



EU Green Regulations and Political Pressure –
from Threats to Opportunities:
A New Model of Sustainable Logistics for Smart
Cities

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Introduction

In the contemporary global landscape, a severe shift is underway, driven by an escalating awareness of environmental and social responsibilities. This direction has set forth a compelling mandate for businesses across diverse sectors to not merely adapt to such change but to actively lead in the integration of sustainable practices. Within this paradigm, the logistics industry, particularly within the dynamic realm of e-commerce, emerges as a focal point of both challenge and opportunity.

The paper undertakes a multifaceted exploration, where its primary objective is to conduct an exhaustive analysis of the Environmental, Social, and Governance (ESG) impact stemming from logistics operations. Following this critical assessment, we embark on an in-depth investigation of the evolving regulatory framework that underpins the pressing necessity for companies engaged in logistics and e-commerce to realign their strategies with contemporary legislative developments.

The logistics sector, recognized as the lifeblood of global trade and commerce, fulfills a pivotal role in our increasingly interconnected world. However, its omnipresence and colossal scale of operations have inadvertently rendered it a significant contributor to environmental degradation and a host of social challenges. It is within this context that ESG considerations have surged to the forefront of corporate consciousness. These encompass a diverse array of factors, encompassing carbon emissions reduction, ethical labor practices, and the cultivation of responsible corporate governance structures.

Simultaneously, the legislative landscape that governs logistics and e-commerce has undergone a profound transition. The impetus for this transformation is evident: heightened awareness regarding the pervasive societal and environmental impacts of these sectors has catalyzed the formulation of an intricate grid of regulations and standards at both European and national levels. These legal provisions are meticulously designed to curtail environmental harm, safeguard labor rights, and instill a culture of ethical responsibility among corporate entities operating within these domains.

The path embarked upon by this paper commences with a meticulous examination of the multi-dimensional ESG implications arising from logistics practices. We delve deeply into the intricate web of challenges and opportunities that ensue from the logistics industry's endeavors to balance economic efficiency with environmental and social sustainability. Our objective is to elucidate the multifaceted nature of these implications, emphasizing the vital role that logistics enterprises play in mitigating their environmental and social footprints.

Following this comprehensive analysis, the dissertation embarks on a detailed normative excursus. The aim is to provide a thorough understanding of why companies engaged in logistics and e-commerce must swiftly and effectively adapt to the contemporary legislative panorama. This section outlines the intricate interplay between societal demands, regulatory imperatives, and corporate obligations. It underscores the pivotal role that logistics and e-commerce companies have as stewards of responsible and sustainable commerce.

Furthermore, our investigation extends to the examination of the current urban constraints that exist at local, European, and national levels. These constraints – also known as Urban Vehicles Access Regulations - while well-intentioned, necessitate innovative and alternative solutions for logistics and e-commerce companies to navigate the complex regulatory landscape. We scrutinize the evolving urban dynamics that require novel approaches for the efficient delivery of goods and services within city limits. Frequently, these innovative solutions align with eco-sustainable practices that can substantially reduce the environmental footprint associated with logistics and e-commerce activities.

Precisely for those reasons, as an example, the Amazon. Com case will be discussed. Being it the biggest marketplace in the commercial world as well as the biggest company nowadays, both for commercial value and expansion, there is a concrete basis for constructing and improving the already existing economies of scale. Also, scale economies are and will be critical for the firm in its adaptation to the modern ESG criteria and sustainable mode of operating. We explore the strategies employed by Amazon to align its vast logistics and e-commerce operations with ESG principles and evolving regulatory standards.

Amidst this intricate framework comprising logistics, regulations, and sustainability, it is vital to recognize the pivotal role played by the customer. Customers wield significant influence in shaping the direction of companies and industries. Their preferences, values, and choices have a profound impact on businesses' strategies, particularly in their journey towards greener alternatives. This undertaking often involves substantial investments in eco-sustainable technologies and practices. To gauge the customer's propensity and receptiveness toward these eco-sustainable options, the latter part of this paper sets out to present the results of a survey. This survey, conducted with precision and purpose, aims to offer insights into customer attitudes, expectations, and behaviors concerning eco-sustainable initiatives implemented by the companies with which they transact.

In sum, this study embarks on a comprehensive expedition that encompasses the exhaustive examination of ESG impacts, the intricate regulatory milieu, and the evolving landscape of logistics

and e-commerce within the context of sustainability. As we traverse through this multifaceted terrain, it becomes unmistakably clear that the future of logistics lies at the intersection of responsible business practices and innovative, eco-sustainable solutions. Customers, who stand as catalysts for positive change, play a pivotal role in the transition towards a more sustainable and responsible logistics and e-commerce ecosystem.

Indeed, the final section of the paper aims to present the results of a survey conducted with the objective of assessing the customer's inclination towards eco-sustainable options implemented by a company they patronize.

Before starting, a definition of logistics is included, which suggests the multiple areas which it may influence:

Logistics refers to the process of planning, implementing, and controlling the efficient and effective flow of goods, services, information, and resources from the point of origin to the point of consumption. It involves the coordination of various activities, such as transportation, storage, inventory management, packaging, and distribution, to ensure that products or services are delivered to the right place, at the right time, and in the right condition.

Chapter 1

1. ESG Legislative Framework applied to Logistics Companies

Introduction

The *Council of Supply Chain Management Professionals* (CSCMP) defines logistics as "the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods, including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements."

The *International Logistics and Supply Chain Management Institute* (ILSCMI) defines logistics as "the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements."

The *Business Dictionary* defines logistics as "the management of the flow of goods, information, and other resources, including energy and people, between the point of origin and the point of consumption in order to meet the requirements of consumers."

These definitions highlight the key aspects of logistics, which involve the movement and management of goods, services, and information to meet customer requirements, while ensuring efficiency and effectiveness in the supply chain.

Being it a relatively young scientific discipline, scholars are committed to discover a comprehensive definition that applies universally. Although the CSCMP, a highly regarded professional organization, has provided a definition of logistics, it may be limited to the realm of business and industry. The overarching goal is instead to establish a shared comprehension of logistics as a discipline that fosters improved collaboration among diverse entities operating in different environments. This common understanding will enable accurate interpretations and effective interaction between these entities (Kukovič, 2014).

As mentioned at the outset, Logistics is considered to be a science, especially when it comes to the integrated management of all materials and the information that flows with them from suppliers through the processing of input materials and on to the final consumer, and though there is no unified definition of logistics, most of the authors agree with this explanation (Kukovič, 2014).

For the sake of giving an historical framing, the term “logistics” was predominantly associated with military operations, and its significance peaked during the two World Wars due to the substantial growth in the number of troops and the diversity of equipment involved (Kukovič, 2014; Topolšek, 2014; Rosi 2014; Jereb 2014). During periods of relative peace, logistics gradually expanded its influence into the business domain, and its advancement surpassed that of military logistics (Rodrigue & Slack, 2002). Likely due to its significant advancements in recent times, the business arena itself played a pivotal role in shaping the progress of logistics as a scientific discipline. (Kukovič, 2014).

Integrated logistics management includes transportation, which is vital to the process. It is a component of value-adding that is integrated into strategic management and decisions through transport logistics (Topolek et al., 2018). A well-developed transportation system assures that logistics systems will operate more cost-effectively and efficiently while also providing higher-quality services (Tseng et al. 2005), transport logistics is in fact one of the core aspects of modern logistics.

The European transport logistics industry plays a vital role in the European economy and is greatly influenced by the external environment, which determines the demands and patterns related to the production and consumption of goods (EC 2015). The EU's Freight Transport Logistics Action Plan provides a definition of transport logistics as the process of planning, organizing, managing, controlling, and executing freight transport operations within the supply chain (EC 2007). The overarching objective of transport logistics in the EU is to mitigate congestion, pollution, noise, CO2 emissions, and reduce reliance on fossil fuels in the long run (Topolek et al., 2018).

The goal of the chapter is to make the reader aware of how pivotal the compliance towards ESG standards is nowadays, and the consequential important role of Non – Financial Disclosure for firms. With this broad and inclusive landscape, this chapter will function as a review of the European and Italian legislative framework that applies to logistics companies for mitigating their ESG impact at a local up until a local level. Starting with the 17 Sustainable Development Goals-(SDGs) described in the "The 2030 Agenda for Sustainable Development" and the main directives and regulations characterizing EU legislations on this topic, the discussion will be narrowed down to the consequential evolution of the Italian legislation as well.

In this way, this chapter will work as a baseline over which to build and justify the whole dissertation's discussion.

Given the previous mentioning of “modern logistics”, it is straightway to convey the discussion towards E-commerce, as it truly defines the current logistics landscape.

1.1 E-commerce

E-commerce, also known as electronic commerce, refers to the buying and selling of goods, services, and information over the internet or other electronic networks. It involves conducting business transactions electronically, often through websites, online platforms, or electronic payment systems.

It entails the process of conducting commercial activities, such as buying and selling products or services, electronically over computer networks, primarily the internet. It encompasses various online activities, including online shopping, electronic payments, online auctions, digital marketing, and electronic data exchange.

E-commerce has revolutionized the way businesses operate and how consumers shop. It offers several advantages, such as global reach, convenience, accessibility, and the ability to compare prices and product options easily. E-commerce transactions can involve business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer (C2C), or consumer-to-business (C2B) interactions, depending on the nature of the transaction and the parties involved.

Overall, e-commerce has transformed traditional commerce by leveraging the power of technology and the internet to enable faster, more efficient, and more convenient buying and selling processes.

Home delivery packages have significantly increased as a result of the recent e-commerce boom, which has also caused a significant increase in the number of orders shipped and, as a result, in urban freight traffic. Additionally, since every residence might potentially serve as a delivery location in e-commerce, the impact of urban freight distribution is exacerbated in new ways and delivery numbers are growing more quickly. All of this indicates that the operations of goods distribution and transportation businesses have significantly increased.

As a result, last-mile deliveries related to internet transactions have increased.

The COVID-19 pandemic's side effects are added to this progressive rise over time. Aside from any immediate effects of the self-isolation and lockdown periods imposed in many countries, the market's structure is changing, further quickening the market's shift towards e-commerce. All of this will then amplify the negative externalities in metropolitan areas where pressure is already rising owing to the growth in urban density (Viu-Roig & Alvarez-Palau, 2020).

This to say that changes in shopping mainly happen in the urban areas, resulting in changes within the logistics system itself in those same areas.

Fast delivery, flexibility, and house deliveries are a few improvements that have occurred in the urban logistics business. According to Russo and Comi's research (Hidayatno et al., 2019), products

purchased through an e-commerce channel are frequently supplied in high-frequency, small-volume orders. Due to urban density, this condition may have detrimental effects on things like traffic congestion, noise, carbon emissions, and safety.

1.2 Model conceptualization

The rise of e-commerce in urban areas has changed the way people buy goods.

The higher delivery frequency is part of the bucket accounting for the increase in energy consumption and emissions, which opens the door to the discussion on the interdependency between economic and environment in urban logistics systems, powered by e-commerce growth (Hidayatno et al., 2019).

With the aim of measuring the impact e-commerce has on logistics, where the transportation sector over the last decade has been the biggest source of GHG emissions, scholars developed a proper model conceptualization of the framework described.

Indonesia hosts an exponential growth of the e-commerce sector, and the city of Jakarta in particular is facing consequential increase in GHG; for such a reason, scholars studied such a relation through the model that will be soon introduced, that can be applied in various and different industries and country levels.

Such model conceptualization is concretized in the so-called *causal loop diagram* (Hidayatno et al., 2019), devised to give a better understanding of a complex dynamic feedback system. The benefits of creating causal loop diagrams for model conceptualization include its ability to clearly explain the interdependence of variables and the concept of feedback, both crucial aspects in a closed system.

The explanation of causal loop diagram is divided into four parts: first, it explains the increase of urban freight volume due to e-commerce growth: time-saving and practical features characterizing e-commerce will again contribute to an increase in the number of urban goods. Second, it focuses on carbon footprint from urban logistics activity: according to some research, frequent e-commerce deliveries will significantly increase the carbon footprint in urban areas. Whereas some individuals might think that e-commerce can help to reduce customers' trips to the store in order to lower carbon footprint, several studies have found the opposite. In fact, according to the European Commission's Directorate-General for Enterprise and Industry, it is reasonable to assume that activities related to freight logistics and passenger transportation account for at least one-third of the greenhouse gas emissions that cause climate change.

Three factors, on average, will cause e-commerce to generate greater emissions: extra packing, the fact that customers which usually buy fewer products, and several purchases that will result in many deliveries. Third, it illustrates the cost associated with urban logistics: the investment opportunity will decrease as logistics costs rise, with the main opportunity cost resulting in the disincentive in investments in fuel efficiency, larger trucks, lower-carbon machinery and electric vehicles. Finally, it signifies the influence of truckload capacity to the delivery frequency in urban logistics: logistics transport delivery loop. The three factors to consider are *the logistics transport delivery amount*, *the shipment amount per delivery* and *the logistics transport utilization* (truckload factor) (Hidayatno et al., 2019).

Smaller shipments per delivery are the outcome of high freight volume. Small shipment volumes will result in low logistics transport utilization, which will be influenced by transport shipment capacity; all of this will lead to lower efficiency.

Whether seen from the perspective of the participants as businesses, organizations, or governmental authorities, the perceived impact of the e-commerce phenomenon differs.

Economic, social, environmental, and technological dimensions' impact, which together make up the fundamental pillars under consideration in the modern world and economy, are in fact the four areas that demand a larger attention.

This phenomenon requires additional investigation, particularly considering the factors that have the biggest implications for the many stakeholders and urban systems. Only in this way can the governmental measures required to lessen negative externalities be effectively implemented and enforced.

In the most industrialized nations, e-commerce has had rapid growth rates of up to two digits in recent years. As a result, there have been more last-mile deliveries related to online purchases, and such trend it is expected to grow.

All of this will then amplify the externalities that are already being felt in metropolitan areas owing to the increase in population density, such as traffic congestion, pollution, and noise.

Considering that cities are now home to more than half of the world's population, focus should be placed primarily on what occurs in cities themselves. This, combined with the fact that public policy on the subject is still in its early stages, could cause problems in many cities, especially those with the busiest transport systems. Due to the economies of scale that emerge from the boom in e-

commerce, firms may also benefit from an expanded client base and new potential to extend their market, making the need to address this issue even more crucial.

1.3 Economies of Scale and the role of consumers

The concept of Economies of scale brings in turn the reasoning about which industrial environments could concretely reach such scale economy and which factors positively or negatively contribute to it.

The urban side that is mentioned earlier gains more importance if once realized that studies show that large companies, which are the ones mainly impacted by the regulations and which are the ones that primarily have to respond to these stimuli, are much more often located in urban areas.

Many aspects need to be considered when approaching economies of scale, ranging from the kind of investments a firm undertakes, whether a firm is part of a cluster of a certain industry, or from organizational and statistical factors (Panzar 1997; Willig 1997).

Finally, the size of a firm is the main factor here, as well as the role of the consumer of that firm: indeed, it is the consumer itself that could be a precious input for a firm to improve and to grow. An accurate analysis of the consumers' (or potential consumers') behavior is vital for whatever firm in understanding the path it needs to follow for growing and for reaching those economies of scale, behaving in alignment with the needs and values of the consumer, in exchange of support itself.

In particular, the ESG impact that logistics firms have nowadays on the main three Environmental, Social and Governmental aspects will be straightforwardly addressed and the following question marks will be under discussion:

What are the new framework industries should adapt to? How do you measure it? And which one is the impact that logistics and e-commerce finally have on this ESG framework?

1.4 Environmental and Social Performance – Value Maximization

Maximizing value is the main goal of any enterprise.

Starting with the concept of "accountability," we examine the process through which there is a progressive orientation of corporate objectives toward social responsibility, with a redefinition of the

concept of corporate value that has led - from a shareholder value approach (Shareholder Value Approach) - to an approach based on stakeholder interests (Stakeholder Approach).

In this context, besides the financial aspects of companies, other categories of information are developing as fundamental when approaching a company or a firm in a perspective of "sustainable economy."

