCI roles to each key activity or business process step. This includes determining who is responsible, accountable, supporting, consulted and informed for each task. The process typically starts by assigning the 'responsible' and 'accountable' roles first, as these are most important. Then, the 'support', 'consult' and 'inform' roles are added as needed.

The diagram ensures an understanding of responsibilities and enables feedback or revisions. Knowledge of responsibilities and interdependence within organizations is not only important in day-to-day operations but also essential when changing procedures and processes. (Smith, 2005)

The RASCI method offers several advantages, including:

- Improved clarity and understanding of roles within processes;
- Enhanced accountability by ensuring each task has a designated "Accountable" person or organization;
- Streamlined communication by avoiding unnecessary consultations or updates;
- Prevention of overlap or redundancy in responsibilities;
- Identification of the points of contact for process changes.

Since all the steps in the e-commerce supply chain have been defined and the stakeholders involved in the operational processes have been identified, all the necessary elements

for describing an e-commerce use case are now in place. Following the RASCI methodology, all process elements are now listed vertically, while all stakeholders directly involved are mapped horizontally in the matrix. This approach enables a clear identification of roles and responsibilities within the web shops of the respective pilots. (see Table 14)

GreenTurn Pilot Name Country Webshop: Name	RESPONSIBILITY MATRIX 1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions
ONLINE SHOP							
Ordering							
Order portal operation							
...							
CUSTOMER ADMINISTRATION							
Accounting							
Payment processing							
...							

Table 14 RASCI Matrix – excerpt

For legal reasons, the names of the web shop operators are subsequently anonymised, but they are known to the project team.

5.2 Fashion eco-route (Poznan, Poland)

5.2.1 Pilot description

Pilot overview

INPO is a Polish LSP with an international presence. In Poland, INPO provides a network of more than 20k parcel lockers, as well as courier services and e-commerce support for more than 10M app users, 17M end users, and more than 40 profiles. MODIVO is a fashion retailer present in more than 20 European countries. In Poland, the company has more than 8M clients and 1M app users.

This pilot will co-develop and implement together with retailer, customers, and the public authority an efficient, low-carbon system for B2C e-commerce deliveries and returns in Poznan, Poland.

Currently, INPO handles an average of >11k MODIVO packages from 8k users per month in the city.

Objectives and activities planned

1) Development of a set of zero-emission delivery and return options, matching behavioural interventions (including incentives and nudges to return reusable packaging) with different customer profiles for comparable prices and convenience.

2) Implementation of a low-emission logistics system that goes beyond the last mile, targeting the entire supply chain via different elements that reduce emissions and traffic congestion (electric trucks to deliver packages to hubs in urban areas; multifunctional and energy-efficient hubs allowing transhipment, collection and delivery, and returns; e-cargo bikes for home deliveries; reusable packaging – up to 10 cycles, made from certified eco-friendly, fully recyclable materials)

3) Evaluation via modelling how changes in price affect demand & shorter time windows influence willingness to pay

4) Involvement of the City of Poznan to co-develop policy levers and regulations to influence greener choices of delivery and returns, while also ensuring designed solutions are aligned to the city's sustainable urban mobility policies.

5.2.2 Web shops

GreenTurn Pilot Poland Webshop: PL1			RESPONSIBILITY MATRIX							
			1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP										
	Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	R	A						On the Webshop platform or via the app, the customer buys second-hand items from the "closets" of other registered users.
	Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.							A	The webshop ensures the functionality of the portal, including payments, interfaces, and registration.
	Customer data management	Storage and forwarding of personal data for order acceptance and further execution						R	A	
	Order Confirmation	Confirmation to the customer that payment has been made and item is available	I	R				I	A	The seller ultimately confirms or rejects the lower price proposal, and can cancel the sale if he changes his mind.
	Order data management	Storage and forwarding of product-related data to the correct recipients	R	R					A	The online platform stores product data on user profiles.
	Forecasting	Quantity estimation for future periods	C					S	A	
CUSTOMER ADMINISTRATION										
Financial	Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)							A	The webshop has statutory prices for buyer protection and delivery dependent on shipment size and value.
Financial	Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I					S	A	The webshop collaborates with payment operators (e.g., Google Pay, Przelewy24, Apple Pay) for smooth transactions.
Logistics	Fullfillment status information	Providing information/updates that goods are ready for collection.	I					R	A	The parcel company sends a notification about the time of delivery to the recipient.
Logistics	Delivery status information	Providing information/updates about the expected delivery date.	I					A		The webshop sends delivery status notifications independently of the information sent by the delivery company.
Logistics	Returns processing	Handling the data concerning the return of products from customers.	R	A						In order to return products, the customer must make a remark to the seller via the webshop platform.
Service	Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.							A	The webshop offers assistance in case of delivery problems, and in some cases refunds the amount owed to the buyer by the dishonest seller.
Service	Customs clearance	Process of getting goods approved by customs authorities for import or export						A	S	
Service	Claims settlement	Resolving customer claims for issues like lost or damaged goods	I	A					S	Claims are made to a specific seller (user) through the webshop platform.
Service	After-sale service	Marketing, customer loyalty programme, product and/or service assessment	C	S				S	A	The webshop advertises its services on popular social media and well-known sites. The platform also takes care of evaluating products and sellers after a
LOGISTICS										
	Order management	Processing after receipt of order in the warehouse; order entry and confirmation		A					S	After receiving the order, the seller has a certain number of days to pack the item and ship it.
	Warehousing	Securing the availability of goods through warehousing.		A						Storage of items is usually done at the seller's home.
	Transhipment requirement	Securing the availability of goods by organising cross-docking processes.						A		If cross-docking operations take place it is usually after the order has been transferred to the logistics operator.
	Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop	I	A					I	The seller packs the order himself and takes it to the parcel point.
	Creation delivery note			R				A	I	
	Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.	I	A						At the point of shipment, the seller scans the package and leaves it at the shop or in the parcel locker.
	Last Mile Transport							A	I	
	Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items	I	R				A	S	Returns involve the platform, the logistics operator and the seller, who must physically pick up the item from the parcel or delivery point.

Table 15 RASCI Matrix PL1

GreenTurn Pilot Poland Webshop: PL2		RESPONSIBILITY MATRIX							
		1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
	Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	R				A		Orders are made via the webshop platform or app.
	Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.						A	The site allows you to register and track the status of your shipment.
	Customer data management	Storage and forwarding of personal data for order acceptance and further execution						A	The personal account stores the data of customers and their orders.
	Order Confirmation	Confirmation to the customer that payment has been made and item is available	I					A	Automated confirmation emails are sent to customers upon successful orders.
	Order data management	Storage and forwarding of product-related data to the correct recipients				R		A	
	Forecasting	Quantity estimation for future periods	C			A			Manufacturers are engaged in forecasting future trends. Customers can be asked for their opinions on preferences.
CUSTOMER ADMINISTRATION									
Financial	Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)					R		A	The webshop handles financial agreements, including payment settlements.
Financial	Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses					R		A	The webshop offers various payment methods such as PayU, PayPal, debit card, BLIK.
Logistics	Fullfillment status information	Providing information/updates that goods are ready for collection.	I				A		I	Customers are updated on the order status through the webshop app or email notifications.
Logistics	Delivery status information	Providing information/updates about the expected delivery date.	I				S	A		Real-time delivery tracking is provided via integration with logistics partners.
Logistics	Returns processing	Handling the data concerning the return of products from customers.					S		A	The company offers transparent ways to return goods. The return process differs depending on the selected delivery method (the selected logistics provider).
Service	Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.						S	A	The platform handles all complaints and requests. If they concern delivery, the company works with logistics operators.
Service	Customs clearance	Process of getting goods approved by customs authorities for import or export						A	S	
Service	Claims settlement	Resolving customer claims for issues like lost or damaged goods	I					S	A	
Service	After-sale service	Marketing, customer loyalty programme, product and/or service assessment	C				S		A	The company cares about customer relations through evaluations, surveys.
LOGISTICS									
	Order management	Processing after receipt of order in the warehouse; order entry and confirmation					A		S	The webshop integrates operations at the warehouse and logistics operators to ensure a smooth flow of information and goods.
	Warehousing	Securing the availability of goods through warehousing.					A			The warehouse prepares the goods for shipment to the customer.
	Transhipment requirement	Securing the availability of goods by organising cross-docking processes.					A			
	Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop					A		I	Preparation of the order for shipment and transfer of information to the online store.
	Creation delivery note						A		I	
	Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.						A	I	
	Last Mile Transport							A	I	Each step of the activity is communicated to the online store, which sends notifications to the customer.
	Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items	I					A	S	The return is handled by a logistics partner that works in cooperation with the webshop. Information about the status is transmitted to the customer.

Table 16 RASCI Matrix PL2

5.2.3 Local Restrictions in Poznan

Legal restrictions in Poland			
NO.	TYPE	DESCRIPTION	SOURCE
1	**Information obligations of the entrepreneur**	The trader is obliged to clearly inform the consumer about the delivery details before concluding the transaction (delivery costs, shipping method, lead time).	Art. 12 - [Information Obligations of Entrepreneurs in Contracts Concluded Remotely or Outside Business Premises] - Consumer Rights Act
2	**Delivery time**	The delivery time according to Polish law is 30 days from the date of signing the contract (unless the sides agreed otherwise). Not keeping the deadline allows the consumer to cancel the contract.	Art. 543^1 - [Consumer Sales] - Civil Code
3	**Personal data protection**	Customer data must be processed in accordance with the GDPR, i.e. data processing must be confirmed by agreement, and data storage must be secured against leakage.	Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation - GDPR)
4	**Cross-border supply regulations**	When supplying from outside Poland, it is necessary to comply with customs and tax regulations, such as VAT and customs duties.	Act of March 19, 2004 - Customs Law
5	**Special restrictions on holidays and Sundays**	Poland bans trading on holidays and Sundays, and this limits the ability to make deliveries on those days.	Act of January 10, 2018 - On the Restriction of Trade on Sundays, Public Holidays, and Certain Other Days
6	**Clean Transportation Zones**	The law on electromobility and alternative fuels, introduced the possibility of establishing clean transport zones in cities. Polish cities are interested in the idea of introducing clean transport zones. Warsaw has introduced this project and established rules for its operation, based on a resolution issued on December 7, 2023.	Art. 39 - act of January 11, 2018 - electromobility and alternative fuels; Resolution No. XCI/2974/2023 of the Council of the Capital City of Warsaw
7	**Restrictions due to weather conditions**	The occurrence of extreme weather conditions may interfere with delivery, and relevant services have the ability to impose temporary traffic restrictions.	Act of June 20, 1997 - Road Traffic Law

Table 17 Legal restrictions Poland

Barriers in Poznań			
NO.	TYPE	DESCRIPTION	SOURCE
8	**Tonnage restrictions**	In the city of Poznań there are restrictions related to the maximum permissible total weight of vehicles. In the strict center- 3.5t.	Road Administration in Poznań: https://zdm.poznan.pl/dowiedz-sie-wiecej-ograniczenia-dla-pojazdow-ciezarowych Link to visualization: https://www.poznan.pl/mim/plan/plan.html?mtype=roads
9	**Paid Parking Zones**	The city center is covered by a paid parking zone on certain days (Mon-Sat).	Road Administration in Poznań- Parking https://zdm.poznan.pl/cennik-oplat-od-01-07-2
10	**Temporary traffic limitations**	Poznan hosts many mass events that paralyze traffic in the city. Currently, the pre-Christmas period brings together a large group of people at the Poznań Christmas market, leading to possible restrictions for drivers on the streets in the center.	https://epoznan.pl/news-news-157431-miasto_zapowiada_mozliwe_ograniczenia_dla_kierowcow_na_ulicach_w_centrum_w_trakcie_przedswiatecznych_weekendow
11	**Tempo 30 Zone**	This is a traffic calmed zone, with a speed limit of 30km/h in the city center. In the city center, the so-called Tempo 30 Zone has been introduced on a number of streets. In Poznan, a zone of residence is also used, where pedestrians have priority and a maximum speed of 20 km/h applies.	Road Administration in Poznań https://zdm.poznan.pl/web/aktualnosci/view/id/Jak+porusza%C4%87+si%C4%99+po+strefie+Tempo+30 Link to visualization: https://poznan.wyborcza.pl/poznan/7,36001,21357734,drogowa-rewolucja-wokol-starego-rynku-strefa-tempo-30-sie-rozrasta.html
12	**Delivery envelopes**	The city has designated envelopes for deliveries. The delivery envelopes are a solution aimed at businesses. Parking on them is time-limited, i.e. up to 15 minutes, and only possible with a purchased badge and parking clock. Currently, there are more than 100 delivery envelopes in the Paid Parking Zone and the Downtown Paid Parking Zone.	Road Administration in Poznań https://zdm.poznan.pl/koperty-dla-dostaw, based on resolution No. XXVIII/497/VIII/2020 of the Poznan City Council, link: https://bip.poznan.pl/bip/uchwaly/uchwala-nr-xxviii-497-viii-2020-z-dnia-2020-05-19,81766/
13	**Restriction of entry to the old market square**	Vehicles can enter the old market from 6:00 a.m. to 10:00 a.m. Access is limited by posts that block entry outside the indicated hours. Entry at other hours is possible only if special permission is received from the Road Administration in Poznań, only in justified cases.	Road Administration in Poznań: https://zdm.poznan.pl/aktualnosc/wjazd-na-stary-rynek-od-1-pazdziernika

Table 18 Legal barriers Poznan

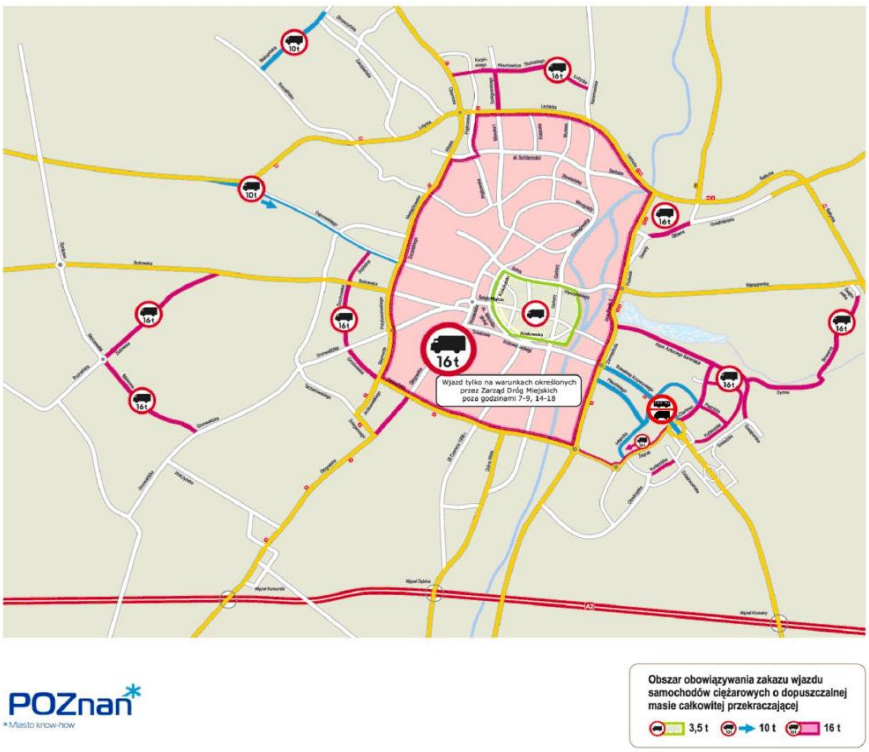

Figure 3 Tonnage restrictions Poznan

Source: https://www.um.poznan.pl/mim/plan/plan.html?mtype=roads

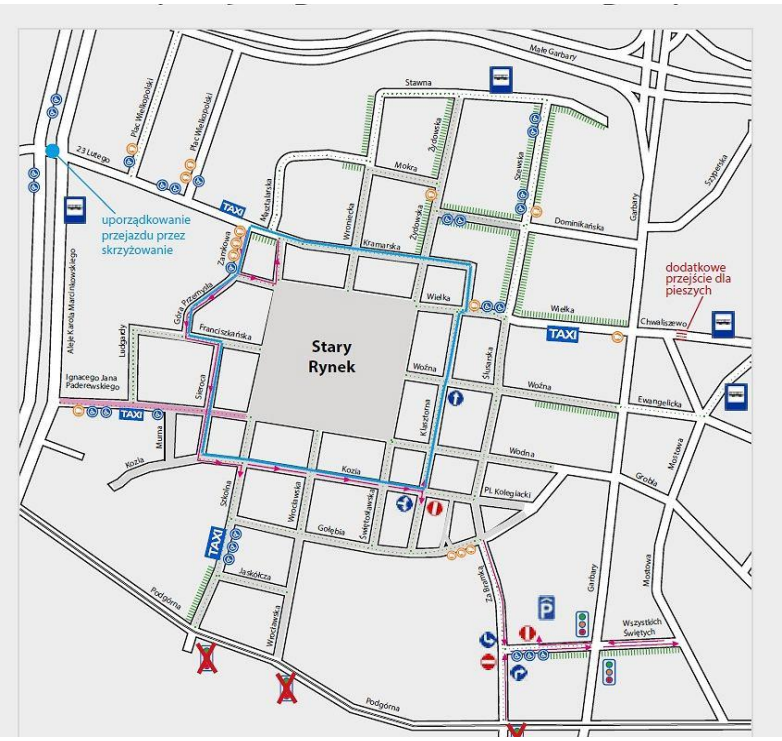

Figure 4 Speed limit zone (30 km/h)

Source: Zarząd Dróg Miejskich w Poznaniu

5.2.4 Catchment Area for Deliveries

The following maps show the districts of Poznan and the distribution of deliveries by district as well as one of the three InPost Hubs. (see Figure 5) and the locations of the Parcel points and all three InPost Hubs. (see Figure 6)