Stakeholders and "third parties" are increasingly aware of the urgency of the current global situation and demand maximum transparency from firms and industries, entailing a more conscious interest not only in the economic and financial performance, but also on the environmental and social performance.

In this regard, ESG (Environmental, Social and Governance) criteria are being affirmed, to which non-financial disclosure is linked: environmental, social and governance aspects are in fact treated and challenged.

Internationally, there has been growing interest in the topic since 2006.

The UN report "Principles for Responsible Investment" was published with the intent of encouraging the spread of sustainable and responsible investment among institutional investors. Over time, rules and regulations on the subject have been developed. In Italy, a step was taken with the enactment of the Legislative Decree 254/2016, which is the implementation of the analogous EU Directive 2014/9/. This decree imposed an obligation on large companies to disclose non-financial information, including environmental, social and governance aspects (ESG) within the annual report.

Subsequently, the Corporate Sustainability Reporting Directive (CSRD) has been adopted, which introduced new provisions for the disclosure of ESG information in companies' financial statements. This directive requires listed companies to publish a report annual ESG information and provides for the introduction of an ESG labeling for financial products.

The three ESG dimensions, referred to by the European Union as the "Pillars of Sustainability" (Team,2023) relate to:

- "E" of Environment: these are environmental criteria and assess how a company behaves towards the environment in which it is located and the environment in general.
- "S" of Social: these are criteria related to social impact and examine the impact and relationship with the territory, people, employees, suppliers, customers and in general with the communities with which it operates or with which it has a relationship.

- "G" of Governance, finally, concerns the issues of corporate management inspired by good practices and ethical principles; in this area, the issues under examination concern logics related to executive compensation, respect for the rights of shareholders, transparency of corporate decisions and choices, respect for minorities.

1.5 ESG Standards

Environmental, social and governance (ESG) impacts from logistics activities represent a crucial challenge in today's sustainability-oriented business landscape. The social costs associated with logistics span a wide range of considerations.

From an environmental perspective, logistics is often responsible for a significant portion of greenhouse gas emissions and air pollution. Fleets of vehicles used to transport goods, often powered by fossil fuels, contribute significantly to the greenhouse effect and polluted air in urban areas. In addition, the intensive use of natural resources for packaging and moving goods can increase material consumption and waste accumulation. Further details will be addressed in the following section.

On the social front, logistics can incur significant costs in terms of the welfare of workers and local communities. Long working hours, lack of adequate protections, and pressure to meet tight deadlines can lead to poor working conditions and exploitation. Especially in developing countries, supply chain labor practices can undermine international human rights and labor standards.

From a governance perspective, inefficiency in logistics can lead to problems with transparency, accountability, and risk management. Opaque business practices and lack of traceability in the supply chain can hinder responsible management and identification of areas for improvement.

To address these ESG impacts, logistics companies are increasingly seeking to adopt sustainable approaches. These may include implementing innovative technologies such as electric or hybrid vehicles, optimizing routes to reduce emissions, adopting eco-friendly packaging practices, and investing in working conditions and worker safety along the supply chain.

In sum, managing the social costs associated with logistics requires an integrated approach that considers environmental impact, social justice, and responsible governance. Companies that effectively balance these considerations will be better positioned not only to meet consumers' and investors' rising expectations for sustainability, but also to contribute to a more equitable and ecologically sound future.

1.6 Numerical evidence

The Directorate-General for Enterprise and Industry of the European Commission has approximated that around one-third of the global energy production is dedicated to the movement of goods and people. Consequently, it can be reasonably inferred that at least one-third of greenhouse gas emissions, which contribute to climate change, stem from passenger transport and freight logistics activities. Also, mobile transportation modes emit more pollutants per unit of energy consumed compared to stationary installation (Directorate-General Enterprise and Industry (DG-ENTR), n.d.).

The pursuit of improved living standards, encompassing aspects like employment, social interactions, education, business ventures, cultural experiences, transportation, and healthcare, has induced a gradual shift of both population and resources from rural to urban areas. However, this shift towards urbanization brings forth a set of challenges that are impeding this aspiration, particularly in large metropolises. Issues such as traffic congestion, air quality, public health, safety concerns, and more, are magnified in such urban environments.

Currently, approximately half of the global population (3.5 billion people) resides in urban settings. In Europe, this proportion rises significantly to 75 percent and is projected to further climb to 80 percent by 2023. A substantial 75 percent of the world's energy consumption takes place within these urban centers (Hidayatno et al., 2019).

One of the paramount predicaments faced by cities today is logistics. Numerous studies conducted in European urban hubs in the present millennium have showcased staggering figures: ranging from 300 to 400 freight vehicle journeys per 1,000 inhabitants each day, and from 30 to 50 tons of freight per person annually. The transportation and delivery of goods within urban confines have substantially contributed to the exacerbation of social and environmental issues stemming from vehicular traffic and air pollution.

The movement of goods within urban conglomerates has an interesting characteristic: products enter while waste exits. The gradual dissemination of the Circular Economy concept will inevitably lead to the collection and subsequent treatment of specific waste, particularly technological waste that is inherently fragmented. This will introduce additional traffic, augmenting the existing supply chain in urban locales and further compromising their livability.

In essence, the latter part of the distribution logistics process, often referred to as the "Last Mile," intersects with the "First Mile," signifying the initial phase of the recovery and recycling process. To mitigate the climate-altering effects of vehicular transport, the conventional approach involves adopting environmentally friendly transportation methods. While this addresses emissions, it fails to address the reduction of vehicles on the road, leaving traffic congestion and associated issues largely unaddressed. However, an alternative, albeit more intricate, approach holds potential for amplifying the initial method's effects: optimizing the loading capacity of transportation vehicles. This not only leads to emission reduction but also streamlines traffic, which is imperative for enhancing urban livability.

The just-discussed reasons have, throughout time, contributed to European and Italian legislation, particularly more recent ones. In fact, businesses now must adjust specifically to deal with these regulations in order to thrive in the market. The most recent European legislative framework is shown below, demonstrating how ESG criteria are equally important to financial performance in terms of priority.

1.7 Non-Financial Disclosure

In recent years, as part of corporate operations, communication to users of financial statements has taken on a central and evolving role.

The concept of accountability, or "empowerment," which represents the adoption by an entity of "proactive behaviors" (European Commission, 2016) (GDPR - Regulation 2016/679) - such as to demonstrate transparency and participation, precisely involves the satisfaction of different stakeholders.

As a result, the legislature's primary concern is now the protection of business stakeholders' interests, and it occasionally enforces the corporate information system mandates.

Stakeholders focus on the enterprise's ability to produce value and, even more so, on its ability to endure over time (Devalle, 2023). The enterprise has often focused on economic and financial reporting: economic condition, financial position and assets, with the annual financial statement as its main document.

However, especially in recent years, it is of paramount importance to pay attention to corporate activity in relation to the use of human resources and the development of the surrounding community.

Along with a shared interest in financial and economic success, stakeholders and "third parties" are demanding maximum clarity from organizations as they become more aware of how bad the situation is.

Thus, financial indicators alone, such as turnover, EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization, i.e., Current Gross Operating Income), net financial position, and shareholders' equity, are proving to be no longer sufficient to ensure adequate disclosure.

Events like the Sars-CoV2 pandemic or natural catastrophes that have affected the planet at various latitudes (fires, tsunamis, floods, etc.) are undoubtedly credited with making a significant contribution in raising awareness of these issues and inspiring large activist groups to fight for environmental protection. The fragility of development dynamics characterized purely by profit has been brought to light by the globalization of markets and the consolidation of a financial dimension that is removed from the real economy.

In this regard, momentum is acquired by ESG (Environmental, Social and Governance) criteria, to which non-financial disclosure is linked: environment, social aspects and governance, are affirmed. Non-financial disclosure, however, is not new in the system of compulsory corporate disclosure at the national level; actually, third parties are just placing increasing attention towards it: art. 2428 - Civil Code on the "Management Report", since 2003 reports in Paragraph 2 that companies must provide an analysis containing "to the extent necessary for an understanding of the company's position and the performance and results of its operations, financial and, where appropriate, non-financial performance indicators relevant to the company's specific business, including information pertaining to the environment and personnel."

ESG aspects are thus becoming a necessary condition for survival in the medium to long term for many companies.

The voluntary choice of non-financial reporting triggers a risk mapping activity and collection of data inherent to the operating segment and business model, such that the company can prevent potential relevant impacts even in the short term.

Non-financial reporting is therefore developed through the Sustainability Report, which is the subject of several regulations at the EU level, first the Directive 2014/95/EU, transposed into Italian jurisdiction by Law 254/2016, up to the more recent Directive 2022/2464/EU (CSRD Directive), which came into force on January 1, 2023.

1.8 The European legislative framework

ESG issues are a global priority and received momentum with "The 2030 Agenda for Sustainable Development" - endorsed on September 25, 2015, by the governments of 193 member countries of the United Nations and approved by the UN General Assembly. The Agenda is divided into 169 goals (targets) to be achieved by 2030 to live in a more sustainable world (Agency for Territorial Cohesion, 2015). The Agenda is a program of action adopted in 2015 by all United Nations member states, whose aim is to promote a shared blueprint for people, planet and prosperity, based on 17 Sustainable Development Goals-(SDGs) "Sustainable Development Goals" [Figure 1.1].

Sustainable Development Goals



Figure 1.1

The 17 goals consider the three dimensions of sustainable development, such as economic, social and ecological dimensions, in order to combat issues such as poverty, social discrimination and climate change, aiming to build an increasingly environmentally and human rights-friendly society. On the other hand, the European Union is also responsible for guiding its implementation phase, through the integration of the Sustainable Development Goals (Fondazione Nazionale Commercialisti, 2022).

Of similar importance is the Paris Agreement, signed in 2015 at the Paris Conference on the Climate Emergency, in which the 196 member states of the United Nations Framework Convention on Climate Change (UNFCCC) participated and discussed in order to reduce greenhouse gas emissions. The common goal is also to lower global warming by at least 2 degrees Celsius compared to pre-industrial levels and keep the global average temperature increase within 1.5 degrees Celsius.

The Agreement was subsequently signed in September 2016 by the two most internationally polluting countries, China and the US.

In the European field, in order to make the language of corporate documents for stakeholders homogeneous and to facilitate their comparison in space and time, international, EU and national directives and legislative decrees have been issued since the 1990s.

1.8.1 Directive 2014/95/EU

The conveyance of non-financial information has undergone acceleration and gained increased importance following Directive 2014/95/EU. Even prior to the implementation of Directive 2014/95/EU, the European Union's accounting framework had already imposed initial requirements for communicating non-accounting-related matters.

Specifically, through Recommendation 30/05/2001, the Commission had called on Member States to adopt suitable measures for identifying and evaluating environmental costs in the yearly and consolidated reports of companies. Subsequently, Directive 2003/51/EC made amendments to the directives governing annual accounts (Directive 78/660/EEC) and consolidated accounts (Directive 83/349/EEC), introducing obligations related to non-financial information.

Directive 2014/95/EU, incorporated into Italian law through the Legislative Decree 254 of December 30, 2016, modifies Directive 2013/34/EU and introduces a requirement for specific companies to prepare the Non-Financial Statement (NFS). Directive 2013/34/EU of the European Parliament and the Council pertains to annual financial statements, consolidated financial statements, and associated reports of certain types of businesses. This directive amends Directive 2006/43/EC of the European Parliament and the Council, and it repeals Directives 78/660/EEC and 83/349/EEC of the Council (MEF, 2013).

The directive, published in Official Journal No. 182 on June 29, 2013, seeks to establish comparability across various financial statements by setting forth clear and robust standards to enhance transparency in social documents. It places particular emphasis on small and medium-sized enterprises (SMEs), outlining distinctions for each business category and establishing qualitative and/or quantitative limits.

The mandatory components of the annual financial statement encompass the balance sheet, income statement, and explanatory notes.

On April 15, 2014, with Barnier Directive No. 5, certain aspects of Directive 2013/34/EU were altered, integrated, or removed to underscore non-financial reporting, bolstering trust in the relationship between companies and citizens. Article 19b, known as the "Non-Financial Declaration,"

was introduced anew. This article, in its initial section, identifies the entities that are required to draft the NFS, including "public interest entities" (PIEs) of substantial size, such as banks, insurance companies, and publicly listed firms on regulated markets. These entities must create the non-financial declaration if they have over 500 employees and have exceeded specific size thresholds (a total balance sheet of 20 million euros or total net sales and revenue of 40 million euros).

Motivated by international experiences in non-financial reporting, the EU legislature concentrates on information deemed noteworthy concerning the impact of a company's operations on aspects beyond mere accounting. The newly introduced minimum reporting standards cover *"environmental and social aspects, respect for human rights, personnel management, and the active and passive prevention of corruption."* The aim of sustainability reporting is to facilitate an *"understanding of the company's trajectory, its outcomes, its standing, and the repercussions of its operations."* (KPMG, 2022).

Regarding the content, the reporting must include the following information:

- the company's business model for managing and organizing business activities.
- the policies adopted in relation to the aforementioned aspects, including applied due diligence procedures and achieved results.
- the main risks arising from the business activities, its products, services, or commercial relationships.
- the primary non-financial indicators relevant to the specific business activity.

The fourth paragraph of Article 19b stipulates that the reporting can be provided in a specific section of the annual management report or in a separate document, a distinct report, as chosen by 78% of listed companies during the initial years of adopting the regulation (Caputo, 2019).

Furthermore, Article 29b, "Consolidated Non-Financial Declaration," has been introduced, which states that public interest entities as indicated in Article 19b, if they are "parent companies" of a large group, are obliged to publish a consolidated Non-Financial Statement, thus exempting controlled companies from the obligation to prepare such statements.

1.8.2 Regulation 2019/2088/EU – Investments

Particular attention is nowadays paid to investments, which are valued more if they also meet ESG criteria. In fact, it is of utmost importance, especially in the critical area of logistics, to be compliant and aware of the regulations covered at EU levels in order to increase attractiveness for investors.

The Directive 95/2014 has been followed by other European legislative acts of various scope and content, often aimed at specific sectors. In November 2019, the European Regulation 2019/2088 was introduced concerning "sustainability-related disclosures in the financial services sector," known as the "Sustainable Finance Disclosure Regulation" (SFDR). Published in the Official Journal on December 9, 2019, and entering into force on March 10, 2021, in an initial version, and on January 1, 2023, in its complete version.

The SFDR regulation aims to harmonize transparency in financial markets, focusing on the concept of sustainability of financial products. Particularly important is Article 2 of the regulation, paragraph 17, where the concept of "sustainable investment" is defined. This refers to an investment that contributes to achieving an environmental or social objective, taking into consideration the terms previously listed. However, a necessary condition is that companies undertaking such investments adhere to practices of "good governance," and such investments do not cause "significant harm to society."

Companies are required to provide information about compliance with the regulation and the alignment of the project with the declared environmental and social characteristics or the objective of sustainable investment.

The regulation imposes common rules on various categories of financial operators regarding sustainability information, which are divided into two levels:

1. ESG (Environmental, Social, and Governance) disclosures on decision-making and advisory processes, during which aspects like the integration of sustainability risks, remuneration policies of personnel and from December 30, 2022, the identification of potential adverse impacts and commitment to their reduction must be considered.

2. ESG disclosures on financial products traded in EU markets, aiming for transparency to become a predominant element, enabling final investors to effectively compare different products across various member states to prevent potential obstacles.

This information must be communicated in pre-contractual documentation as well as on specific websites. In cases where such disclosures are absent, based on the "*comply or explain*" principle, the company must provide reasons for these choices while adhering to the perspective of corporate transparency.

The ultimate goal of investor protection, achieved through the pursuit of transparency and consequent reduction of information asymmetries related to ESG aspects and the concept of sustainability, has been further pursued by Delegated Regulation (EU) 2022/1288.

1.8.3 Directive 2022/2464/EU – Corporate Sustainability Reporting Directive (CSRD)

Finally, among the most recent European Union measures is the Corporate Sustainability Reporting Standard Directive (CSRD), published on April 21, 2021.