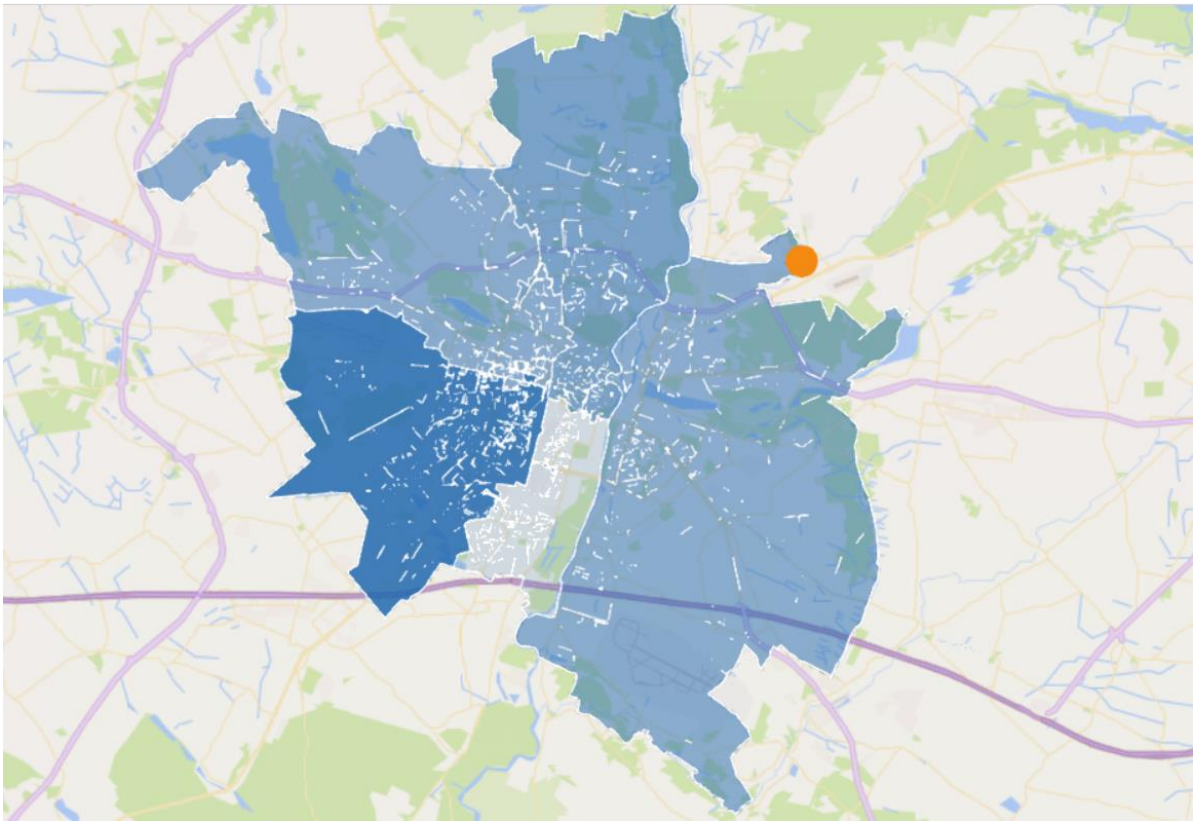

Figure 5 Delivery area Fashion eco-route

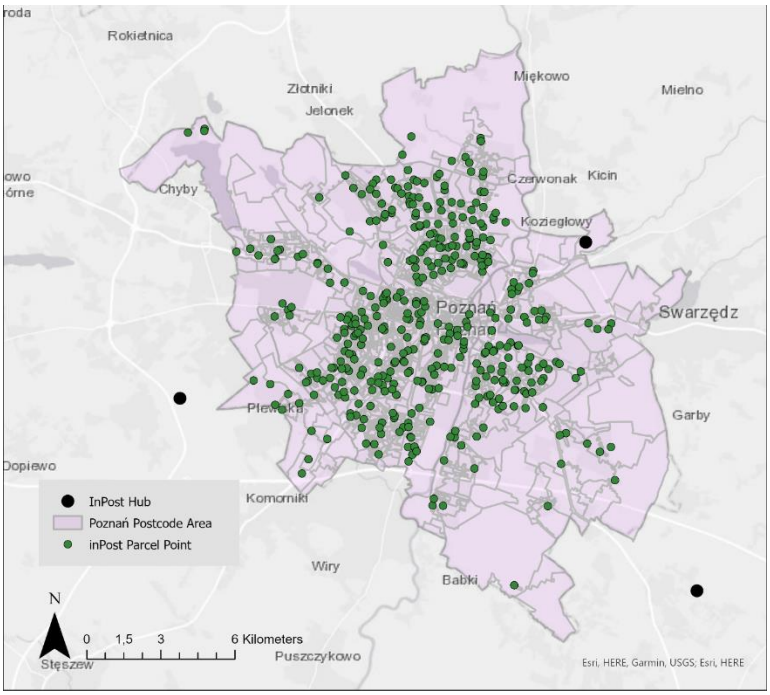

Figure 6 Parcel Points and Hubs Poznan

5.3 Sustain-Swap (Lyon, France)

5.3.1 Pilot description

Pilot overview

INPO will collaborate with Vinted, an online marketplace for re-commerce which allows buying, selling, and exchanging second-hand items, including clothing, accessories, homeware, books, games, and toys. Vinted has a growing member base of over 80M members spanning 18 countries in Europe and North America. In Poland, the company has 7M users, while in France it has over 12M users. Shopping is not limited to national boundaries, and users can purchase items from any other country where Vinted operates. This pilot will explore C2C re-commerce, comparing cultural and geographic specificities of Polish (Poznań) and French (Lyon) markets. Currently, INPO handles an average of >30k Vinted packages from >13k users per month just in Poznań.

Objectives and activities planned

1) Understanding of the specificities of the re-commerce market, the stakeholders' needs and preferences in France (including customers, retailers, and public authorities), by comparing it with Poland;
2) Establishment of collaborations between the cities of Poznan and Lyon, to exchange best practices on policy interventions that can incentivise greener delivery and return options;
3) Development a roadmap for implementation of solutions in Lyon for INPO.

5.3.2 Local Restrictions in Lyon

LEGAL RESTRICTIONS IN FRANCE			
NO.	**TYPE**	**DESCRIPTION**	**SOURCES**
1	Low emission zones (ZFE - Zones à Faibles Émissions)	Low-emission mobility (ZFE) zones are a state-supported system aimed at reducing emissions, especially in large cities, to improve air quality. In France, ZFE zones are based on the Crit'Air vignette system.	Article L221-1- Environmental Code Directive 2008/50/EC of the European Parliament and of the Council of May 21, 2008 on ambient air quality and clean air for Europe
2	Crit'Air environmental badges	France has introduced a total of six types of environmental badges. At first glance, they differ mainly in color. They place the vehicle in one of six categories depending on the level of pollution and allow police in the environmental zone to easily inspect it.	https://tiny.pl/d93f6qt3
3	Tonnage restrictions	Restrictions for trucks over 7.5 tons apply throughout the country: - on Saturdays and days before holidays: from 22:00 to 00:00; - on Sundays and holidays: from 00:00 to 22:00.	https://inelo.pl/zakaz-jazdy-francja/ https://www.cargopedia.pl/ograniczenia-jazdy-ciezarowka

4	Permissible total weight	From October 01, 2025, new rules will come into effect in France, under which vehicles older than Euro 6 will have a four-ton lower gross vehicle weight limit. At that time, the 44-ton gross vehicle weight limit, commonly used in French national transportation, will start to apply only to vehicles first registered after January 1, 2014.	Traffic regulations Chapter II: Weight and dimensions (Articles R312-1 to R312-25) https://pisil.pl/w-francji-obnizenie-dmc-dla-ciezarowek-euro-5/ https://trans.info/pl/francja-ciezarowki-ofni-399233
5	Personal data protection	Customer data must be processed in accordance with the GDPR, i.e. data processing must be confirmed by agreement, and data storage must be secured against leakage.	Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation - GDPR)
6	French consumer law	Logistics companies must provide customers with clear and transparent information about delivery terms (e.g., lead time, costs, complaint procedure).	Consumer Code Article L111-1, Article L111-2, Article L221-5, Article L221-11
7	Speed limits for heavy vehicles	The speed of vehicles with a maximum permissible weight exceeding 3.5 tons or combinations of vehicles with a maximum permissible weight exceeding 3.5 tons, except for public transport vehicles, is limited: to 90 km/h on highways; to 80 km/h on priority roads/ dual carriageways; to 50 km/h in built-up areas.	Road Code - Article R413-8 https://tiny.pl/np80gst8
8	Noise emission regulations	The country has implemented policies that are both preventive and treatment in the field of land and air transportation. Specific noise protection obligations are imposed on all owners of land transportation infrastructure. These concern the content of impact studies, the protection goals to be achieved, and the measures of protection to be applied to achieve them.	Environmental Code, Chapter II: Assessment, prevention and reduction of environmental noise (Articles L572-1 to L572-11) Directive 2002/49/EC of the European Parliament and of the Council of June 25, 2002 relating to the assessment and management of environmental noise levels

			https://www.ecologie.gouv.fr/politiques-publiques/bruit-nuisances-sonores-pollution-sonore

Table 19 Legal restrictions in France

BARRIERS IN LYON			
NO.	**TYPE**	**DESCRIPTION**	**SOURCES**
9	Degree of smog danger (emergency low-emissions zone- ZPA)	Reaching a high level of smog alert, drivers with high Crit'Air environmental badge numbers cannot legally drive in the Lyon city area.	https://www.environmentalbadge.com/ecological-zone-lyon/ https://mairie2.lyon.fr/actualite/deplacements/circulation-differenciee-la-vignette-critair
10	Ban diesel vehicles registered before 2011 and gasoline vehicles registered before 2006 from driving in the city	From January 1, 2025, vehicles with the Crit'Air 3 environmental sticker will be banned in Greater Lyon, as will the already excluded Crit'Air 4, Crit'Air 5 and unclassified cars.	Act of August 22, 2021 on combating climate change and increasing resilience to its effects https://tiny.pl/tvddkrm4 Interactive map: https://mobilites.grandlyon.com/carte?transportMode=voiture https://met.grandlyon.com/nouvelle-etape-pour-la-zfe-au-1er-janvier-2025/
11	Paid parking zones within the city	The city has one parking zone "UNO" for all users. The price is subject to change depending on the features of the vehicle.	Parking regulations in the Lyon municipality: https://www.lyon.fr/sites/lyonfr/files/content/documents/2024-06/2010rp25637-stationnement_abusif.pdf Fair and progressive paid street parking policy - May 30, 2024 Session https://www.lyon.fr/sites/lyonfr/files/content/documents/2024-

			06/20240530_d_24_0434_nvelle_politique_stat.pdf
12	ZTL limited traffic zone	Transit traffic is prohibited in the ZTL. The goal is to provide more space for pedestrians and cyclists to fully enjoy downtown Lyon in complete peace and quiet. Implementation will take place in June 2025.	"Presqu'île à Vivre" project https://jeparticipe.grandlyon.com/project/presquileavivreztl/presentation/je-minforme A link to a video promoting the project: https://www.youtube.com/watch?v=QUtEZRz29oM&t=14s

Table 20 Barriers in Lyon

5.3.3 Catchment Area for Deliveries

The following maps show the districts of Lyon and the distribution of deliveries by district (see Figure 7) and the locations of the Parcel points as well as the Mondial Relay Hub. (see Figure 8)

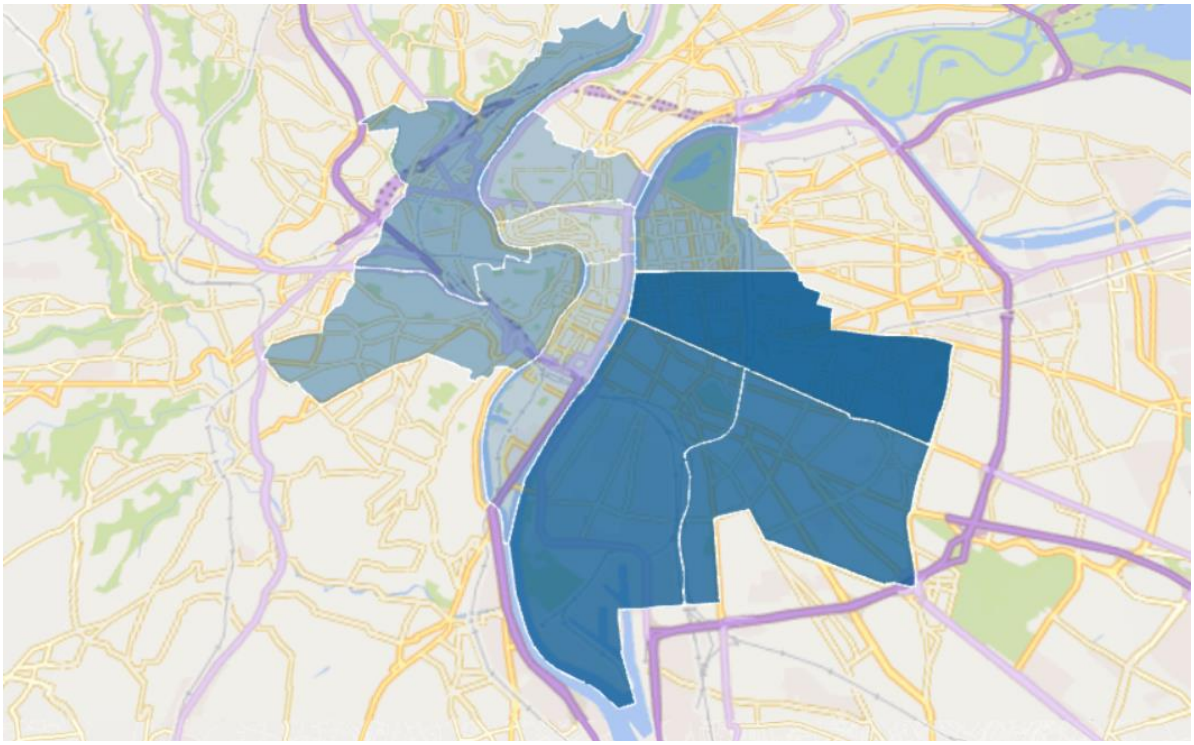

Figure 7 Delivery area Sustain Swap

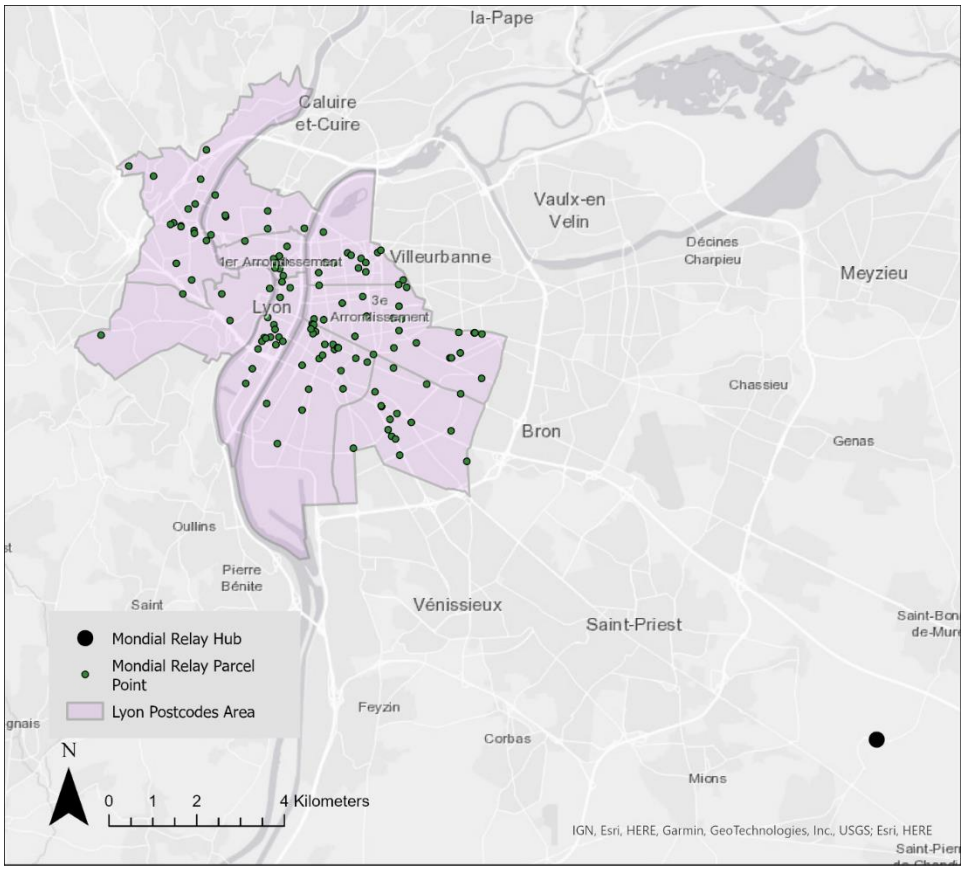

Figure 8 Parcel Points and Hubs Lyon

5.4 Electro Smart (Athens, Greece)

5.4.1 Pilot description

Pilot overview

LOK is a leading logistics service provider (LSP) in Greece providing among other services micro-picking and delivery/return operations for a significant number of e-shops in Greece. LOK is among the first LSPs to support quick commerce in this market by using a last-mile orchestration platform. The company has a total turnover of €11M (turnover of 2023 is expected). The pilot looks at B2C deliveries, focusing primarily on delivery points in the city centre of Athens. The municipality has introduced regulations that limit the entry of polluting delivery vehicles to specific night-time windows, determining LOK to develop zero-emission delivery and return models. LOK is now aiming to enhance communication with end-customers via its omnichannel distribution models that provides as well as to understand their preferences, needs, and willingness to pay.

Objectives and activities planned

This pilot will leverage LOK strategy to develop zero-emission delivery and return solutions. To this end, the pilot aims to:

1) Engage with customers via different channels (see below) to understand needs and preferences (e.g., home delivery vs. parcel locker);

2) increase transparency of operations and provide information on the environmental footprint of delivery and return choices;

3) co-develop behavioural interventions that can reduce the negative impact.

4) rely on an innovative delivery and return model combining electric vans (two Citroen Ami Cargo), and parcel lockers to optimise efficiency thanks to a last-mile orchestration platform that provides consumers with time slots and dynamically calculated CO2 emissions.

5) explore the possibility of integrating electric vehicle charging stations, helping LOK to align to the city's goal to create a Zero Emission Zone in the city centre (SUMP 2021) and to the National Climate Law.

The electric cars (Citroen Ami Cargo) will be used mainly during pilot testing in order to assess the proposed alternative models for sustainable & smart pick-up & delivery of products to end-customers. The vehicles will be purchased in the first year of the GreenTurn project, where initially some pre-pilots will take place in order to fine tuning the pilot scenarios. These vehicles will be used until the end of the project providing smart and sustainable deliveries and returns. They will also be covered with the logos of the EU and the project, disseminating in that way the scope & results of the project.

5.4.2 Web shops

GreenTurn **Pilot LOGIKA Greece** **Webshop: GR1**		RESPONSIBILITY MATRIX							
		1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.			A		S			This pilot focuses on B2B e-commerce operation. The "online shop" is managed by GR1 which is a Wholesaler in Greece. LOGIKA acts as 3PL operator and provides both storage & transport services
Customer data management	Storage and forwarding of personal data for order acceptance and further execution			A				I	
Order Confirmation	Confirmation to the customer that payment has been made and item is available	I		A		S		R	
Order data management	Storage and forwarding of product-related data to the correct recipients			A		I			
Forecasting	Quantity estimation for future periods			A	I	I			
CUSTOMER ADMINISTRATION									
Financial – Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)			A				I	
Financial – Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I		I		I		A	
Logistics – Fullfillment status information	Providing information/updates that goods are ready for collection.	I		R		A			
Logistics – Delivery status information	Providing information/updates about the expected delivery date.	I		I		A			LOGIKA acts as 3PL operator and provides both storage & transport services
Logistics – Returns processing	Handling the data concerning the return of products from customers.	I		A		R			
Service – Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.	I		A		R			LOGIKA provides an insurance to all products that are either stored or transported that covers loss,
Service – Customs clearance	Process of getting goods approved by customs authorities for import or export								Not applicable
Service – Claims settlement	Resolving customer claims for issues like lost or damaged goods	I		A		R		I	
Service – After-sale service	Marketing, customer loyalty programme, product and/or service assessment	I		A	R				
LOGISTICS									
Order management	Processing after receipt of order in the warehouse; order entry and confirmation			I		A			
Warehousing	Securing the availability of goods through warehousing.			A	S	R			
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.			I		A			
Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop			I		A			
Creation delivery note						A			
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.			I		A			
Last Mile Transport		C		I		A			
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items			S		A			