The year 2022, in fact, has been marked by a growing interest in the impact of ESG risks in corporate assessments.

The CSRD Directive thus becomes a key building block in the implementation of the Non-Financial Disclosure, as it aims to implement "The European Green Deal", presented by the European Commission on December 11, 2019, and the 2018 Action Plan on Financing Sustainable Growth ("Action Plan on Financing Sustainable Growth" (Fondazione Nazionale Commercialisti, 2022), by improving the forms of corporate communications regarding sustainability risks.

It expands, thus, the responsibility of companies for the sustainable economy, with the aim of amending the complete set of regulations on financial statements and sustainability reporting, as "the current legal framework does not ensure that the information needs of these users are met". According to the European Commission, *"the reason is that some companies from which users expect sustainability information do not report it, while many of the companies that do report it omit some information that is nevertheless relevant to users. The information, where disclosed, is often not reliable enough and not comparable enough across companies. Information is often difficult for users to find and is rarely available in a digital format that can be read by an automated device."*

The new regulations will apply to an increasing number of companies, which will be held accountable for the impacts of their activities on society and the environment. Data on environmental and social footprints will, in fact, be made publicly available, but will provide a transitional timeframe for companies to prepare for a new form of reporting.

The regulatory framework is therefore set to change significantly: the new sustainability report will replace the current non-financial statements.

Other relevant changes (Assonime, 2023) introduced by the CSRD include two of fundamental importance that will be taken up in the discussion to follow:

- The *total harmonization* of reporting criteria, emphasizing the possibility of voluntary choice of use of these principles for SMEs not listed on regulated markets.
- The *digitization* of disclosed information, publishing Management Reports in digital format (Article 29d), preparing a "processable electronic language," better known as "European Single Electronic Format" or "ESEF," referred to in Article 3 of EU Delegated Regulation 2019/81523.

On 11/22/2022, EFRAG (European Financial Reporting Advisory Group) submitted to the European Commission the draft of the first set of principles consisting of 12 documents, comprising 2 "Cross-cutting" principles (Staunig, 2022, Visnescu, 2022), relating to general requirements and general disclosure, respectively, and the following 10 relating to the three dimensions of sustainability reporting ("Environment," "Social," and "Governance"), as shown in Figure 1.2.

First set of ESRS – EFRAG principles

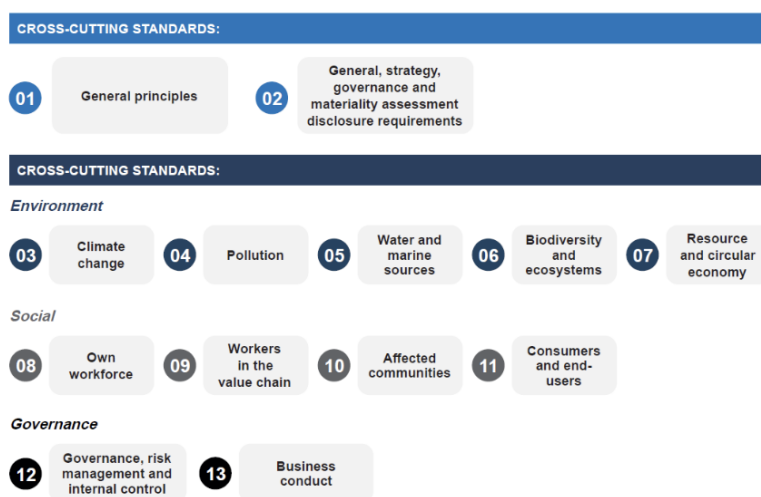


Figure 1.2

The implementation of CSRD will take place between 2024 and 2028, with a roadmap modulated on the basis of the size of the companies involved and the time given to them to comply with the directive.

The new CSRD directive must be transposed by the Member States, including Italy, by July 6, 2024.

It foresees a significant expansion of the recipients compared to the current scope outlined in Legislative Decree 254/2016, extending the obligations of disclosure to additional companies, including all those of significant size and those listed on regulated markets.

Within the regulatory framework, two other important proposals from the European Commission, developed in 2022, come into play.

Indeed, the European Union has identified in the proposal for the CSDD directive (Corporate Sustainability Due Diligence Directive or Supply Chain Act) the mandatory due diligence requirements that companies must implement.

This directive, with a very broad scope, extends to various subjects or areas of interest: a greater number of companies will have to answer for their impact on human rights and the environment, and companies should also assess value chain partners when conducting "*due diligence*."

The second proposal, on the other hand, is the suggestion of a Regulation that bans products made using forced labor (the "*Forced Labor Ban Regulation*"), aiming to eliminate all forms of modern slavery internationally and remove resulting products from the EU market.

The state of "poly-crisis" (Vernero, 2023; Cattarossi, 2023) that the planet is experiencing, as outlined in the 2023 report by the World Economic Forum, increasingly highlights how the interplay and amplification of crises affecting various sectors necessitate legislation playing a fundamental role in safeguarding rights, both environmental and, first and foremost, human.

1.9 Evolution of the Italian Legislation

At the national level, the growing importance of environmental and social issues has led to a situation where these themes have become so important that they have been turned into constitutional rights.

As a result of the amendments introduced by Constitutional Law 1/2022, Article 41 of the Constitution states that "*private economic initiative is free. It may not be carried out contrary to social utility or in such a way as to be detrimental to health, the environment, security, liberty, and human dignity. The law shall determine the appropriate programs and controls so that public and private economic activity may be directed and coordinated for social and environmental purposes.*"

1.9.1 Corporate Social Responsibility Policies

Undertaking Corporate Social Responsibility (CSR) policies involves companies understanding their business direction and identifying social responsibility practices, including in social communication plans.

To date, there are four reporting tools used to provide information to stakeholders regarding sustainability:

- Social Balance Sheet
- Environmental Balance Sheet
- Sustainability Balance Sheet
- Integrated Report

The Social Balance Sheet is a reporting tool aimed at stakeholders that integrates information provided by economic accounting with ethical and social aspects, which characterize how an organization pursues its institutional goals. The Social Balance Sheet follows the regulatory process mentioned earlier, currently mandatory for a considerable number of companies.

The Environmental Balance Sheet, on the other hand, focuses on the impact that business activities have on the environment. It's a voluntary document lacking standardized reporting, analyzing aspects often not comparable across different business entities.

The Sustainability Balance Sheet and the Integrated Report have a broader perspective: they analyze the economic, social, and environmental performance of the company to contribute to sustainable development.

The sustainability balance sheet is a document prepared by the company according to the guidelines set by the Global Reporting Initiative (GRI). In particular, reflecting the fact that ESG

(Environmental, Social, and Governance) issues are of regulatory interest at all levels, the GRI Standards find greater resonance at the global level.

1.9.2 GRI Standards

The GRI (Global Reporting Initiative) Sustainability Reporting Standards used in the latest versions of Non-Financial Statements came into effect in July 2018. They originated in October 2016 as an update to the previous guidelines (G4 Sustainability Reporting Guidelines of 2013). With the shift from Guidelines to Standards, the GRI reporting format was transformed into interconnected modules designed to be used as a set for preparing a sustainability balance sheet. This way, the GRI model offers greater coherence and a clearer structure for presenting information on corporate sustainability.

The GRI Standards are divided into four series (Gentili, 2017):

- Universal Standards Series 100, which includes: Universal Standards, GRI 101 - Foundation, concerning reporting guidelines and compliance requirements for adopting the standard; GRI 102 - General Disclosures, addressing general, organizational, and contextual information; GRI 103 - Material Topics, focusing on management approaches.
- Specific Standards Series 200 - *Economic*, addressing economic topics (17 KPIs).
- Specific Standards Series 300 - *Environmental*, covering environmental topics (30 KPIs).
- Specific Standards Series 400 - *Social*, dealing with social topics (34 KPIs).

Particularly, to claim that a sustainability balance sheet has been prepared in accordance with the GRI Standards, a company must adopt the following principles:

- Inlusiveness, a set of principles guiding companies on what content to include in the sustainability balance sheet, in the interest of stakeholders.
- Materiality, the sustainability balance sheet should include relevant topics that significantly influence stakeholder assessments and decisions.
- Responsiveness communicated information must be sufficiently accurate and detailed for stakeholders to assess the company's performance.

- Impact, the sustainability balance sheet should comprehensively encompass all material topics and their scope, reflecting the company's significant economic, environmental, and social impacts, allowing stakeholders to evaluate performance over the reference period.

Among these, *materiality* holds particular importance (Gentili, 2017). Materiality analysis helps identify everything that impacts the business or that the business can impact. GRI 3: Material Topics 2021 introduces the materiality approach, including the concept of due diligence and reinforcing the impact concept. A topic is considered material if it represents the organization's most significant impact, be it economic, environmental, human, or human rights related. This implies investigative and evaluative activities to identify key questions that define the company's operational and ethical orientations, involving its stakeholders. Additionally, due diligence and stakeholder engagement assist organizations in identifying their most significant impacts.

Furthermore, consistent with the beginning of this chapter, materiality analysis strengthens accountability and management responsibility for various forms of capital (financial, productive, intellectual, human, social, relational, and natural), enhancing the understanding of their interdependence.

Chapter 2

2. Policy and Regulatory Pressures

Introduction

As discussed in Chapter 1, concern for the environment is being translated into standards and legislation, both globally and nationally. Indeed, companies will have to adapt - and in part, many of them are already taking the correct path - to the demands and directions coming directly from the state if intended at the national level. In this regard, environmental indicators must be developed to properly acknowledge human endeavor's impact on the environment, given that those effects could be extensive and various. Their heterogeneous nature makes the statistical bases used for analyzing them somewhat confusing. Indeed, a conceptual framework that organizes the various environmental data in a way that makes it easier to access and understand for decision-making (*a planning function*) and informational (*a communication function*) reasons is therefore crucial. By doing so, it is also feasible to spot data gaps and focus search efforts on them.

In light of this, significant advancements have been achieved in the creation of conceptual frameworks for crafting environmental indicators. Numerous nations in Europe, along with Canada, the United States, and New Zealand, have devised methodologies and established operational protocols for the selection of comprehensive sets of environmental indicators. These indicators are designed to track alterations in the environmental conditions. Notably, Alberti and Parker's 1993 review, featured in Legambiente's annual report titled "Ambiente Italia 1993," provides an up-to-date overview of the progress in the field of environmental indicators.

However, despite theoretical discussions spanning an extended period, the practical creation of environmental indicators has received relatively little attention within the realm of policy and program development. What has predominantly emerged are sector-specific environmental indicators designed to assess environmental conditions on local, regional, and global levels. Unfortunately, their efficacy in influencing environmental and economic policies has remained quite restricted.

This chapter will then address the so-called "State-Pressure-Response Model", with the aim of critically introduce the reader to the importance of i) first acknowledging the so called "state

indicators”, ii) monitoring the “response” indicators and then iii) implementing the “response” indicators.

After that, the chapter will address the argument of the Urban Vehicle Access Regulations (UVARs), for granting a clear understanding, again both at a European and then Italian level, of the restrictions that are present mainly in urban centers – where firms of our interest operate.

Those UVARs are analyzed and highly considered because, added to the legislation introduced in the first chapter, have a significant impact on the daily business of e-commerce and logistics firms.

2.1 Structure of the State-Pressure-Response Model

For increasing the influence of those environmental indicators, in 1989, the Organization for Economic Cooperation and Development (OECD) launched a program, known as the State-Pressure-Response Model, with the aim of establishing a unified and needed *international* approach. This initiative sought to identify environmental indicators as instruments for seamlessly incorporating environmental factors into the decision-making processes related to development. Among the stated objectives set forth by the OECD were:

- Monitoring the current environmental status.
- Assessing the efficiency and impact of projects, plans, and programs.
- Providing information to both the public and decision-makers.
- Assisting in the formulation of long-term planning efforts.

Indeed, through this PSR program, the OECD intends to shift from a purely explanatory view of environmental indicators to *transform* them into instruments capable of not only describing environmental occurrences but also of interpreting them and providing guidance for the development of policies.

Actually, the scheme developed by the OECD resulted in meeting support not only at a national and local level, but also at the worldwide level, where research institutes like the World Resource Institute have adopted it (WRI, 1995). In fact, also the 1992-1997 studies from the Ministry of the Environment have been using this strategy; such a scheme can be used for a local community (such a province, mountain village, or urban center), at the national level, sectoral level, but also at the level of an individual industrial enterprise.

The pressure-state-response (PSR) structure deriving from the OECD model, though, strives to be an expression of a way of viewing and comprehending the connections between society and the ecosystem – not just a method of arranging environmental data (Neri et al., 2016).

For clarity, it is built from the following trio of questions - that help understand the underlying connections between the anthropogenic and environmental systems:

1. What is happening to the overall condition of natural and environmental resources?
2. Why is this taking place?
3. What steps are being taken to resolve it?

The logic behind such model is that the answers to such questions will be the so-called *indicators* (Neri et al., 2016), that will trigger the actions that are needed or the actions that are already taking place.

1. What is happening to the overall condition of natural and environmental resources?

State indicators: Answers to this first question indicate changes and trends in the biophysical state of the natural environment.

2. Why is this taking place?

Pressure indicators: Answers to this second question suggest the anthropogenic or natural pressures or stresses *producing* environmental change.

3. What steps are being taken to resolve it?

Response Indicators: Finally, answers to such question comprehend the policies that have and are being adopted for facing the environmental issues.

Based on this pressure-state-response model, a plurality of indicators can be organized for different environmental issues and can be considered individually or at multiple level of aggregation, and can further be categorized for industry of firm typology.

For example - for the sake of comparisons among entities - to assess the greenhouse effect, emissions of different greenhouse gases can be combined in order to arrive at an indicator of equivalent emissions.

Given the complexity of the indicators treated, the PSR model is not free of criticisms though (Huang & Kuo, 2011), in the meantime, it resulted as being a valuable instrument for highlighting the importance of the relationship between environmental alteration phenomena and political actions. Indeed, even when the PSR model proves to be inapplicable, it nevertheless offers crucial perceptions into the structural and informational knowledge gaps that characterize the issue being studied.

2.1.1 Characteristics of status, pressure and response indicators

2.1.1.1 Pressure Indicators

Once more, those indicators represent the pressures placed on the environment by human activity, as well as the amount and quality of natural resources that are being deployed.

In other words, thanks to those indicators it is possible to depict the precise pressure factors that contribute to environmental issues. Examples could be the overuse of natural resources, pollution and waste discharge into the environment, the presence of significant infrastructure, or the alteration of natural ecosystems.

Indicators of pressure are very useful when considering environmental policy. In this way, they serve both a descriptive purpose and a direct feedback role about the accomplishment of policy-set objectives (Huang & Kuo, 2011). They are thus very helpful in setting goals and determining whether they have been met and are frequently employed in prospective assessments to determine how various socioeconomic scenarios or environmental policy initiatives would affect the environment.

Carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), and chlorofluorocarbons (CFCs) are the four primary climate-altering gases that must be held primarily accountable for the majority of the global warming (a result of the greenhouse effect). A key indicator of a city's contribution to local and global pollution, for instance, are greenhouse gas emissions from domestic but mainly industrial sources.

In deeper terms, an example of a pressure indicator is greenhouse gas emissions. In fact, the link between anthropogenic activity and gas concentration has long been established, while evidence of human influence on the global climate is growing.

2.1.1.2 State indicators

Those indicators explore alterations in the quality and quantity of environmental elements due to various pressures. Illustrations of these alterations include measuring the concentration of the ozone layer, assessing the availability of natural resources, and monitoring urban air quality.

It's important to recognize that distinguishing between indicators of the environment's condition and the forces impacting it can be challenging, and sometimes, due to technical and financial constraints, it might not be feasible to directly observe environmental circumstances. Consequently, environmental pressure measurement is often used as a substitute for assessing the actual environmental conditions.

2.1.1.3 Response indicators

Those are key indicators, because they consist in the actions taken by society as a whole or specific institutions at various levels in response to environmental challenges. These actions encompass both individual and collective efforts to minimize, adapt to, or prevent negative environmental impacts caused by human activities, to stop or repair harm inflicted upon the environment, and to safeguard and sustain nature and natural resources.

These indicators gauge the extent to which environmental regulations are being adhered to but do not provide insights into the actual state of the environment. As an example, state indicators can indicate the policies that have been implemented – both at national or supranational levels – , the evolution of the relative legislation but cannot suggest how and if the environment is positively responding or not to such policies. Furthermore, while there is a wealth of data available for pressure indicators, information for creating response indicators remains relatively scarce. Indeed, the emphasis on this type of indicator is relatively recent, reflecting society's evolving response to various aspects of the environmental problem.

The importance of defining and creating response indicators is evident, especially when evaluating the efficiency and effectiveness of environmental policies. This becomes particularly significant in urban settings, where demonstrating the successful attainment of specific objectives, even in the face of opposition, such as in the case of urban traffic issues, is crucial for maintaining political consensus and ensuring the continuation of these initiatives. In simpler terms, urban politics often demand that long-term actions be made visible and valued by the local community in the short to medium term, given the timing constraints involved.

After the explanation of the meanings of the three indicators within the RDP model, with a specific focus on the significant environmental impact of the industrial and urban aspects, it is now worth to introduce practical measures that are emerging, especially in urban areas.

The subject that will be discussed has direct implications for the industrial sector and logistics companies. Specifically, the concept of "Urban Vehicle Access Regulations," which, among other functions, involves limiting vehicle access within urban centers, and will undoubtedly serve as a catalyst for logistics companies to adapt their operations, particularly those related to deliveries.

Given the relevance of this piece of regulation for the discussion in this thesis, a specific section will be devoted to the analysis of UVAR.

2.2 Introduction to UVAR

Urban and regional access schemes are 'measures to regulate vehicular access to urban infrastructure' (European Commission, 2013), and they are generally designated under the term "UVAR". They include Low Emission Zones (LEZ), Limited Traffic Zones (LTZ), and other examples that will follow. The "R" in UVAR refers to regulation rather than limitation. This is to emphasize the significant feature of a UVAR, which can also decide not to completely ban entry for vehicles but to designate and regulate the circumstances under which they can enter a particular area (Civitas ReVeAL, 2021).

Various administrative and governmental departments (environment, mobility, urbanism, etc.) and authority levels (local, regional, national) can be involved in their setup. UVARs are adopted at a local level by various types of authorities across European cities and regions.

As mentioned in previous sections, it is crucial to connect with and acknowledge all of the urban centers involved; in fact, making sure that road users are aware of the rules needs to be a priority concern. The way the regulation is communicated also varies from one area to another: some local governments print it in regional newspapers, while others include it into software that varies from city to city.

Establishing an overview of UVARs in Europe is required to provide a common data encoding a standard, taking into account the diversity of the measures and processes - though all are adopted with the same general overarching goals, including urban mobility sustainability, traffic reduction, air quality improvement and improvement to the urban living realm (Lopez, 2018), etc. However, the

variety of channels and languages in which UVAR information is disseminated makes it difficult for firms and stakeholders such as local regulatory bodies to deal with it. As a result, there is a set of guidelines known as the "UVAR Box" that intends to provide guidance at a European level on how to handle shared standards and alignment; these guidelines in fact rely on multiple partners with in-depth expertise on UVARs from different EU countries.

2.2.1 Definition of UVARs

UVARs, which stands for Urban Vehicle Access Regulations, encompass a range of measures designed to control and manage the entry of motorized vehicles into urban infrastructure and areas at both urban and regional levels. As mentioned earlier, UVARs come in various forms and types (Lopez, 2018).

The UVAR Box project, along with its associated guidelines, primarily focuses on the most common UVARs found in the European Union, including:

Low Emissions Zones (LEZ): These are areas where restrictions are imposed on vehicles based on their emissions levels to reduce air pollution.

Congestion Charges (CS): These are systems where charges are levied on vehicles entering certain areas during peak traffic hours to alleviate congestion.

Limited Traffic Zones (LTZ): These zones restrict vehicle access to specific areas for various reasons, such as preserving historical sites or reducing noise.

Additionally, the project also addresses:

Parking Regulations (PARK): These regulations govern parking within urban areas, although their scope extends beyond merely controlling access to urban infrastructure.

Pedestrian Zones (PED): While primarily aimed at pedestrian safety and promoting walking, pedestrian zones are also covered by the project, even though their purpose extends beyond access regulation to urban infrastructure.

In essence, the UVAR Box project and guidelines offer insights and recommendations for managing and implementing these different types of urban vehicle access regulations within the EU.

On a more abstract level, a UVAR (Urban Vehicle Access Regulation) establishes rules for when specific vehicles can enter designated areas within a city. These regulations encompass various criteria, including:

- Vehicle characteristics like weight and size (e.g., maximum height, width, length, or axle weights).
- Timing restrictions (such as certain hours of the day or particular days of the week).
- Emission standards, either per vehicle or for a specific zone.
- Residential status considerations.
- The requirement to pay a designated fee.
- Occupancy thresholds.

The UVAR Box tool is designed to facilitate the digitalization of all types of UVARs. It employs data models and encoding formats that are applicable across the board. UVAR Box partners will primarily focus on gathering data related to Low Emission Zones (LEZs), Controlled Traffic Zones (CSs), and Limited Traffic Zones (LTZs) within predefined target areas. In the following, each kind of regulation will be explained in detail.

2.2.2 Typology of UVARs

The five categories of UVARs that the UVAR Box tools will support for digitization are explained below with examples (Civitas ReVeAL, 2021b).

2.2.2.1 Low Emission Zones (LEZ) and diesel bans

Low Emission Zones (LEZs), diesel bans, and pollution control areas represent designated areas where the entry of vehicles emitting pollutants above a certain threshold is limited, with the primary aim of enhancing air quality. Within certain LEZs, vehicles falling short of the prescribed emission criteria may still gain entry, either by paying a fee or meeting specific criteria (e.g., emergency vehicles). Notably, some LEZs are categorized as Zero Emission Zones (ZEZs). Presently, a limited number of these zones are operational, and additional ones are under development for the future.

2.2.2.2 Congestion charging schemes & urban road charging schemes (CS)

In areas where congestion pricing systems are in place, a fee must be paid to gain access to the designated zone. The primary goal of this system is to alleviate traffic congestion, improve air quality, and reduce noise pollution. The collection of this fee is predominantly carried out through cameras and electronic transponders, or by paying the charge upon entering the zone.

For instance, Milan, Italy, serves as an illustration of this concept. To enter the restricted zone, individuals must purchase a ticket and activate it. This rule applies to all vehicles except for electric vehicles, motorcycles, and mopeds. The zone operates on weekdays from 07:30 to 19:30 (with an exception on Thursdays, ending at 18:00), excluding bank holidays. The enforcement of this congestion pricing system relies on surveillance cameras. Additionally, vehicles that do not meet the specified emissions standards are prohibited from entering the area, even if they have paid the fee, creating a combined congestion and low emission zone.

2.2.2.3 Limited traffic zones (LTZ)

Limited Traffic Zones (LTZs) are specific areas where entry is allowed only to those possessing the requisite permits. These permits often come with conditions that specify the purpose of the trip, the type of vehicle, and, in some cases, may involve payment or emissions-related requirements. Typically, these access restrictions are applicable during specific time intervals, such as between 21:00 and 06:00, with certain exceptions for residents' vehicles, delivery vehicles, and similar cases.

For instance, consider the LTZ in Celano, Italy. This LTZ is active from 21:00 to 06:00, during which no vehicles can enter unless they are exempted from this restriction.

Another example is the Gent Restricted Traffic Area, where vehicles need permits to enter a central zone based on various criteria.

2.2.2.4 Pedestrian zones (PED)

A pedestrian zone is an area where most or all automotive traffic is forbidden and only intended for use by pedestrians. Most of the vehicles that qualify for exemptions are delivery trucks and emergency vehicles. For the convenience of pedestrians, almost every city has pedestrian zones. A few pedestrian zones allow bicycles, pedal cycles, and other light or active "road" users, it is important to know this.

2.2.2.5 Parking regulations (PARK)

Restricted parking zones are designated areas where only residents or individuals holding permits are permitted to park during specific time periods. The primary objective is to alleviate parking congestion in residential neighborhoods or urban areas. A notable example is Germany's "Parkraumbewirtschaftungszonen," where residents can obtain permits, enabling them to park permanently within their residential zone. Non-residents have the option to purchase temporary parking permits from ticket machines. Typically, these zones have defined time constraints, such as allowing parking on weekdays between 09:00 and 19:00 and on Saturdays from 10:00 to 16:00.

2.2.2.6 Combined schemes

Schemes that combine various scheme types are becoming more prevalent. For instance, LTZs that include emission standards and permit fees, or LEZs that are implemented through a pricing system.

2.3 UVAR in Italy

With several hundreds of UVARs, Italy has the most in Europe. LTZs are the most common UVARs, but there are also other distinct Low Emission Zones (LEZs) with various criteria and durations, mostly in northern Italy, but also in mid-Italy and Sicily - Milan and Palermo both have combined LEZ and urban road tolling schemes. Municipalities are the UVAR-responsible authorities, and the national Road Code dispositions guide enforcement. The process of digitizing publications is progressively beginning in Italy.

2.3.1 Current and planned UVAR measures in Italy

2.3.1.1 LEZ

In the CLARS database (European Commission, 2022), there are 86 city-level Low Emission Zones (LEZs), as well as 90 winter-specific LEZs. These LEZs are primarily enforced in the northern Italian regions of Emilia Romagna, Lombardia, Piemonte, and Veneto. In June 2017, these regions jointly signed an agreement with the Minister of Environment to enhance air quality in the Po valley, an area notorious for having the worst air pollution levels in Europe. This region is particularly susceptible to high pollution due to its geographical location, being enclosed by the towering Alps and Apennines mountains. Currently, it stands as the largest LEZ network in Europe.

Regarding emergency pollution measures, the CLARS database contains information on 97 such schemes. Similar to LEZs, these emergency measures are enforced within the same four northern Italian regions mentioned earlier, in accordance with the aforementioned agreement. These temporary emergency pollution schemes are activated based on air pollution levels and forecasts, especially when PM10 levels surpass pollution thresholds for 3, 4, or 10 consecutive days. These emergency measures are implemented on a regional scale and specify the cities involved, determined by population criteria.

2.3.1.2 Combined schemes

In Italy, there are two operational charging systems in place, situated in Milan and Palermo. These systems are integrated with Low Emission Zone (LEZ) schemes. In various other cities, there might be charges associated with entering their Limited Traffic Zones (LTZ), particularly for occasional visits, thereby encompassing substantial Congestion Surcharge (CS) elements. Additionally, these charges are often converted into yearly fees for acquiring permits within specific user categories, with possible distinctions in fees based on factors such as whether on-street parking is permitted or for residents' second or third vehicles.

2.3.1.3 LTZ

In June 2019, the Italian Ministry of Transport, specifically the Directorate General for Road Safety, issued the "Guidelines for the Regulation of Road Traffic and Signage in Limited Traffic Zones" (LTZ). This document introduced and outlined standardized rules for the proper planning and implementation of LTZs, as well as Pedestrian Areas (PEDs). It also differentiated between temporary and permanent schemes and aimed to restrict the presence of adjacent LTZs with differing regulations to prevent confusion among users.

These guidelines (Fenton, 2021) provided specific instructions regarding the terminology to be used at entry or exit points of LTZs and PEDs, which includes Variable Message Signs (VMS) displaying information in both Italian and English languages. Furthermore, the document outlined precise specifications for the layout and positioning of road signage within these zones.

The Ministry continues to be in charge of granting prior authorization and certification for all UVAR enforcement systems that municipalities may install. Nevertheless, cities are no longer required to seek approval for their digitally enforced LTZ/PED systems, thanks to a recent regulatory update.

2.3.1.4 PARK

Italian cities commonly feature on-street parking zones for residents and paid parking programs, which have gradually replaced time-limited parking disc systems. Typically, residents are eligible for reduced parking fees or even free parking permits for their primary vehicle, provided they do not own a private parking space or garage.

2.3.1.5 PED

Nearly all Italian cities have designated pedestrian areas, and these areas follow specific regulations similar to those outlined in the Road Code. The only motorized vehicles permitted in these zones are those used for emergency or public security purposes (such as police cars, ambulances, and fire trucks), vehicles for freight loading and unloading (with restricted time windows), and those owned by residents who require access to their garages or individuals with blue badges. Bicycles, on the other hand, are always allowed. Additionally, some cities have multiple schemes in place, and there are approximately 370 to 460 Urban Vehicle Access Regulation (UVAR) cities that can be reached through the CLARS database (European Commission, 2022).

2.4 Impact of Regulatory Schemes

Recent literature suggests that given the strong impact regulations may have, it is worth to develop a contextual framework for assessing this and other top-down forces.

The forthcoming framework endeavors to categorize all the pertinent factors concerning the stakeholders mentioned earlier into four essential policy-related pillars for a policy toolkit. These pillars are (Latinopoulos et al., 2021):

- User attributes
- Patterns of spatiotemporal usage
- Effects on the system, including environmental and traffic congestion considerations
- Implications for policy and regulations

To exemplify the application of this policy toolkit at the urban level, we have engaged in an analytical exercise focusing on e-scooters in Paris. A rudimentary analysis (Latinopoulos et al., 2021):is presented for each of these four pillars as an illustration, along with the prerequisites for conducting a comprehensive policy analysis.

The examination within each category has the potential to spark autonomous avenues of research and initiate dialogues that will culminate in a comprehensive solution. For instance, it may prompt inquiries such as: What measures should be taken to make e-scooters, or other electric vehicles, available to a diverse array of demographic groups? What obstacles exist in ensuring that e-scooters serve as a secure option for first and last-mile travel? How can sustainable and safe mobility be realized through the deployment of e-scooters?

The main pillars are showed in the mind map in Figure 2.1 (Latinopoulos et al., 2021):

Evaluation framework for free-floating micromobility modes

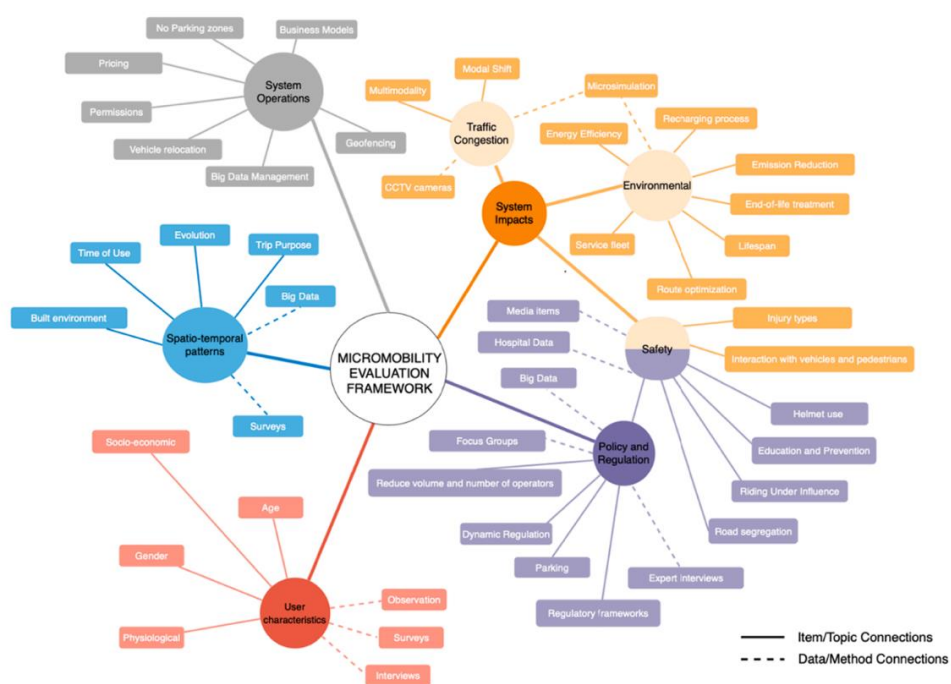


Figure 2.1

Instead, Figure 2.2 (Latinopoulos et al., 2021) provides a higher-level illustration of the proposed micromobility evaluation system, clearly displaying the four interconnected policy-relevant pillars.