Table 21 RASCI Matrix GR1

GreenTurn Pilot LOGIKA Greece Webshop: GR2		RESPONSIBILITY MATRIX							
		1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.			A		S			This pilot focus on B2B e-commerce operation. The "online shop" is managed by GR2 Hellas which is a Wholesaler in Greece. LOGIKA acts as 3PL operator and provides both storage & transport services
Customer data management	Storage and forwarding of personal data for order acceptance and further execution			A				I	
Order Confirmation	Confirmation to the customer that payment has been made and item is available	I		A		S		R	
Order data management	Storage and forwarding of product-related data to the correct recipients			A		I			
Forecasting	Quantity estimation for future periods			A	I	I			
CUSTOMER ADMINISTRATION									
Financial: Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)			A				I	
Financial: Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I		I		I		A	
Logistics: Fullfillment status information	Providing information/updates that goods are ready for collection.	I		R		A			
Logistics: Delivery status information	Providing information/updates about the expected delivery date.	I		I		A			LOGIKA acts as 3PL operator and provides both storage & transport services
Logistics: Returns processing	Handling the data concerning the return of products from customers.	I		A		R			
Service: Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.	I		A		R			LOGIKA provides an insurance to all products that are either stored or transported that covers loss, damage, theft
Service: Customs clearance	Process of getting goods approved by customs authorities for import or export			A		R			LOGIKA provides also customs clearance services to its depositors/clients
Service: Claims settlement	Resolving customer claims for issues like lost or damaged goods	I		A		R		I	
Service: After-sale service	Marketing, customer loyalty programme, product and/or service assessment	I		A					
LOGISTICS									
Order management	Processing after receipt of order in the warehouse; order entry and confirmation			I		A			
Warehousing	Securing the availability of goods through warehousing.			A		R			
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.			I		A			
Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop			I		A			
Creation delivery note						A			
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.			I		A			
Last Mile Transport		C		I		A			
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items			S		A			

Table 22 RASCI Matrix GR2

5.4.3 Local Restrictions in Athens

Athens applies the "Daktylios" (Athens ring road), which restricts access to the city center based on the last number of the license plate (odd or even). Low-emission vehicles, such as electric or hybrid cars and Euro 6 diesel cars producing less than 120g/km of CO2, are exempt with a special permit. In addition, according to Greece's national climate law, all new taxis and one-

third of rental cars in Athens and Thessaloniki must be electric by 2025 to promote "sustainable urban mobility."

Furthermore, according to the decision titled "Determination of the hours for the supply of businesses, supermarkets and other stores and restriction of truck traffic" (decision number 177 of the Regional Council of Attica - Government Gazette B' 7084/31-12-2022), a time limit has been established for the traffic and supply of businesses, supermarkets, and other stores in the Municipality of Athens. These deliveries can only take place between 21:00 and 09:00 the following day using any type of truck. For the remaining hours, deliveries are limited to vehicles with a gross weight of up to two (2) tons.

The following are excluded from these restrictions:

1. State, Municipal, Public Utilities, and Public Utility Trucks;
2. Trucks transporting medicines and hospital equipment;
3. Trucks delivering daily and periodical press;
4. All-electric vehicles with a gross weight of up to 2.5 tons.

5.4.4 Catchment Area for Deliveries

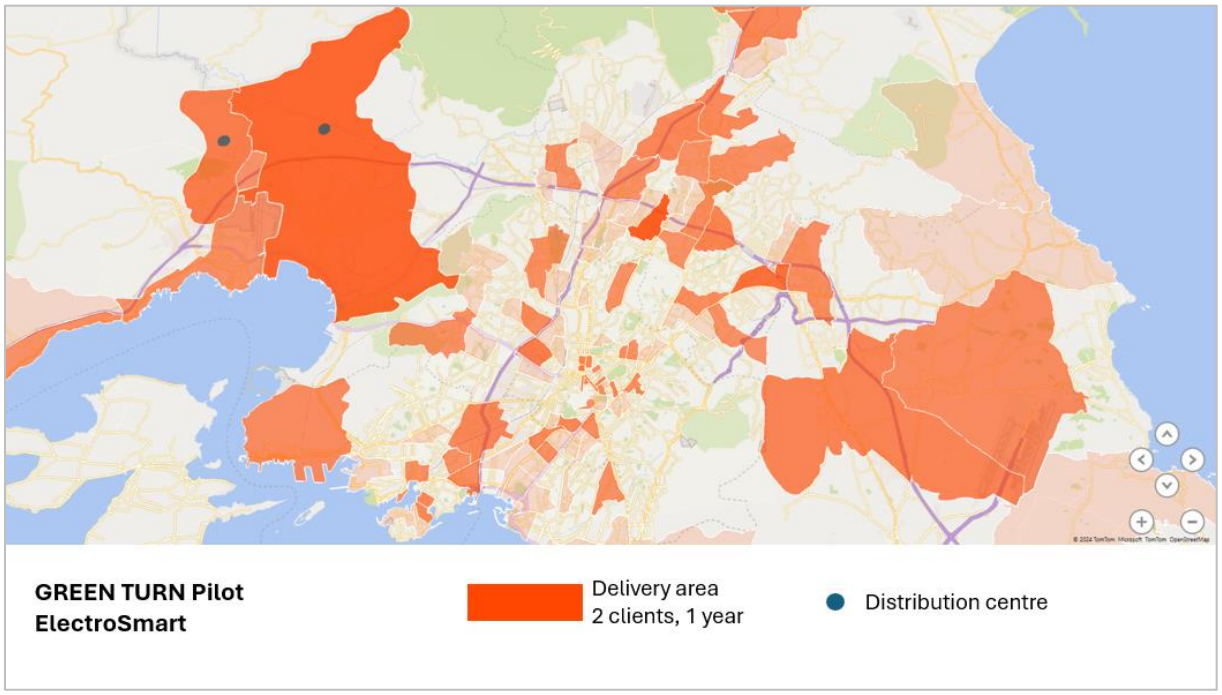

Figure 9 Distribution of deliveries in the past year

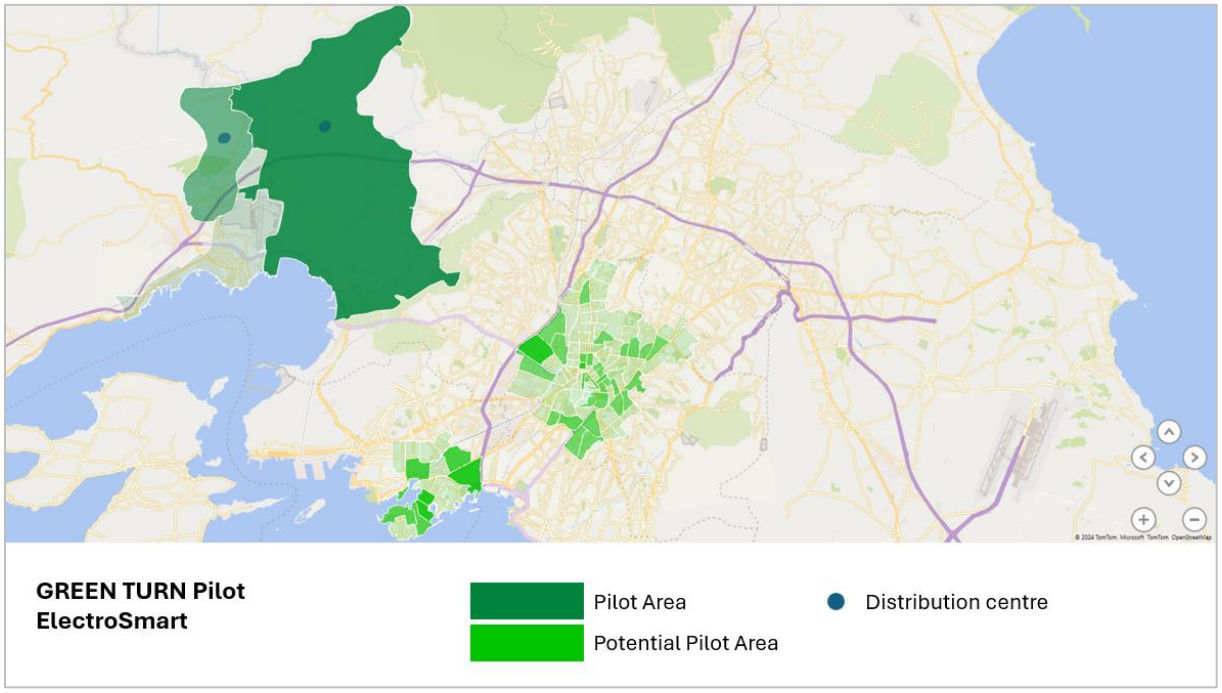

Figure 10 Pilot area (designated and potential)

5.5 LogPoint (Vienna, Austria)

5.5.1 Pilot description

Pilot overview

LOGP is a full-service intralogistics fulfilment provider, offering multiple modules for a tailor-made package for e-commerce businesses. LOGP will implement a marketplace pilot in Vienna, Austria, where it operates a City Logistics Hub that guarantees short and efficient links for cargo bikes and EVs. The company offers sustainable solutions, including zero emission delivery options, as well as optimized returns management that allow multiple cycles for (re)using packaging materials. The company business model includes 90% B2C and 10% B2B. 98% of all deliveries are parcels, with a majority of foods and beverages (92%), as well as pharmaceuticals and cosmetics (6%), and home furnishings (2%).

Objectives and activities planned

The pilot has a twofold aim

1) to work closely with retailers to develop a) behavioural interventions to change consumer behaviour, and b) best practices for transparent communication and awareness raising on logistics footprints

2) to reveal the customers' willingness and motivations to choose more sustainable delivery and return options when presented with information regarding a) available transport options, and b) reusable packaging materials.