Relationship of micro-mobility policy toolkit pillars

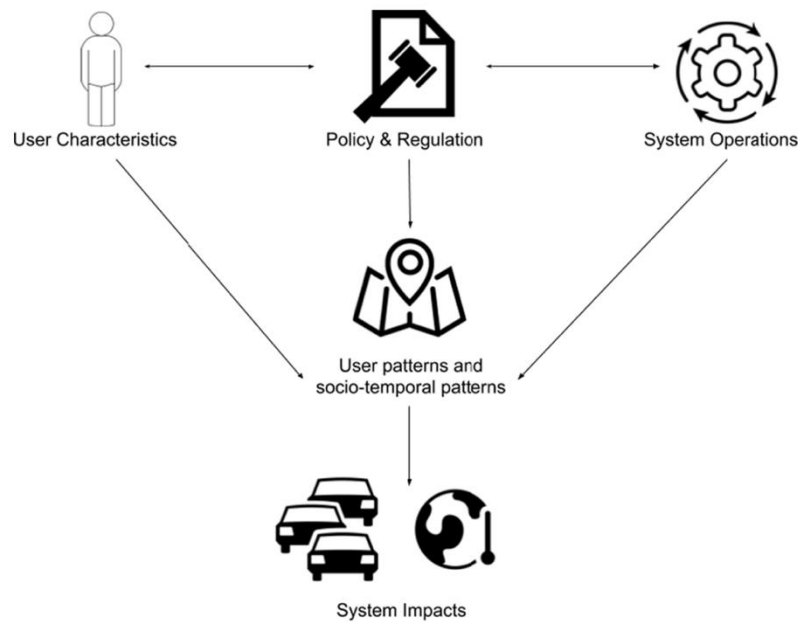


Figure 2.2

The purpose of constructing this multifaceted analysis is to develop a policy toolkit capable of aiding in the strategic planning stages for the implementation of micromobility services in urban areas. Simultaneously, stakeholders can evaluate the effectiveness of existing systems and pinpoint areas of weakness and policy deficiencies. Cities, akin to living organisms, undergo continuous evolution and adaptation to their surroundings, and micromobility, like other components of this organism, is subject to this evolutionary process.

Given that e-scooters – the example chosen to be dealt with - represent a relatively recent addition to the realm of micromobility, our literature review is extended, as necessary, to extract insights from other established micromobility services.

Among the factors impacting the adoption of sustainable solutions, recalling both the OECD PSR model and the UVARs, the dissertation’s focus will now be on the policies and regulations’ implications.

2.5 Policy and regulatory implications

The success of a micro-mobility sharing program relies significantly on the regulations and decisions made by policymakers. Evaluating the impact of new policies on safety can involve various methods, such as conducting focus groups, interviewing experts, and analyzing activity and accident data (Martin et al., 2016). Scholar Gossling's findings in 2020 demonstrated that cities that introduced e-scooters without considering adequate policies faced safety issues. To address these problems, a media analysis recommended that urban planners implement policies related to maximum speed limits, mandatory utilization of bike infrastructure, designated parking areas, and limitations on the number of service providers.

One noteworthy observation from this research is how regulatory concerns evolve following the introduction of e-scooters in cities. The absence of standardized regulations is also emphasized by further scholars (Martin et al., 2016), who propose that requiring helmet usage could potentially reduce the severity of injuries.

Examples follow on how cities across the world are taking compliance safety measures linked to micromobility services. Indeed, safety issues are, within such framework, one of the main triggers for shaping regulations.

In Europe, the micromobility landscape has shifted from being largely unregulated to adopting more adaptable regulatory frameworks that either encourage or penalize operators based on their performance. Leading the way in this transition are cities in France, Germany, and Belgium. However, this is not the case everywhere, as cities like Madrid and Copenhagen allow multiple operators with strict limits on fleet sizes, leading to less sustainable solutions.

Indeed, regulatory concerns have become a central topic of discussion among policy experts and have started to find their way into national laws in recent years. One particularly challenging regulatory issue is the allocation of parking space for micromobility modes. It is crucial for municipalities to prevent situations where these vehicles obstruct sidewalks, creating obstacles for pedestrians. Improperly parked e-scooters are especially problematic for people with disabilities (Portland Bureau of Transportation, 2018). For instance, in Montreal, after a three-month trial period, the city authorities decided to ban e-scooters, citing one of the main reasons as the fact that only 20% of the vehicles were parked correctly after use (Laframboise, 2020).

There are straightforward solutions to this problem, including investing in infrastructure like parking racks and implementing geofencing technology that encourages riders to park their vehicles in designated city-approved zones. A successful example of this can be seen in Aarhus, where 60% of e-scooter trips ended at these designated parking hubs (EY, 2020). In San Francisco, operators collaborate with the local transportation agency to develop a locking mechanism that prevents e-scooters from obstructing sidewalks.

Further investigation is essential to understand how improper parking practices affect various types of sidewalk spaces and different traffic conditions. These research studies should also assess the role of enforcement in addressing pedestrian access issues and resolving conflicts with other parked vehicles. It is crucial to invest in infrastructure improvements to redefine road segregation and curb management.

Currently, e-scooters and other micromobility vehicles do not have dedicated portions of the road allocated for their use. Consequently, some riders choose to use the sidewalk while others opt for the street, leading to discomfort and safety concerns for pedestrians. In fact, the average speed of e-scooters, approximately 25 km/h, makes them more suitable for bike lanes or streets. In Germany, there is a legal requirement for e-scooters to use bicycle infrastructure whenever it is available, which is not the case for bicycle riders. If there is no dedicated infrastructure, it becomes mandatory to use e-scooters on the road rather than the sidewalk. Violating these regulations can result in fines, highlighting the need for enforcement and clear regulations (Latinopoulos et al., 2021).

One initial approach to tackle the safety concerns mentioned earlier involves reducing the presence of e-scooters in congested urban areas. However, it's important to note that decreasing the number of environmentally friendly vehicles is not a viable solution. Therefore, it is crucial to focus on deploying such vehicles in a regulated manner.

Cities have begun implementing licensing systems and tender processes to restrict the number of operators, creating an environment that encourages sustainable and responsible practices while providing operators with financial stability for their investments (EY, 2020). Also, when the quantity of shared vehicles is limited, it becomes more feasible to restrict access to specific zones.

Contrary to e-scooters, the reduction of vehicles is not necessarily the solution for bike-sharing systems. Research (Martin, 2016) has indicated that increasing the number of shared bikes in urban

areas can contribute to a decrease in traffic collisions. However, one area where there is still a lack of laws and regulations pertains to riding under the influence (RUI). According to a study conducted by Kobayashi et al. (2019), 48% of hospitalized riders who were tested for alcohol were found to be affected at the time. Arguably, this can have similar effects to driving under the influence, impairing riders' ability to make appropriate decisions and react promptly.

Proactive measures involving education and the establishment of clear policies, drawing from lessons learned in the automotive sector, can have a significant impact in this context.

In Germany, recent legislation treats e-scooters on par with other motorized vehicles, imposing the same alcohol limits for riders as for drivers. This underscores the importance of regulatory responses to safeguard public health and raise awareness within the e-scooter rider community.

Additionally, as demonstrated in studies like UVAR, the variation in results due to regional characteristics and small sample sizes emphasizes the need for innovative data collection methods to thoroughly investigate safety concerns associated with e-scooters.

In this regard, a thorough analysis (Ma et. al, 2021) of existing guidelines and policies governing the use of E-Scooters in 156 U.S. cities, identifying key issues to support the planning and operation of E-Scooter programs in urban areas. They specifically highlighted critical gaps, commonalities among cities, the significance of post-evaluation, and the necessity for municipalities to implement actionable guidelines based on quantitative performance metrics.

Throughout history, different circumstances have prompted the introduction of new regulations and requirements. The outbreak of the Covid-19 pandemic in 2020 significantly disrupted transportation, leading governments to invest in and develop comprehensive plans to promote walking, cycling, and micromobility as safe modes of travel and to alleviate the burden on public transport. In some instances, this crisis served as a catalyst for the regulation of e-scooters.

For example, in the UK, which had previously taken a different approach from continental Europe by banning the use of this new mode, e-scooter trials were expedited by one year (DfT, 2020). There are also indications that micromobility usage patterns have shifted after the pandemic, with more individuals now considering them as complete transportation solutions rather than complementary modes. In cities like Lyon and Paris, the number of regular micromobility users has tripled, and the median trip length has increased by 15%.

2.6 Paris case study

Evolution of micromobility and regulatory context

For the sake of bringing a concrete example of the interconnections between micromobility vehicles, need, regulations and adaptation, the Paris case study will follow.

Paris introduced its inaugural bike-sharing system called Vélib' in June 2007, initially deploying 1500 bike stations across the city. In the first year of operation, the system garnered 200,000 registered users, and an impressive 26 million bike trips were recorded (Laporte et al., 2015). In 2011, the bike-sharing service was complemented by Autolib', an electric car-sharing service. In major cities, cycling has emerged as a viable alternative to car usage, particularly for trips under 5 km (Ministère de la Transition écologique et solidaire, 2018).

Over the course of the subsequent decade, Paris experienced a noticeable reduction in road traffic and urban disturbances (Autolib' Vélib' Métropole, 2019). Since 2007, the range of shared mobility services in Paris has expanded significantly. Operators such as ZipCar, Ubeeqo, Mobilib', and Communauto have provided access to both electric and non-electric shared cars. Vélib' was no longer the sole bike operator in the city, as it was joined by Obike, Ofo, and Mobike, offering bike and e-bike dockless services. The most recent additions to the market are motor scooters and e-scooters. Electric scooters made their debut in Paris in June 2018, with hundreds of vehicles made available. The objective was to offer an efficient and reliable multimodal mobility service tailored to the needs of the city's residents (Latinopoulos et al., 2021).

At the time of the research, e-scooters were provided by 12 different operators in the city. A Code of Conduct for e-scooters was introduced on May 13, 2019, aiming to address e-scooter parking issues and enhance the quality and terms of use by actively involving micromobility operators. This initiative empowered the Paris City Hall to impose fines on riders using sidewalks and to allocate dedicated spaces for e-scooter parking. Meanwhile, operators were tasked with ensuring the quality and safety of their vehicles, encouraging helmet use, and informing users about potential risks and accidents associated with their vehicles (Latinopoulos et al., 2021).

Subsequently, in October 2019, a new bill was signed, granting additional authority to local authorities, including the ability to reduce the number of vehicles and operators and to enforce maintenance, noise, and pollution standards.

Such a peculiar case shows how across time, the implementation of alternative modes of transportation paves the way for new successes, but on the other hand brings new issues to attention - which is exactly why policies evolve at fast and constantly evolving pace. Similarly, whether public or private, within today's environmental needs and modern views of transportation methods, a key element of cities and firms is precisely flexibility.

A common theme that has emerged from the various aspects examined, as well as the discussion surrounding the nationwide communication of UVAR (Urban Vehicle Access Regulations), is the necessity for cooperation between micromobility operators and local authorities. These two parties must establish how they collaborate in deploying micromobility vehicles and integrating them with public transportation and other active travel modes. This collaboration ensures fairness for citizens, the sharing of data for further research and proper assessment of operational methods, the monitoring of environmental objectives, and potentially the implementation of data-driven adaptive regulations.

While the COVID-19 pandemic significantly disrupted the landscape, causing a dramatic drop in micromobility trips at the beginning of 2020, the market is now resurging even stronger. Transportation agencies must rise to the challenge of accommodating mobility needs within the constraints of limited public transport capacities, all without compromising environmental targets by increasing vehicle emissions.

Investments in infrastructure that support active travel, such as dedicated cycling lanes, pedestrian sidewalks, and traffic-calming measures, are increasingly on the agendas of governments and local authorities. In this uncertain environment, the micromobility vehicle market has the opportunity to restructure itself in an organized manner, guide high-level decision-making, and play a vital role in shaping the way forward.

In this regard, it is worth asking ourselves whether a country has or not the proper infrastructure to welcome the implementation of sustainable vehicles, which is precisely the point where the private sphere meets and needs to find a time-sustainable balance with the public sphere.

2.7 The role of infrastructures

Italy does have the basic infrastructure in place to support eco-sustainable logistics solutions, but there are challenges and opportunities to consider within the context of sustainable logistics in the country (Nigro & De Vicentis, 2018).

2.8 Challenges

Italy faces several challenges in promoting eco-sustainable logistics due to various factors. One major issue is aging infrastructure, as many parts of the country's road and rail networks are outdated and in need of significant modernization. However, these infrastructure investments can be costly and time-consuming to implement. Urban congestion is another significant challenge, particularly in major cities like Rome, Milan, and Naples. Severe traffic congestion in these urban areas can impede the efficiency of sustainable logistics solutions, such as electric vehicle deliveries or cargo bicycle services. Addressing this issue may require specific infrastructure plans and traffic management measures to make urban areas more accessible to electric vehicles.

Italy's diverse topography, which includes mountainous and coastal regions, presents logistical challenges. Deliveries and transportation in these areas may require tailored solutions, such as specialized vehicles for mountainous regions. The unique geography of Italy adds complexity to the logistics landscape, requiring careful planning and adaptation to overcome geographic obstacles.

2.9 Opportunities

In Italy, there are several opportunities to advance sustainable logistics. The country's well-developed railway network offers a promising avenue for more eco-friendly freight transportation when compared to traditional road transport. Additional investments in railway infrastructure, particularly electrification, could further bolster this sustainable transportation option.

Italy's numerous strategically located maritime ports provide a vital opportunity for sustainable goods transport by sea. By enhancing port accessibility and optimizing port operations, Italy can play a significant role in promoting sustainable logistics and reducing the environmental impact of freight transportation.

Some Italian cities have already taken steps to encourage sustainable mobility through initiatives such as restricted traffic zones (ZTL) and incentives for low-emission vehicles. These efforts not only contribute to more sustainable urban transportation but also support eco-friendly logistics solutions, including emissions-free deliveries within city limits.

Furthermore, embracing emerging technologies, such as electric vehicles, delivery drones, advanced logistics management systems, and cargo tracking, can greatly improve the efficiency and sustainability of logistics operations across Italy. These innovations offer the potential to reduce environmental impact while enhancing the overall effectiveness of the logistics industry in the country.

Finally, Italy has the potential to develop eco-sustainable logistics solutions, but addressing existing infrastructure and logistics challenges is essential to maximize this opportunity (Nigro & De Vicentis, 2018). Investments in infrastructure, coupled with targeted government policies and incentives for the adoption of sustainable logistics practices, can play a pivotal role in promoting sustainable logistics in the country.

2.10 Companies' adaptation to the Regulatory framework

Undoubtedly, sustainability has become one of the most relevant and pressing challenges for private logistics companies worldwide. In recent years, environmental regulations and policies have intensified, reflecting the growing awareness of the environmental impact of business operations. It is at such point worth to comprehend why adapting to these regulations and policies is crucial for the survival and prosperity of private logistics companies.

First and foremost, it is essential to recognize that sustainability is no longer a choice. The effects of climate change, depletion of natural resources, and environmental pollution are becoming increasingly evident and pose real threats to our planet and society (Rossato, 2018). In this context, governments and international organizations are adopting stringent policies and regulations to reduce the environmental impact of commercial activities, including logistics.

Logistics companies must understand that compliance with these policies and regulations is not only a social responsibility but also an economic imperative.

Some pivotal reasons explain why adapting to sustainability is vital:

Legal compliance is of paramount importance in the environmental context, as violations of environmental laws can result in significant fines and heavy legal penalties. To avoid high legal costs and damage to the company's reputation, it is essential to adhere to environmental regulations. Furthermore, adopting sustainable practices can lead to significant cost savings. For example, by optimizing routes and using low-impact vehicles, it is possible to reduce operating costs such as fuel and maintenance expenses. The growing consumer interest in environmental issues presents growth

opportunities in the market. Companies that demonstrate a commitment to sustainability can attract a broader and more loyal customer base.