The pilot illustrates the

1) operations of a white label quick e-commerce marketplace, in combination with

2) zero-emission delivery and sustainable return models, offering a

3) wider range of delivery and return options (e.g., cargo-bike, parcel locker, etc.) that customers can choose both through the marketplace and the associated retailers' web shops. Besides, the pilot will have a strong focus on locally produced/sourced goods and on short supply chains.

5.5.2 Web shops

GreenTurn Pilot LogPOINT Austria Webshop: AT1			RESPONSIBILITY MATRIX							
			1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP										
	Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
	Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.		A					S	
	Customer data management	Storage and forwarding of personal data for order acceptance and further execution		A					I	
	Order Confirmation	Confirmation to the customer that payment has been made and item is available	I	R			A		R	
	Order data management	Storage and forwarding of product-related data to the correct recipients		A			I			
	Forecasting	Quantity estimation for future periods		A	I	I	I	I		
CUSTOMER ADMINISTRATION										
Financial	Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)		A					I	(7) returns information
Financial	Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I	I					A	
Logistics	Fullfillment status information	Providing information/updates that goods are ready for collection.	I	R			A			
Logistics	Delivery status information	Providing information/updates about the expected delivery date.	I	R			R	A		(6) forwarding Trackinglink
Logistics	Returns processing	Handling the data concerning the return of products from customers.	I	A			R		I	
Service	Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.	I	s			A	R		
Service	Customs clearance	Process of getting goods approved by customs authorities for import or export								
Service	Claims settlement	Resolving customer claims for issues like lost or damaged goods	I	A			S	S		
Service	After-sale service	Marketing, customer loyalty programme, product and/or service assessment		A						
LOGISTICS										
	Order management	Processing after receipt of order in the warehouse; order entry and confirmation		I			A			
	Warehousing	Securing the availability of goods through warehousing.		A		I	R			no wholesalers in between
	Transhipment requirement	Securing the availability of goods by organising cross-docking processes.								not applicable
	Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop		I			A			
	Creation delivery note						A			
	Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.	I	I			R	A		
	Last Mile Transport		C					A		
	Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items		S			A	R		

Table 23 RASCI Matrix AT1

Table 24 RASCI Matrix AT1

GreenTurn **Pilot LogPOINT Austria** **Webshop: AT2**		RESPONSIBILITY MATRIX							NOTES
		1 Customers/Consumers	2 Retailer = Manufacturer	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	
ONLINE SHOP									
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.		A					S	
Customer data management	Storage and forwarding of personal data for order acceptance and further execution		A					I	
Order Confirmation	Confirmation to the customer that payment has been made and item is available	I	R			A		R	
Order data management	Storage and forwarding of product-related data to the correct recipients		A			I			
Forecasting	Quantity estimation for future periods		A	I	A	I	I		
CUSTOMER ADMINISTRATION									
Financial	Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)		A					I	
Financial	Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I	I					A	
Logistics	Fullfillment status information	Providing information/updates that goods are ready for collection.	I	R			A	I		(6) Transport receives immediate shipment details
Logistics	Delivery status information	Providing information/updates about the expected delivery date.	I	R			R	A		
Logistics	Returns processing	Handling the data concerning the return of products from customers.	I	A					I	(Returns directly to AT2)
Service	Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.	I	A				R		(Claims directly to AT2)
Service	Customs clearance	Process of getting goods approved by customs authorities for import or export		A			R			
Service	Claims settlement	Resolving customer claims for issues like lost or damaged goods	I	A				S		
Service	After-sale service	Marketing, customer loyalty programme, product and/or service assessment		A						
LOGISTICS									
Order management	Processing after receipt of order in the warehouse; order entry and confirmation		R			A			(LogPOINT uses AT2 ERP)
Warehousing	Securing the availability of goods through warehousing.		A		A	S			
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.		A		A				
Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop		R			A			(2) confirmation to web shop
Creation delivery note			R			A			(LogPOINT uses AT2 ERP)
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.	I	I			R	A		
Last Mile Transport		C	I				A		
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items		A				R		

Table 25 RASCI Matrix AT2

GreenTurn **Pilot LogPOINT Austria** **Webshop: Lackner Handel**		RESPONSIBILITY MATRIX 1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.		A					S	
Customer data management	Storage and forwarding of personal data for order acceptance and further execution		A					I	
Order Confirmation	Confirmation to the customer that payment has been made and item is available	I	A			S		R	(5) Availability of item
Order data management	Storage and forwarding of product-related data to the correct recipients		A			I			
Forecasting	Quantity estimation for future periods		A	I		I	I		
CUSTOMER ADMINISTRATION									
Financial – Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)		A					I	
Financial – Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I	I					A	
Logistics – Fullfillment status information	Providing information/updates that goods are ready for collection.	I	R			A			
Logistics – Delivery status information	Providing information/updates about the expected delivery date.	I	R			R	A		
Logistics – Returns processing	Handling the data concerning the return of products from customers.	I	A			R		I	
Service – Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.	I	S			A	R		
Service – Customs clearance	Process of getting goods approved by customs authorities for import or export		A	R		I			
Service – Claims settlement	Resolving customer claims for issues like lost or damaged goods	I	A			S	S		
Service – After-sale service	Marketing, customer loyalty programme, product and/or service assessment		A						
LOGISTICS									
Order management	Processing after receipt of order in the warehouse; order entry and confirmation		I			A			
Warehousing	Securing the availability of goods through warehousing.		A	S		R			
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.		A	S					
Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop		I			A			
Creation delivery note						A			
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.	I	I			R	A		
Last Mile Transport		C	I				A		
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items		S			A	R		

Table 26 RASCI Matrix AT3

GreenTurn Pilot LOGPOINT Austria Webshop: AT4		RESPONSIBILITY MATRIX							
		1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
	Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A						
	Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.		A				S	
	Customer data management	Storage and forwarding of personal data for order acceptance and further execution		A				I	AT4 does not offer payment against invoice.
	Order Confirmation	Confirmation to the customer that payment has been made and item is available	I	R			A	R	For the order confirmation, you need feedback from (7) that the payment was successful.
	Order data management	Storage and forwarding of product-related data to the correct recipients		A			I		
	Forecasting	Quantity estimation for future periods		A	I	I	I	I	
CUSTOMER ADMINISTRATION									
Financial	Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)		A				I	(7) returns information
Financial	Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses	I	I				A	(1) Amount debited (2) Payment has been made
Logistics	Fullfillment status information	Providing information/updates that goods are ready for collection.	I	R			A		
Logistics	Delivery status information	Providing information/updates about the expected delivery date.	I	R				A	
Logistics	Returns processing	Handling the data concerning the return of products from customers.	I	A			R		I	AT4 has no returns, but non-acceptance is possible (no advice of non-acceptance)
Service	Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.							not applicable
Service	Customs clearance	Process of getting goods approved by customs authorities for import or export							not applicable
Service	Claims settlement	Resolving customer claims for issues like lost or damaged goods	I	A			(S)	(S)	Information depends on the reason for the complaint; support is needed to check the reason
Service	After-sale service	Marketing, customer loyalty programme, product and/or service assessment		A					
LOGISTICS									
	Order management	Processing after receipt of order in the warehouse; order entry and confirmation					R	A		(6) must ensure transport
	Warehousing	Securing the availability of goods through warehousing.		A	I	I	R		
	Transhipment requirement	Securing the availability of goods by organising cross-docking processes.							not applicable
	Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop		I			A		
	Creation delivery note						A		
	Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.		I			R	A	
	Last Mile Transport		C					A	Customer can re-route
	Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items		S			A	R	

Table 27 RASCI Matrix AT4

5.5.3 Local Restrictions in Vienna

In Austria, lorries with a maximum permissible gross weight of over 3.5 tonnes, articulated vehicles and self-propelled machines with a maximum permissible gross weight of 7.5 tonnes are not allowed on the roads between 10 p.m. and 5 a.m. at night and at weekends and on public holidays. (WKO, n.d.)

In Vienna, there is a year-round driving ban on vehicles in category N (motor vehicles for the transport of goods) that are registered as lorries or articulated vehicles and in which an engine in exhaust class Euro 1 or Euro 2 is installed. This also applies to lorries and articulated vehicles that were first registered before 1992.

The Austrian Federal Emission Control Act (IG-L) stipulates that measures must be taken to improve air quality if the limit values for certain air pollutants are exceeded. For this reason, there are ordinances at the state level that prohibit lorries from driving. For commercial traffic and for journeys in the overriding public interest, it is possible to apply to the relevant authority for special permits. (WKO, n.d.)

With a few exceptions, all vehicular traffic is prohibited in pedestrian zones unless an additional sign is displayed. In this case, vehicles are allowed in for loading and unloading at certain times, for example. (Stadt Wien, n.d.)

5.5.4 Catchment Area for Deliveries

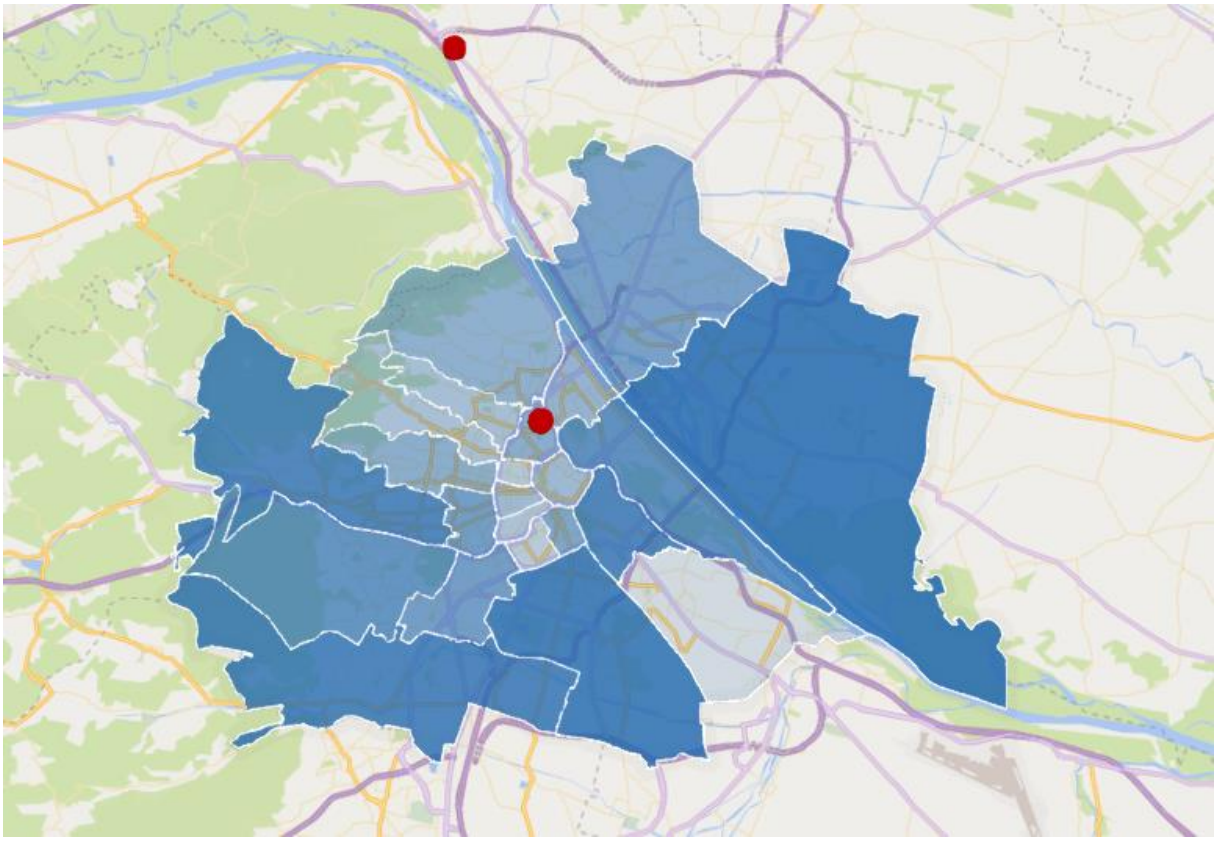

Figure 11 Delivery area LogPoint

5.6 GreenButton (Zaragoza, Spain)

5.6.1 Pilot description

Pilot overview

Zaragoza will integrate in a G2B2C pilot a series of existing programs developed for its citizens and local merchants. Thanks to its longstanding partnerships with local retailers and LSPs, coupled with its decision-making powers, Zaragoza can introduce legal and technical requirements to align deliveries to its LEZ and wider climate-neutral policies. Besides, the city can raise awareness about the environmental and social impact of e-commerce logistics among retailers and consumers. The existing e-commerce platforms (e.g., Mercadeando – public, Ntucity and Mercado Delicias – private) which allow customers to buy fresh produce from local shops and municipal markets are currently uncoordinated. The Citizen Card, currently used by 300k inhabitants (including 1.5k disabled persons), is a public authority led multi-service card giving citizens access to >15 services (e.g., public transport, sport & cultural facilities, etc.). Volveremos is a consumer incentive Groupon programme that promotes local businesses. There are more than 5.8k businesses (bookstores, fashion stores, taxi or hairdressers among others) registered and >132k app downloads, opening the possibility to integrate access to marketplaces, as well as authorization, incentives and rewards through the citizen card. A key feature of Volveremos is that it has a multiplier effect, meaning that for each € invested by the city in discounts, 8-10 € are mobilized from customers towards local businesses.

Objectives and activities planned

Zaragoza will leverage collaborations with retailers and LSPs, aiming to:

1) integrate different services and further expand the Citizen Card by adding functionalities to calculate the footprint of e-commerce last mile deliveries, among other daily activities;

2) create a gamification engine to raise awareness, develop behavioural interventions and a smart pricing mechanism to encourage local commerce shopping and sustainable deliveries of refrigerated and non-refrigerated products;

3) contribute to developing the toolset for local authorities to influence greener e-commerce deliveries and returns. This pilot will address both environmental and social sustainability. Many inhabitants around downtown public markets have mobility issues (e.g., elderly people dwelling in houses without escalators), while some disabled inhabitants have no low/zero carbon options for their online shopping. By including these profiles in the personas and customer journeys, and by working with social enterprises (e.g., Koiki – sustainable LSP hiring marginalized communities who have difficulty finding jobs), the pilot will tackle issues of equity and inclusivity in logistics.

5.6.2 Local Restrictions in Zaragoza

Zaragoza Low Emission Zone[1]

Zaragoza has approved the creation of a **Low Emission Zone (LEZ)** to improve air quality and reduce greenhouse gas emissions. Its implementation is regulated by a municipal ordinance that:

- Defines the perimeter of the zone;
- Establishes conditions for vehicle access, circulation, and parking;
- Sets control systems and other practical operational aspects.

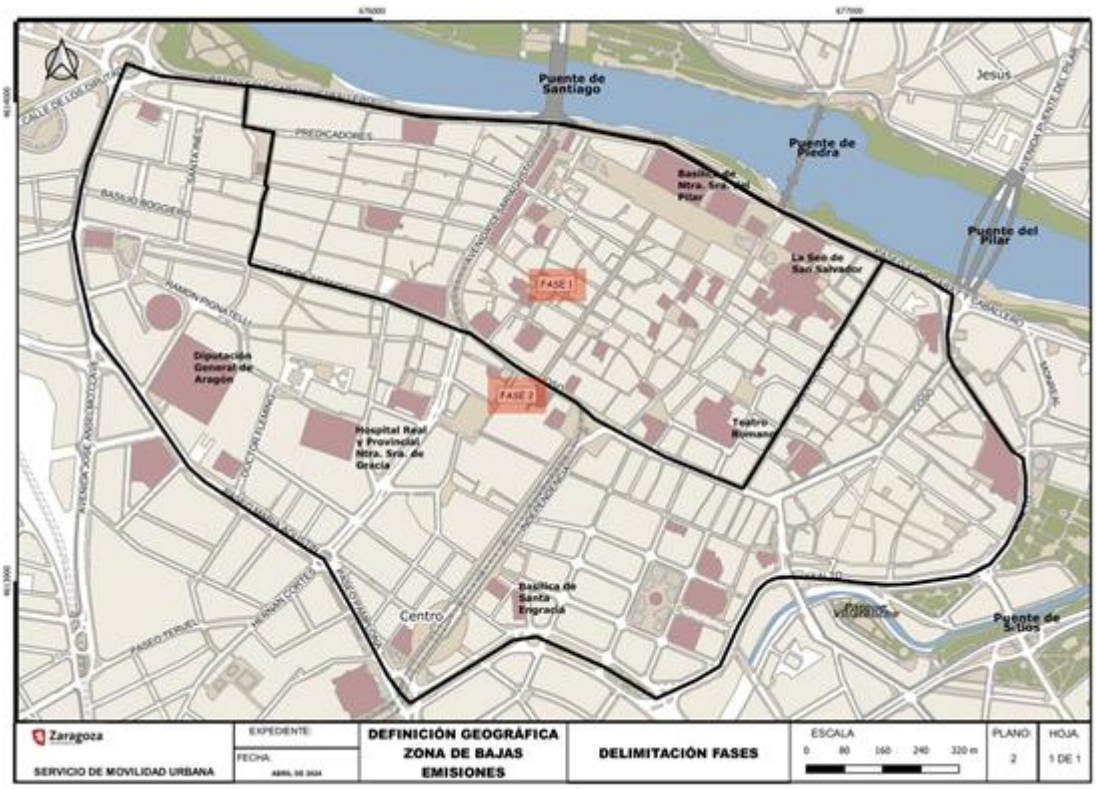

Figure 12 Zaragoza Low Emission Zone

Historic City Center Low Emission Zone (ZBE)

It is bounded by Paseo Echegaray y Caballero, San Vicente de Paúl, Coso, Plaza de España, Conde Aranda, Mayoral, Plaza de Santo Domingo, and Ramón Celma Street, which connects back to Echegaray. The ZBE will be the zone where the GreenTurn pilot will run.

Its implementation will begin on **September 11, 2024**, progressively in the following phases:

- **Phase 1:** From September 11, 2024, for 6 months (until March 2025). Informative period, although it will be mandatory for vehicles to display the environmental label once available.

- **Phase 2:** In the following 6 months (March-September 2025), Local Police will monitor the area. Officers will issue "informative sanctions," meaning without a fine amount.

[1] Applicable for our pilot since it will be in the LEZ 1 where the ZARAGOZA pilot will be executed

- **Phase 3:** From September 2025 for six months (until March 2026), a registration process will begin for vehicles that need authorization to access the Low Emission Zone (because they don't meet environmental standards but do qualify for exceptions).

- **Phase 4:** From March 2026, the Historic City Center Low Emission Zone will operate fully with automated monitoring systems and enforcement of corresponding penalties for non-compliance.

City Center Low Emission Zone (ZBE) (starting in 2030)

It will cover the area inside the perimeter defined by the streets Echegaray y Caballero, Coso, Alonso V, Asalto, Paseo de la Mina, Constitución, Plaza Paraíso, Paseo Pamplona, Paseo María Agustín, Plaza de Europa, and again Echegaray y Caballero.

It will begin to be implemented on **January 1, 2030**:

- **Phase 1:** A registration process will be implemented for vehicles requiring authorization to enter, lasting for six months.