Moreover, many financial institutions are beginning to favor companies with a focus on sustainability. Compliance with environmental policies can facilitate access to favorable financing and investment opportunities. Climate stability and environmental challenges can disrupt supply chains and logistics operations for businesses. Companies that implement sustainable measures are often more resilient and better prepared to face extreme events. Finally, a strong commitment to sustainability can enhance the company's reputation and brand value. Consumers and business partners are increasingly interested in collaborating with companies that demonstrate social and environmental responsibility, which can contribute to the long-term success of the company.

In conclusion, private logistics companies should embrace sustainability as an integral part of their operations. This is not just a regulatory requirement, but an opportunity to thrive in a world where sustainability has become a central priority. Adapting to environmental policies and regulations can lead to financial benefits, enhance corporate reputation, and help build a more sustainable future for all.

Chapter 3

3. THE AMAZON CASE

Introduction

E-commerce industry has been around since 1990s, but it is growing at a breakneck pace, expanding its use and service to be potentially covered. The growth of this phenomenon derives in turn from the e-commerce role in driving massive job growth in related industries, such as Warehousing, IT Support, Customer Service, as well as in Delivery and Logistics, the areas of interest of the dissertation.

Economic gains globally have been substantial, especially with the avenue of the pandemic, but another aspect that need to be challenged and analyzed it is the environmental impact of e-commerce expansion. In fact, e-commerce shows to be 17% more carbon efficient that traditional retail (Lingble, 2022).

To what extent, though, is e-commerce truly and only beneficial for the environment?

It is worth to attempt answering such question by focusing on a specific case-study, and bringing attention to how the company Amazon.com, the global e-commerce giant, is behaving.

In the rest of the Chapter, the e-commerce impact on the environment will be treated and it will be shown that is not as smooth as it seems, there are darker areas that need to be addressed, and the path toward decreased/zero emissions can also be long and controversial.

3.1 Amazon.com case study

Global temperatures are rising, and it is commonly recognized that this is due to the vast generation of greenhouse gases. It's important to evaluate whether Amazon, the top e-commerce corporation in the world and one of the most well-known brands, is now making efforts to assist Sustainable Development Goal 13 (SDG 13) on climate change. (Li, 2023)

As mentioned at the outset of the dissertation, the 30-year sustainable development agenda and its 17 Sustainable Development Goals (SDGs) were formally launched at the beginning of 2016 (Martin,2018). Furthermore, the comprehensiveness and indivisibility traits of the 2030 agenda stand out among other sustainable development initiatives (Bennich & Carlsen, 2020). To put it another way, this agenda is applicable to all nations, and it cannot be implemented in a silo. Therefore, fostering sustainable development necessitates collaboration and action on the part of all nations.

Given Amazon's prominence in e-commerce and the widespread concern about climate change, it is crucial to focus on Amazon and SDG - 13, particularly on Amazon's transition to net-zero carbon.

But why Amazon?

With the aim of considering the impact of logistics companies and industries as well as considering the growth daily faced by the E-commerce phenomenon, Amazon is with no doubt the Company which fits the scope of the study and which impact is significant and worth of attention.

Amazon.com was the first company to transition book retailing from offline to online (Machlis, 1998). Today, *"Amazon.com is an international e-commerce company that offers online retail, computing services, consumer electronics, digital content and other local services such as daily deals and groceries."* (Statista, 2022). Furthermore, Amazon is regarded as one of the most powerful brands in the world due to its widespread popularity and influence on a global scale. (Statista, 2022)

Figure 3.1 demonstrates that, in 2022, Amazon classified as the most valuable brand among other e-commerce enterprises, with a brand value that is 1.2 times greater than that of Microsoft Corporation in the US and four times greater than that of Alibaba, the leading e-commerce platform in China. This says a lot about the commercial worth and market dominance of Amazon.com.

Leading brands worldwide in 2022, by brand value (in billion U.S. dollars)

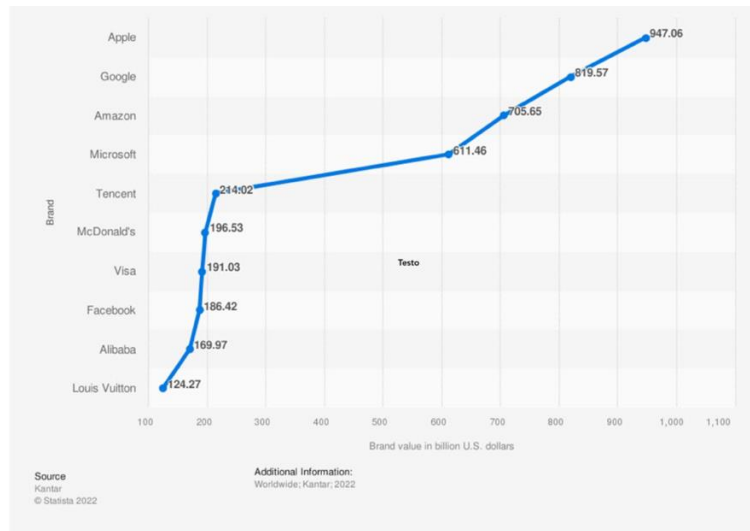


Figure 3.1

Because Internet companies seek to create and develop competitive advantage, it is relevant to point out that within such industry Amazon has been growing internationally as an international business.

The epidemic's catastrophic effects, including job losses, unpaid leave, and wage reductions, emphasized the importance of safeguarding capital, building up financial reserves, and reducing discretionary expenditure. In particular, the movement in customer behavior toward online shopping, in-store pickup, and home delivery, whether you're purchasing groceries or personal computers, has been accelerated by worries about health and safety. (Li, 2023)

Figure 3.2 shows instead how Amazon's UK – the market where our firm of interest faced a major growth in the last decade - revenue increased from \$39,304 million to \$162,360 million between 2010 and 2021. It ought to be noted to note that – as aforementioned - the epidemic era from 2019 to 2022 did not account for Amazon's revenue to fall, rather given the nature of the business they increased.

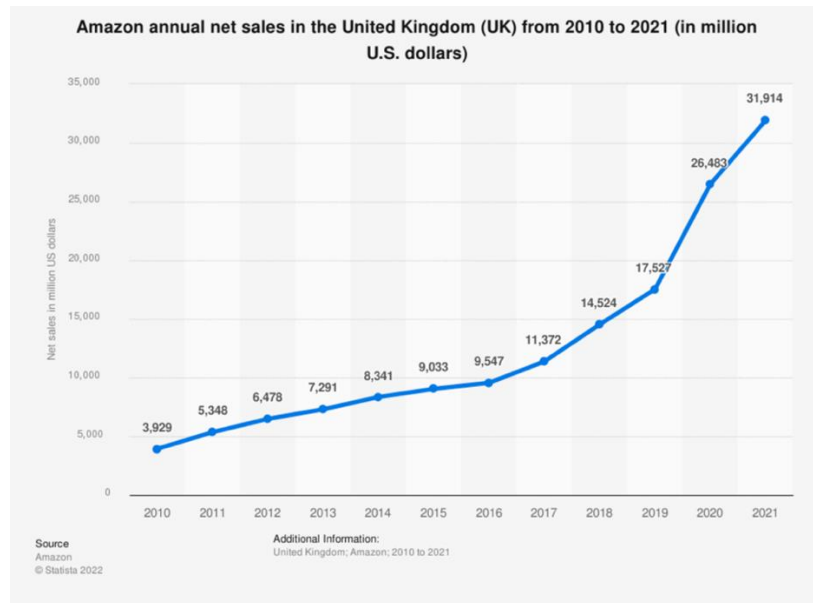


Figure 3.2

Amazon is a company which bases its giant business on 14 fundamental principles, experienced as the pillars of the Company. In this context it is indeed possible to recall the one that follows.

3.1.1 “Success and Scale Bring Broad Responsibility”

“We started in a garage, but we’re not there anymore. We are big, we impact the world, and we are far from perfect. We must be humble and thoughtful about even the secondary effects of our actions. Our local communities, planet, and future generations need us to be better every day. We must begin each day with a determination to make better, do better, and be better for our customers, our employees, our partners, and the world at large. And we must end every day knowing we can do even more tomorrow. Leaders create more than they consume and always leave things better than how they found them.” (Leadership Principles, Amazon.com)

The idea suggested by the aforementioned citation by Amazon.com underscores the importance of concrete awareness of impactful business entities. As emphasized in the first chapter, especially at

the legislative level, it is now inadequate to solely assess a company's performance based on profits. Following the acknowledgment and a significant evaluation of a business' environmental, social (primarily human), and governance impacts, it becomes crucial to undertake tangible, long-term actions that also yield partially visible and measurable results in the short term. This short-term, daily-impact perspective has emerged from the urgency of the current environmental situation that must be addressed.

Naturally, to achieve this, Amazon relies not only on the collaboration with other businesses but also on engaging third parties and its main stakeholders, working toward a shared objective. It is undeniable that, at least in the medium term, improvement in sustainability often entails considering the possibility of a trade-off between economic benefits, profit, and innovation in the sustainable realm.

This is why the role of consumers and investors in supporting and aligning with the company's pursuit of corporate growth while respecting the global environmental situation becomes pivotal and will soon be addressed.

Thus, Amazon should examine every component of the whole supply chain to look for methods to cut back on delivery, boost technological investment, etc.

3.2 The role of stakeholders

The client is the most significant stakeholder for Amazon. In line with the 1997's study conducted by the scholar Mitchell, the "stakeholder typology" (Li, 2023) involves three main relationship attributes, being those *power*, *urgency*, and *legitimacy*.

The client, the stakeholder who is pivotal for the existence of a company, constitutes itself one of the three attributes in question. Customers can help Amazon make money, and for the firm, money is what it is valued the most. Not to forget though suppliers and Amazon's investors, or shareholders, other two parties that play a significant role in other factors.

Inserted into this context is another foundational pillar, part of the *14 Leadership Principles* promoted by the Company, namely that of *Customer Obsession*: "*Leaders start with the customer and work backward. They work vigorously to earn and keep customer loyalty. Although leaders pay attention to competitors, they obsess over customers.*" (*Leadership Principles, Amazon.com*)

Once again, it is evident how the customer is the true focal point around which all of Amazon's energies and attentions, and those of most customer-centric companies, revolve. This underscores the importance of striking a balance between the continuous focus on the consumer—sustaining performance at a continuously high pace and never failing the promise made to the customer in terms of products, services, and timing—while simultaneously striving for growth in line with the Climate Pledge, a commitment made instead to one of the main stakeholders, namely the environment itself.

Current literature developed the so-called *stakeholder theory*, aimed at analyzing the potential firm's behaviors to be adopted toward its stakeholders (Donaldson & Preston, 1995).

Among the various stakeholder theories, one of the most substantial is the *normative stakeholder approach*. This approach defines how businesses should function, particularly on an ethical level (Wagner et al., 2011). Advocates of this perspective offer alternative depictions of business operations that enable managers to engage with stakeholders at a heightened ethical level. Their focus encompasses the company's developmental focus, including its objectives and the methods it employs (Jones & Wicks, 1999).

Centered around Amazon.com, this seems to signify that the Company is dedicated to enhancing the customer's shopping and logistical experiences and strives for profitable outcome – in line with the *Customer Obsession* pillar mentioned earlier - irrespective of the volume of CO2 emissions generated. Additionally, Amazon maintains a general interest in cultivating favorable relationships with its suppliers. Nonetheless, prioritizing a customer-centric approach without acknowledging the consequences of climate change stands in opposition to the goal of SDG 13, which envisions achieving a net-zero carbon state – an objective that Amazon.com is committed to embracing.

In pursuit of aligning the objective of addressing climate change as outlined in SDG 13 with the aim of providing exceptional customer service, Amazon draws upon the collective efforts of its various stakeholders. Rowley (1997) underscores the significance of stakeholder-oriented communication within a regulated framework, as it serves to harmonize the shared expectations of companies within the stakeholder ecosystem.

Consequently, other stakeholders of Amazon, namely shareholders (investors), actively participate in the Paris Agreement and are actively striving to achieve its objectives. This commitment is exemplified by their consistent monitoring and reporting of greenhouse gas emissions, as well as the implementation of strategies for decarbonization through transformative business practices and innovative measures that align with the Paris Agreement. These strategies encompass enhancements

in efficiency, the adoption of renewable energy sources, reductions in material usage, and the implementation of various approaches to eliminate carbon emissions. (Li, 2023)

Within this framework, the implications for suppliers appear to be favorable. Amazon's adherence to an ethical code of conduct not only enables the company to maintain a fair-trading environment but also ensures equitable pricing for its suppliers. This approach contrasts with imposing unsustainable price pressures due to compromised profits, which could lead to undesirable repercussions. As long as suppliers are receptive to the significance of carbon emissions, their engagement with Amazon's sustainability endeavors is unlikely to pose a risk. Driscoll & Starik (2004) suggest a two-sided approach to the environment, stating that "The natural environment can be identified as the primary stakeholder of the firm in its own right". Indeed, Amazon is continuously looking for a balance and coming up with strategies to try to satisfy the Paris Convention. Amazon's attitude of putting the consumer first, regardless of the environment, is destructive to the climate. It is crucial for the Firm to find a prioritization coexistence of both clients and environments.

Finally, the theory is put to the test with actual customers. They are the ones thanks to which profits occur, for Amazon and for whichever company, making them the most crucial individuals. Amazon's commitment towards the 13th Sustainable Development Goal needs to be supported by its customers, who will gain as well in terms of the critical environmental conditions characterizing such historical era.

Even though such commitment this might be advantageous for Amazon in terms of environmental and reputational gains, the Company would still have been required to put in place sustainable actions, due to governments and local authorities pressure to comply with the SDGs (13th) as well as with the terms of the Paris Convention.

Amazon is also fully aware that pursuing the SDG 13 goals would unavoidably cause some financial losses along the way. However, historically it has appeared that economics and the environment need in fact to coexist. As a result, in order to balance the pursuit of the aims with the pursuit of economic gains, Amazon must find common ground with a variety of stakeholders.

3.3 SDG 13

Among the 13th SDG, focus will be placed on the sub-goals 13.2 and 13.3. Respectively, they state as follows:

13.2: *“Integrate climate change measures into national policies, strategies and planning”*.

13.3: *“Improve education, awareness-raising and human and institutional capacity on climate change”*.

With respect to those goals, mind that in only 30 years global temperatures rose by 0.85°C - from 1880 to 2012 (Martin, 2018) and actions need to be taken for granting the achievement of those goals. Indeed, Net Zero Carbon is exactly one of those actions in questions; in fact, to be in line with the climate goals, Amazon deployed the “Amazon's Climate Commitment Friendly Program”, where through the use of sustainability certifications is able to highlight its products which respect the natural environment.

As highlighted in Chapter 2, the amount of carbon emissions is directly correlated with the manufacturing of products and manufacturing procedures in manufacturing (Jeswiet & Kara, 2008). In the case of Amazon, given the huge and complex supply chain, manufacturing process, transportation but also the long-time storage of Amazon's products, it accounts for extremely large amounts of CO₂ emissions, certainly contributing to the phenomenon of global warming.

According to the Amazon Carbon Footprint (2022), commitment and first results are stated as follows: *“While Amazon's business grows significantly in 2020 and our absolute carbon emissions increase by 19% over the same period, our overall carbon intensity decreases by 16%, from 122.8 grams of CO₂e per dollar of GMS in 2019 to 102.7 grams of CO₂e per dollar of GMS in 2020. 102.7 grams of CO₂e GMS in 2020. Therefore, there is an urgent need for Amazon to take action to reduce its impact on climate change.”*

Accordingly, it is straightforward to contend that in order to preserve the environment and fight climate change, Amazon, a sizable and established company, should take decisive action to cut carbon emissions in the production chain of its shareholders and suppliers in addition to modest efforts to cut carbon emissions at the consumer level and move toward net zero carbon.

The following section will introduce the reader to the Amazon Climate Pledge Friendly commitment.

3.4 Amazon Climate Pledge

Amazon launched the "Climate Pledge" in September 2019 as a significant commitment to solve the urgent issues brought on by climate change. The goal of the promise is to promote a more sustainable future by addressing the company's environmental effect and coordinating its business practices with global warming objectives. Amazon's pledge to become carbon-neutral by 2040 is a praiseworthy effort to reduce its ecological footprint in the face of mounting worldwide worries about the harmful impacts of human activities on the planet's climatic systems. (Li, 2023)

A solid commitment to attaining net-zero greenhouse gas emissions by the year 2040 is at the core of the Climate Pledge. Amazon is committed to balancing the emissions it creates with corresponding reductions or offsets in order to effectively eliminate its net contribution to the buildup of greenhouse gases in the atmosphere, which is a challenging aim. To do this, the corporation is putting into practice several tactics that include both lowering its direct emissions and funding projects that either remove or stop the release of carbon dioxide.

The pledge made by Amazon to get all of its energy from renewable sources by 2025 is one of the pledge's main tenets. Amazon wants to cut its carbon emissions while simultaneously promoting the use of cleaner energy alternatives more widely by shifting its operations away from fossil fuels and toward renewable energy. This transformation not only respects the environment but also shows how corporations can be agents of long-term change. (Corrales & Gross, 2020)

Amazon's commitment to accountability and openness is a key component of its Climate Pledge. The corporation has committed to releasing yearly reports that break down its greenhouse gas emissions and list the efforts it has taken to meet its environmental objectives. As it enables the evaluation of progress and the efficacy of implemented methods, this dedication to transparent reporting is crucial for fostering confidence with stakeholders and the general public.

Additionally, Amazon's Climate Pledge goes beyond just its own business activities. The business is actively enticing other companies to sign the pledge and take comparable actions to lessen their carbon footprint. This cooperative strategy recognizes that combating climate change is a shared challenge that calls for shared effort. Amazon is developing a more complete and effective solution to the complicated problem of climate change by encouraging alliances and partnerships.

Amazon has created the "Climate Pledge Fund," a \$2 billion investment vehicle (Staff, 2020) created to promote businesses and technology that share the objective of lowering carbon emissions and promoting sustainable behaviors, in accordance with its commitment. In addition to demonstrating Amazon's commitment to promoting climate solutions, this fund demonstrates how much the business values creativity and teamwork in resolving climate-related problems.

In conclusion, the Amazon Climate Pledge is a comprehensive commitment that includes adoption of renewable energy, carbon neutrality, transparency, and cooperation. Amazon is demonstrating its role as a responsible corporate citizen working to have a positive impact on the environment and establish a standard for sustainability in the business world by establishing an aggressive timeline for carbon neutrality, adopting renewable energy sources, and inviting other companies to join the initiative.

Having said how beneficial could be the attention from a Company towards the environments, given the focus posed on logistics/e-commerce companies and in particular on the giant Amazon, some recommended actions to be undertaken.

3.5 Recommendations

3.5.1 Reduce the number of deliveries and fleet electrification

In fact, transportation is the more impacting source of carbon emissions (Pamucar et al., 2021). As a first step, it is suggested for a logistics company to diminish the number of deliveries and to implement electrification processes to substitute, where possible, the standard fuels vehicles. Growth should be pursued to the extent to which the entire supply chain will need to be re-adapted to the new-vehicles scenario. Indeed, to reduce fossil fuel usage and support Amazon's attempts to become net-zero carbon, the whole supply chain of transport from suppliers to warehouses and from warehouses to consumers' homes should be encouraged to adopt electric vehicles. Through this line of reasoning, focus finally goes to another important Amazon stakeholder, being it the supplier (Wagner et al., 2011).

3.5.2 Increasing the share of investment funds for research into new energy sources

Research and Development: Increase the investments towards alternative energy sources (including nuclear – though being a fairly contrasting theme) to foster technological advances, pivotal in

reducing carbon emissions (Chen et.al., 2020). Though, for obtaining significant investments is of main importance the involvement of the shareholders and of the most empowered stakeholders.

3.5.3 Carbon Footprint quantification

Providers and privately owned products should state if the product is environmentally friendly on the product shopping page and on the outside of the packaging. The total greenhouse gas emissions attributed to direct and indirect operations are calculated as part of Amazon's corporate carbon footprint. Indeed, Amazon is now able to quantify greenhouse gas emissions. In order to stimulate proactive action toward net-zero carbon, the inclusion of the carbon footprint and information about whether the product is environmentally friendly is suggested to be highlighted on the product shopping page and on the outside of the box.

3.6 Amazon Sustainable Initiatives

Improving the last-mile delivery procedure, or the point at which the package is delivered to the customer's doorstep, is the most important requirement for assuring customer loyalty to online retailers when it comes to shipping logistics. But last-mile delivery services have their own set of challenges and difficulties (Tănase, 2021).

3.6.1 ELECTRIC VAN

The number of vehicles engaged in last-mile delivery activities has sharply increased and as a result, fuel usage and carbon emissions are notably on the rise. By 2030, the top 100 suburbs in the world are expected to face a 36% increase in delivery vehicles due to the increasing demand for last-mile deliveries. In the absence of effective action, this will also contribute to increase carbon emissions up to a level which will be hard to recover. (Tănase, 2021).

The usage of electric vehicles for last-mile tasks is steadily increasing as convenience, delivery speed, and efficiency expand to guide the consumer experience. EVs are kinder to the environment and provide supply chain companies with critical financial gains. The e-commerce sector has experienced a significant boom in recent years. Furthermore, with major changes in consumer purchasing patterns brought on by the COVID-19 pandemic, internet shopping has become yet another new norm for all of us. (Tănase, 2021).

In particular, e-commerce giant Amazon seeks to run entirely on renewable energy by the year 2030 and the collaboration with Rivian Automotive Inc. has the goal of adding 100,000 battery-electric delivery vans for its Prime deliveries. (Rivian, 2023)

Indeed, one of the finest trends towards adopting green logistics in supply chains is the use of EVs or electric cars for last-mile deliveries. (Staff, 2023) Instead of internal combustion engines that produce power by burning a mixture of fuel and gases, these electric cars run mainly on electric motors. Besides just being environmentally friendly, electric vehicles provide supply chain businesses with several additional benefits.

The two types of EVs which are mainly used by companies are the so called All-Electric Vehicles” (AEVs), which run solely on electricity, and Plug-in Hybrid Electric Vehicles (PHEVs), which instead have both an internal combustion engine and electric motor, running partially on fuel and electricity (Tănase, 2021).

3.6.1.1 Main Advantages of Using Electric Vehicles (EVs) for Last-Mile Deliveries for Companies

Minimal fuel consumption

Throughout the supply chain journey, the logistics industry consumes an excessive amount of gasoline due to its heavy reliance on transportation. Two-thirds of the roughly nine billion barrels of petroleum that were consumed in the United States in 2018 were utilized for transportation. A fully electric car requires no gasoline, compressed natural gas, or diesel fuel, and even a hybrid EV uses a negligibly small amount of fuel. Supply chain businesses can dramatically reduce their fuel use by deploying electric vehicles for last-mile delivery. (Tănase, 2021).

Cost-efficient logistics

Fuel consumption and logistics costs are inextricably linked, thus switching to all-electric last-mile operations lowers both operational costs and fuel consumption. A conventional three-wheeler calls for operating expenses which are 3.3 times higher with respect to an electric three-wheeler. Thus, it results in significant cost reductions over the life of the asset. Additionally, compared to a few years ago, the transition to an electric delivery fleet doesn't require a huge financial investment thanks to the fast pace of technological developments and the alignment of the market toward the electric. (Tănase, 2021).

Maintenance

Electric cars require very little regular maintenance. Electric vehicles can be connected to an external power source to recharge, just like a smartphone. Most electric vehicles (EVs) can run for up to 12

hours and 80 to 100 miles after being fully charged. Additionally, compared to conventional vehicles, electric vehicles have less auto parts including the engine, radiator, pistons, spark plugs, gasoline pumps, cooling systems, exhaust systems, and timing belts, which makes vehicle maintenance much more straightforward. These cars simply require maintenance or battery replacement every couple of years. Recalling the efficiency gains mentioned above, an electric automobile is at least 30% less expensive to service and maintain than a vehicle powered by an internal combustion engine, according to research by automotive data specialists KeeResources. (Tănase, 2021).

Amazon Electric Fleet

One of the initial contributors of the Climate Pledge was Amazon (Staff, 2020), which pledged to achieve net carbon neutrality by the year 2040. The business is testing 100,000 electric delivery trucks that it purchased from Rivian, an American maker of electric vehicles. For its European delivery fleet, Amazon also ordered 1,800 electric vans from Mercedes-Benz.

3.6.1.2 Amazon EVs – Main Features

Delving into the specifics of Amazon's Electric Van initiative reveals a series of noteworthy figures and critical milestones, for the successful implementation of such a significant project.

Strategic Investment: Amazon boldly announced a substantial investment of \$700 million to procure a fleet of 100,000 electric delivery vans from Rivian (Rivian, 2023), a pioneering electric vehicle manufacturer. This investment not only underscores Amazon's commitment to sustainability but also catalyzes the electric mobility industry. This is a concrete example of how *collaboration* among firms is pivotal in the pursuit of the macro sustainability objective.

An example of how important the collaboration of different firms is highlighted by the words of the Director of the Global Fleet and Product Division of Amazon.com:

“Together, Amazon and Rivian designed and built a state-of-the-art electric vehicle from the ground up, and unlike anything else on the road today.”

Neil Emery, Amazon, Director, Global Fleet and Product

Agile Implementation: In the year 2021, the Amazon Electric Van project's physical embodiment started to take shape. In a ground-breaking move, Amazon announced that delivery operations for the

first batch of Rivian-produced electric vans would begin in Los Angeles. This served as the starting point of a transformative journey that led to the widespread use of electric vans throughout Amazon's international delivery network. Additionally, this points to the start of an extensive switch to employing Electric Vans in Amazon's delivery operations. (Rivian, 2023)

Quantitative Vision: A fundamental change in Amazon's fleet dynamics is anticipated in its strategic plan. Amazon plans to have thousands of electric vans in use across the country by 2024 (Staff, 2023). This is a significant step in the direction of the company's larger goal of taking the Electric Van program *global* in the coming years.

Currently, the Electric Van operation is being shaped in Europe, with Germany being the first country to host those innovative vehicles. Concerning other markets, further expansion is yet to come once successful results will continue to be achieved and quantified. The toughness of such vehicle's implementation and usage in different markets stands mainly from the fact that vans need to be tailored to the needs of the territory in question. As an example, **in Europe, Amazon and Rivian specially designed a shorter, thinner van than its U.S. counterpart in order to better fit in European's cities.** (Rivian, 2023) The approach is one of a **tailored innovation**, where the design needs to be precisely tuned to answer to the unique requirements of the business' delivery operations.

In close collaboration with Rivian, Amazon created its own "Amazon Rivian Delivery Van".

As successfully stated by Rivian Vice President,

"We're thrilled to see the EDV rolling out in Germany today. This vehicle was designed in conjunction with our partners at Amazon and not only puts driver convenience and safety first, but also the environment. We've had incredible feedback from drivers in the US and we're excited to start international expansion in Germany. Today is a real milestone for us as it also marks the first Rivian vehicles in Europe and we're very excited about our future in the region."

Dagan Mishoulam, Strategy & Go to Market

Concerning the operational sphere, Amazon's Electric Vans are at the fore of the "Last Mile Delivery," – the most important leg of the delivery route. These vehicles generally travel through urban and suburban settings, reducing noise in neighborhoods and improving local air quality (Rivian, 2023).

Beyond the immediate environmental advantages, Amazon's Electric Van program is an important engine of innovation in the field of electric vehicles. By mass-adopting electric vehicles, Amazon increases demand for these technologies, boosting industry growth and quickening the shift to a more environmentally friendly transportation system. All this will result in an innovative impetus which will positively influence the market and the Company's Stakeholders.

Finally, recalling the importance of collaboration and strategic alignment between parties, Amazon's broader sustainability goal is well aligned with the adoption of electric vans. This project demonstrates Amazon's unrelenting dedication to its goal of having a carbon-neutral delivery fleet by 2040, which is in line with the company's larger goal of reducing the environmental impact of its operations globally.

In conclusion, Amazon's effort to introduce Electric Vans demonstrates its unwavering commitment to both operational effectiveness and environmental sustainability. The decision to add Electric Vans to its delivery fleet is consistent with Amazon's wider goal of setting an example and spurring a more thorough transition in the logistics and transportation industries (Staff, 2023). Amazon's adoption of Electric Vans is a concrete demonstration of its status as a market pioneer in environmentally friendly innovation as it continues to navigate its path toward carbon neutrality.

It is now worth to examine the environmental and economic aspect of the Amazon electric fleet acquisition.

3.6.1.3 Analysis of the environmental and economic impacts

Three of the first places where Amazon incorporated a significant number of vehicles are Illinois, California and New York States. In the following, I will present the results of the study (Corrales & Gross, 2020), which show:

Environmental Impact

To start, the environmental impact will be considered, and the results obtained in those three places will be the objects under study. As suggested (Manjunath & Gross, 2017), those vehicles will not emit greenhouse gases straight into the atmosphere, rather this happens when charging batteries – which is the case of the Plug-in vehicles previously introduced. This is mainly due to the utilized electricity previously produced which is not 100% renewable.

There is an index – known as the EVEI (Manjunath & Gross, 2017) (Figure 3.3), which compares the emissions of typical internal combustion vehicles and electric ones in specific locations. Precisely, the index calculates the amount of CO₂ these new vehicles emit.

Table of EVEI results in each state.

<i>region</i>	<i>EVEI</i>
<i>Illinois</i>	0.52
<i>California</i>	0.31
<i>New York</i>	0.29

Figure 3.3

Among the three states, the biggest reduction in CO₂ emissions is seen in New York, where EVEI is 0.29. Illinois has the smallest decline, with an EVEI of 0.52 there. Furthermore, as a result of a test replacing 10,000 diesel vehicles with Rivian R1T over the course of a year, the New York generation mix, which is the cleanest of the three, produced the results shown in Figure 3.4.

Comparative figure of the environmental analysis in the different regions.

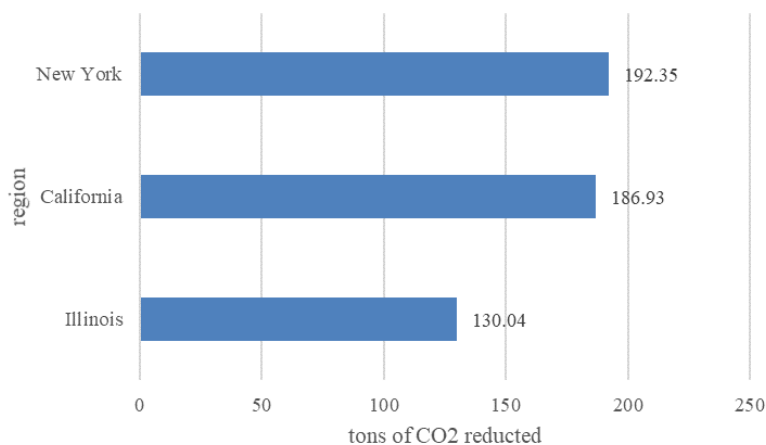


Figure 3.4

In conclusion, this study's findings suggest that, if the generating mix is free of CO₂ emissions, using electric vehicles is a more effective way to help the environment.

The advancement of renewable energy sources satisfies a short-term goal while also providing an instant response to the world's growing concern over climate change.

Economic Impact

Besides the somehow obvious environmental gains from the implementation of Electric Vans, it is pivotal for a giant such as Amazon to consider the economic impact of such an important business operation. Indeed, after running the initial “tests”, the Company needs to be aware of which market to target and where to begin or continue investments for a certain pilot.

Certainly, the main economic impact is described by the fuel costs, where the comparison here needs to be done between the diesel fuel costs (of the standard Mercedes vans utilized by Amazon) and the cost of electricity consumption of the new Rivian R1T (the new electric vans purchased by the Company). Again, the states under study will be Illinois, California and New York. (Corrales & Gross, 2020)

Data table of the two different fuels by state.