- **Phase 2:** The full operation of the Low Emission Zone will begin, with automated monitoring systems in place and penalties applied for non-compliance with the regulations.

The creation of a Low Emission Zone in Zaragoza is required by **Law 7/2021, of May 20**, on Climate Change and Energy Transition. This law mandates municipalities with over 50,000 inhabitants to adopt "sustainable urban mobility plans, which must include mitigation measures to reduce emissions from mobility, including the establishment of low-emission zones."

The implementation will be phased, and during the first months, users will receive information from the Local Police. However, vehicles must display the environmental badge (DGT label) if they have one to drive within the designated area, which is already marked.

Drivers must meet certain criteria, such as owning or renting a parking space in the LEZ, being the owner of a commercial establishment in the area or residing within the LEZ. In the latter case, drivers must have a Resident Card to park in the designated regulated parking area (ESRE). Authorizations will be issued and must be renewed annually.

Regarding operating hours, the Low Emission Zone will be enforced—monitored and with fines applied—**Monday to Friday, from 7:00 AM to 8:00 PM**.

When accessing LEZ, the system will use **smart cameras** to read vehicle registration details and verify compliance with the environmental badge or authorization requirements.

Parking zones for residents, non-residents, urban distribution of goods (DUM), bicycles, personal mobility vehicles (PMV) and motorcycles will be marked within the LEZ.

Fines will be imposed according to the **Traffic Law**, both in classification and amount. Violating access, circulation, and parking restrictions within the LEZ will be considered a **serious infraction**.

The implementation of the LEZ aims to reduce traffic in various parts of the city, thereby decreasing emissions of pollutants and noise. Zaragoza has already shown favourable trends in pollutant levels in recent years, generally staying below limits set by current legislation.

The LEZ will include systems to measure air quality, such as a **portable station**, to track emission reductions using key indicators.

If air quality levels exceed limits set by national legislation, the LEZ will contribute to compliance as quickly as possible. Measurements will guide decisions for necessary actions.

The Zaragoza Ordinance aligns closely with those already approved or being drafted in other cities, as national regulations provide clear guidelines for implementing Low Emission Zones.

In compliance with the law, Zaragoza's LEZ ordinance defines aspects such as:

- The delineation of the LEZ perimeter, ensuring it is suitable, sufficient, and proportional to achieve the LEZ's objectives.
- An analysis of the nature, origin, and evaluation of pollution.
- Proposed air quality improvement measures and their implementation schedule.
- The access, circulation, and parking control system within the LEZ.

Once the Low Emission Zone is implemented, access will be free for:

- Bicycles (including electric ones) and personal mobility vehicles
- Vehicles with environmental labels B, C, ECO, and 0.

The Ordinance includes a wide range of exceptions for the entry of other types of vehicles (see Table 28), although an explicit authorization will be required, which may be permanent, annual, for single use, etc. These are the following:

VEHICLE TYPE	Authorization duration
Vehicles designated for transporting people with reduced mobility (PMR), with a valid PMR card displayed on the windshield	While the PMR card remains valid
Vehicles owned, leased, rented ("renting" or "leasing"), received as in-kind benefits, or used as replacement vehicles by owners or lessees of parking spaces located in the Zaragoza LEZ.	Annual, renewable
Vehicles owned, leased, rented ("renting" or "leasing"), received as in-kind benefits, or used as replacement vehicles by owners or lessees of commercial premises within the low-emission zone Vehicles owned, leased, rented ("renting" or "leasing"), received as in-kind benefits, or used as replacement	Annual, renewable

vehicles by owners or lessees of commercial premises within the low-emission zone.	
Vehicles owned, leased, rented ("renting" or "leasing"), received as in-kind benefits, or used as replacement vehicles by residents with a regulated parking zone resident card when parking in their assigned area	Annual, renewable
Service vehicles providing emergency and essential services, including: • Medical vehicles offering home healthcare for the public health system • Ambulances • Municipal tow trucks • Funeral service vehicles • Civil protection and rescue vehicles • Fire department vehicles • Police vehicles and those used by state security forces and the military • Vehicles for public cleaning, street lighting, traffic signals, and public works • Registered vehicles classified as essential public service vehicles	Permanent
Foreign-registered vehicles meeting LEZ technological and emissions standards but not listed in the DGT database	Annual, renewable
Vehicles used to transport people with medical conditions (both ambulances and private vehicles) that prevent them from using public transport	Annual, renewable or until the medical condition ends
Vehicles accessing public parking facilities with entry systems connected to the LEZ control system	Per parking access

Vehicles accessing hotel reservations with access systems connected to the LEZ control system	Per hotel stay
Vehicles providing a singular service eligible for LEZ access exemption, including: • Driving school vehicles: Vehicles used for driving lessons (Approval category: N2, N3, M2, M3) • Armored vehicles: Vehicles with reinforced closed boxes for transporting goods or people (Approval category: N1, N2, N3) • RTV vehicles: Adapted for radio/TV broadcasting (Approval category: N1, N2, N3) • Workshop or laboratory vehicles: Equipped for on-site repairs or maintenance (Approval category: N1, N2, N3) • Library vehicles: Adapted for book display and reading (Approval category: N1, N2, N3, M3) • Shop vehicles: Permanently adapted for selling items (Approval category: N1, N2) • Tow trucks: Vehicles designed to tow others (Approval category: N1, N2, N3) • Lifting cranes: Equipped to lift loads without transporting them (Approval category: N1, N2, N3, N3G) • Concrete mixers: For transporting and mixing concrete during transit (Approval category: N3, N3G) • Fairground vehicles: Adapted for transporting circus or amusement fair equipment (Approval category: N1, N3) • Concrete pumps: Designed to pump liquid concrete (Approval category: N3) • Asphalt sprayers: For spreading asphalt material on pavement (Approval category: N1, N2, N3)	Annual, renewable

• Line painters: Used for marking road lines (Approval category: N1, N2, N3) • Snowplows: Exclusively for clearing snow from roads and paths	
Registered vehicles classified as adapted taxis	Permanent
Registered vehicles classified as historic by DGT regulations	Permanent
Non-environmentally compliant vehicles requiring temporary or one-day LEZ access authorization for sporadic entry, limited to eight entries per month	Day of authorization
Registered vehicles belonging to residents with a Municipal Resident Parking space within the area	Authorization limited to parking a single vehicle in the owner's assigned space

Table 28 Exceptions for the entries into Zaragoza's Low Emission Zone

Figure 13 Examples of signs placed in the low-emission zone.

Local Regulations in Zaragoza (Summary)

Low Emission Zone (LEZ) Ordinance (Approved July 2024)
Urban Mobility Ordinance (Effective September 2024)

5.6.3 Catchment Area for Deliveries

Figure 14 Area under consideration Zaragoza

Source: (Urban Access Regulations in Europe, 2024)

6. Conclusions

This analysis reveals the complexity and interdependence of the e-commerce supply chain ecosystem, with stakeholders playing distinct roles at various levels of involvement. By applying the RASCI methodology, roles and responsibilities within the pilot web shops are systematically clarified, providing a structured basis for efficient collaboration and process alignment. This framework supports a detailed understanding of operational dynamics and prepares the groundwork for subsequent activities.

The findings highlight the importance of integrating sustainability across economic, environmental, and social dimensions. This foundation enables the exploration of innovative, zero-emission logistics solutions tailored to diverse operational contexts.

As the project progresses, these insights serve as a valuable guide for refining models, facilitating collaboration, and aligning efforts towards sustainable and efficient e-commerce practices. The structured approach ensures that the identified objectives can be achieved effectively while adapting to the evolving demands of the sector.

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Appendix

Template RASCI Matrix

GreenTurn Pilot Name Country Webshop: Name		RESPONSIBILITY MATRIX 1 Customers/Consumers	2 Retailers	3 Wholesaler/Supplier	4 Manufacturers	5 Logistics Providers-Warehouse	6 Logistics Providers-Transport	7 Financial or Legal Institutions	NOTES
ONLINE SHOP									
Ordering	Data entry (product & quantity and personal data such as name, home & delivery address, payment data, etc.)	A							
Order portal operation	Ensuring that the portal works – including the registration form, payment module, interfaces, etc.								
Customer data management	Storage and forwarding of personal data for order acceptance and further execution								
Order Confirmation	Confirmation to the customer that payment has been made and item is available								
Order data management	Storage and forwarding of product-related data to the correct recipients								
Forecasting	Quantity estimation for future periods								
CUSTOMER ADMINISTRATION									
Financial: Accounting	Financial processing of payment in the online shop (crediting, allocation of payment to the order, etc.)								
Financial: Payment processing	Handling customer payments, incl. verifying payment details, authorizing transactions, updating order statuses								
Logistics: Fullfillment status information	Providing information/updates that goods are ready for collection.								
Logistics: Delivery status information	Providing information/updates about the expected delivery date.								
Logistics: Returns processing	Handling the data concerning the return of products from customers.								
Service: Insurance processing	Managing claims for lost, damaged, or stolen goods during shipping.								
Service: Customs clearance	Process of getting goods approved by customs authorities for import or export								
Service: Claims settlement	Resolving customer claims for issues like lost or damaged goods								
Service: After-sale service	Marketing, customer loyalty programme, product and/or service assessment								
LOGISTICS									
Order management	Processing after receipt of order in the warehouse; order entry and confirmation								
Warehousing	Securing the availability of goods through warehousing.								
Transhipment requirement	Securing the availability of goods by organising cross-docking processes.								
Order fulfillment (warehouse)	Picking, packing, labeling, etc. and confirmation to web shop								
Creation delivery note									
Handover for dispatch	Transfer to transport (incl. liability), scan of the shipment.								
Last Mile Transport									
Returns processing (physical)	Handling the return of products from customers, including receiving, inspecting, and restocking items								

Table 29 RASCI Matrix template