<i>region</i>	<i>\$/gallon [5]</i>	<i>\$/kWh [6]</i>
<i>Illinois</i>	2.65	0.133
<i>California</i>	4.18	0.176
<i>New York</i>	2.78	0.21

Figure 3.5

Figure 3.5 shows results which are somehow the opposite with respect to the ones from the previous environmental analysis.

The decrease in expenses from the diesel fuel to the charging of the electric vehicle is there, but among the three state here NY shows a way higher price of electricity, both compared to Illinois and California but also if compared to the average US price of 0.1339 \$/kWh (*Electric Power Monthly - U.S. Energy Information Administration (EIA)*, n.d.)

The difference is mainly due to the concentration of electricity usage in NY. Indeed, the biggest part of the State’s electricity is used in highly dense and populated urban areas, for which the high and increasing demand cannot be satisfied through the plants located in the city; energy is therefore

supplied by power plants such as the hydroelectric generator at Niagara Falls and others in upstate NY.

Figure 3.6 shows in fact the M\$ saved per year, confirming the aforementioned comments.

Comparative figure of the result of the economic analysis



Figure 3.6

Finally, it is possible to deduce that NY State is the worst state to invest in when it comes to electric vehicles, while California seems to be the best option; Illinois is instead halfway, because benefits can be obtained, but are way lower with respect to those pursued in California.

3.6.1.4 Opportunities for the Firm to be exploited

The primary issue arising from the surge in electric vehicle sales is the concurrent rise in electricity demand for charging these batteries, presenting a significant challenge to the power grid due to the added load. To address this, effective management of EV battery charging becomes imperative. This is accomplished through the integration of intelligent charging systems that factor in variables such as energy costs, scheduling, battery capacity, environmental factors, and more to ensure optimal electricity input to these vehicles.

Furthermore, a substantial hurdle for EVs is the strategic deployment of electric car batteries (REE, 2020). To match the convenience of conventional gasoline vehicles, fast battery charging has become a necessity (Corrales & Gross, 2020). While current charging technology offers high-speed capabilities, only a limited number of vehicles can withstand the elevated temperatures generated during the charging process. (Corrales & Gross, 2020)

This constraint, however, is being swiftly addressed, exemplified by innovations like the Tesla V3 Supercharger, signifying rapid advancements in this domain. This progress will soon enable vehicles to undergo rapid and secure charging procedures.

The considerations which have been made through the paper with respect to the advantages, disadvantages and tradeoffs that are needed for a sustainable business growth, are in fact seen in the conclusions drawn upon those three states.

The case of the NY State presents a situation where environmentally speaking it is the best place where to focus on, but economically speaking it faces a loss of money for the supply of electricity that cannot meet demand in urban and dense areas.

California, on the other hand, is among the three the best state to invest under the economic point of view – mainly due to the high prices of gasoline due the high taxation on it – and this context can be exploited for achieving greater and greater reduction of CO2 emissions.

Illinois finds instead itself halfway through the other two states, being it the place where the kWh is cheaper than the US average (contrary to the NY State), making it a convenient place to invest considering the economic frontier. Nonetheless, environmental gains did not result in being excellent.

Additionally, elevated demand charges are the main issue brought on by the growing number of EVs on the grid. Due to the need for EVs to charge their batteries, their widespread use and implementation pose a problem and cause for concern. This could lead to a significant spike in demand that the current grids are unable to handle. By offering a smart mechanism to charge these vehicles, smart grids might assist the network in supporting all this increase in usage.

Although charging EVs has benefits for utility companies and consumers, especially during the off-peak nighttime hours, the grid impacts require careful consideration in order to build the energy infrastructures to handle the huge numbers of EVs in the future. With the help of smart grids, infrastructure in the electrical sector may be used more effectively, resulting in cheaper electricity rates. More benefits of smart networks include improved performance of renewable energy sources at night and increased generation and distribution efficiency.

3.6.1.5 Limitations of Sustainability Projects implementation for firms

It is easy to expect that some limitations, besides the economic ones, apply not only to the new pilots the Company undertakes, but also to the ordinary conducted business. Those issues, if not addressed, may end up clearing up the effort spend in new sustainable growth areas.

As an example, Amazon Fresh – which is the Amazon Supermarket – gives consumers the freedom to choose delivery from a time span that goes from 7 am to 9 pm; such deliveries are performed even when the grocery shop that operates the service is not able to deliver, because Amazon itself wears the shoes of the shop. Of course, this satisfies Amazon' customer focus but at the same time it increases both greenhouse gas emissions, given the multiple travels the delivery vehicles performs for reaching the client, as well as labor costs (Li, 2023). Therefore, to effectively contribute to the reduction of those emission, it is recommended the delivery time period to be reduced. (Li, 2023).

Such reduction will potentially affect the business 'objective and it will annoy customers, which is the main Amazon's goal. Precisely for this reason, for changes that regard the ordinary business, it is advised for the company to proceed gently and gradually, making the customer aware of the reasons behind the potential modification of the service (Li, 2023). This needs to be done also for avoiding a potential loss of reputation and a consequential drastic reduction in profits.

Nonetheless, despite all those aspects threatening the company, behaving in such direction is anyway a brave attempt toward the zero emissions final objective.

In summary, the research demonstrates that Amazon does positively contribute to meeting its climate obligations and advancing SDG 13, keeping in mind the original subject of study—Agenda 2030 and its Sustainable Development Goals. Amazon has numerous obstacles, though, in its efforts to assist the SDGs even further. Therefore, Amazon must persuade all stakeholders as identified by the stakeholder typology (Mitchell et al., 1997) to adopt fewer deliveries, more investment in technology research and development, and packaging labeling in order to move towards net-zero carbon emissions, even at the risk of forgoing financial gains.

3.6.2 MICROMOBILITY

Another step which Amazon is taking towards the implementation of sustainable initiatives is the use of (e-) cargo bikes for performing deliveries, under the Micromobility Project.

There are two main issues to be addressed in terms of environment, social and governance, which are the environmental pollution and the traffic congestion.

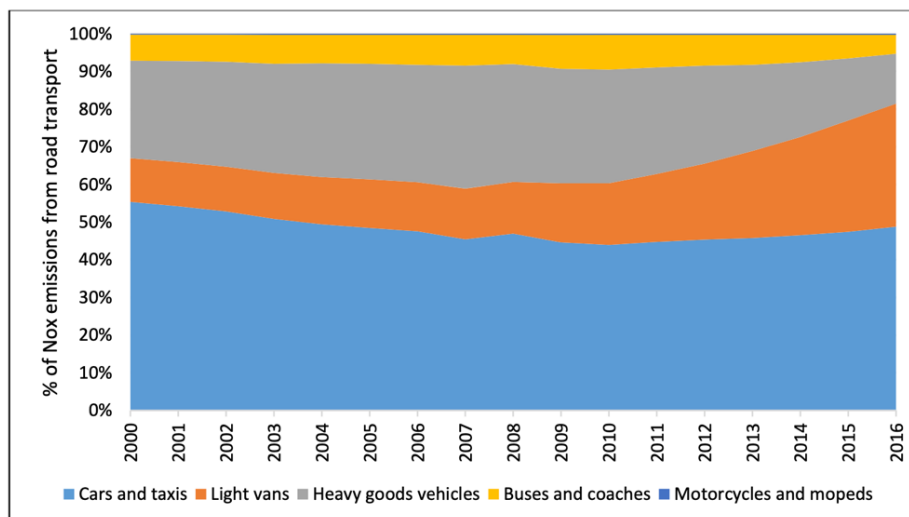
The benchmark here is the pollution and the emissions which are caused by van traffic – because that’s what logistics companies use the most – which account for higher greenhouse gas emissions with respect to, for example, cars. Also, it is important to mind that vans in companies travel way longer distances with respect to vans in private ownership.

3.6.2.1 Environmental impacts of van traffic

According to the Department for Business, Energy and Industrial Strategy (2018), average van emissions in 2018 were 262gCO₂e/km compared to 140gCO₂e/km for a diesel car and 154gCO₂e/km for a petrol car.

Recalling the logistics – parcel and delivery sector – estimates show that average mileage for vans counts around 25,000 miles per year, which translated in emissions result in 10.5 tons of Co₂. Counting up to the year 2016, in fact, it is possible to observe that the contribution of vans to NO_x emissions (which indicates the sum of nitrogen monoxide (NO) and nitrogen dioxide (NO₂)) is notably increasing (Figure 3.7) (Cairns & Sloman, 2019)

Increasing contribution of vans to NO_x Road transport pollution



Data taken from DfT table ENV0301.

Figure 3.7

Vans emit more than 30% of all NOx emissions among all vehicles – not only cars; not to forget the GHG emissions. Indeed, employment of (e-)cargo bikes would result, first of all, in improved air quality.

3.6.2.2 Congestion issues

The second issue to tackle is the congestion one, taking place especially in more dense and urban areas, and lately such a problem is getting worse and worse.

According to European research, in Britain for example vans usage is rapidly worsening traffic congestion, and those vehicles already account for 15% of motorized vehicles miles in urban areas. Furthermore, the same research argues that in bigger cities the 25% of all traffic may be due to the employment of vans by logistic companies.

Taking into considerations components such as infrastructure of urban centers, economic conditions of the company and many other factors, estimates suggest that the 30% of the trips performed by standard vans can be substituted – in Europe – by (e-)cargo bikes. This would result in a reduction of traffic mileage of about 1.5/1.7%.

Main benefits could be observable, again, in dense urban areas, where feasibility is given by the shortness of the delivery trips and high concentration. Nonetheless, straightforwardness of such a change is not ensured in every circumstances. The switch could be a straight switch, but the reality of more complex companies would call for the re-organization of supply chains to be adapted to the use of those (e-)cargo bikes for the last part of the delivery.

Indeed, the Freight Transport Association (2018) states “*growth in the activity of vans is contributing to traffic congestion. Levels of congestion on the network have a massive effect on the productivity of logistics*”.

3.6.2.3 Main Benefits

E-cargo bikes also have the potential to bring benefits in terms of efficiency (Cairns & Sloman, 2019). Those vehicles are easier to park, which speeds up delivery, and they are less expensive to buy, insure, and repair than vans, and they can also travel shorter, faster routes (using bicycle and bus lanes, or being wheeled through pedestrianized zones).

But how could (e-)cargo bikes contribute to van replacement and city logistics?

There are multiple areas where e-cargo bikes can be deployed as a new way to transport goods and people, reason why multiple companies probably hide the potentiality to think about choosing the use of e-cargo in substitution of other vehicles. (Maes, 2018)

Figure 3.8 shows the main areas where it is worth to test the potentiality of e-cargo bikes.

Potential opportunities for using cycle logistics

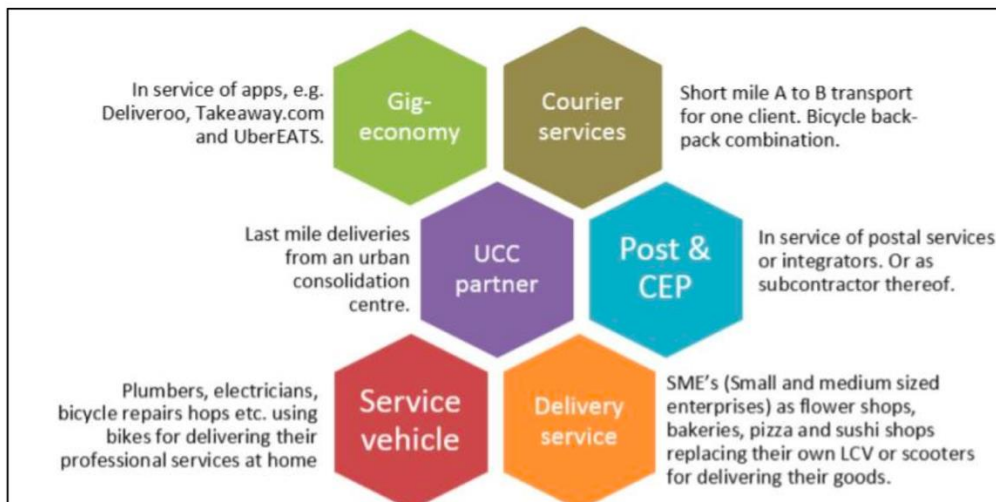


Figure 3.8

As pointed out by the European 'Cycle logistics Ahead' project (2017), providing point-to-point operations, delivering mail, bike-train-bike services, and last and first mile services provided for other companies are all practical areas of operations for cycle logistics companies performing delivery services.

As suggested by the nature of the activities mentioned above, "there is a general consensus that cycle logistics are most suited to dense urban areas, with relatively high concentrations of suitable delivery work, or where individual trips are relatively short" (Cairns & Sloman, 2019).

To sum up, the primary benefits of utilizing (e-)cargo bikes in comparison to conventional vehicles are as follows:

- Significantly lower levels of pollution.

- Possibility of conducting activities with greater speed and efficiency due to potential for shorter routes, reduced susceptibility to traffic congestion, and quicker and more convenient parking in closer proximity to destinations.
- Occupy less road space.
- Potential for cost savings, owing to lower vehicle acquisition costs, decreased expenses for vehicle maintenance and insurance, and reduced qualification requirements for drivers.
- Offer greater ease of parking, often allowing parking on sidewalks and closer proximity to destinations compared to traditional vehicles. This is particularly advantageous in urban zones characterized by stringent parking regulations.
- Often capable of taking shorter routes by utilizing cycle lanes, bus lanes, and potentially restricted vehicle traffic areas.
- Contribute to the well-being of users by promoting health advantages.

3.6.2.4 Amazon adoption of (e-)cargo bikes

Starting in the UK but not disclosing the exact number of vehicles and drivers, the giant Amazon also uses (e-)cargo-bikes.

Indeed, unveiled as part of a £300 million investment in the electrification of the company's UK transportation network over five years, Amazon expects by 2025 e-cargo bikes and walkers to make more than two million deliveries yearly. (*Amazon Expands Micromobility Fleet; New Hubs in the UK - electrive.com, 2022*). In Europe, the initiative of decarbonizing logistics accounts for one-billion euro to be deployed in electrification.

In particular, among the information disclosed on the pilot, numbers suggest that, in London, five million deliveries have been reached with the contribution of e-cargo bikes (as well as electric vans), in the 'Ultra Low Emission Zone' where the first cargo-hub has been installed. To pursue the goal of 2 million deliveries yearly by e-cargo bikes alone, the Company announced in December 2022 the expansion of the e-cargo fleet in UK with the launch of new hubs, both in London and Manchester, cities that host urban and dense areas for which the use of such vehicles can be pivotal in solving the pollution and congestion issues. (*Amazon Expands Micromobility Fleet; New Hubs in the UK - electrive.com, 2022*)

Regarding the “last miles” operations, the light electric vehicles are supported by the aforementioned micro-mobility hubs, which are central depots that send out smaller vehicles for deliveries. These already exist in more than 20 cities throughout Europe, including London and, as of recently, Manchester, Munich, and Paris. According to Amazon, this number will more than double by the end of 2025.

“With more than €1 billion committed to electrifying and decarbonizing our European transportation network over the next five years, including more than £300 million in the UK alone, we remain laser-focused on reaching net carbon zero by 2040,” said John Boumphrey, UK Country Manager, Amazon. *“These new hubs will not only bring our customers more electric-powered deliveries but also support local authorities looking for ways to reduce congestion and find alternative transportation methods. We look forward to expanding our e-cargo bike fleet further in the coming months.”*

Lately, France and Italy have been pointed out by the Company for further expansion. On this regard, major details concerning the Italian growth follow:

The new project announced by Amazon, introduced in 20 European cities, sees the creation of micro-mobility centers that make last-mile deliveries inevitably more sustainable (Rivers & Rivers, 2022). Joining in 2022 are the urban centers of Milan, Naples, Genoa and Bologna.

In fact, the e-commerce giant has decided to install small depots in central points of the cities, precisely hubs that house and act as parking for the vehicles in question.

“Transportation is a key component of Amazon's strategy to achieve zero net carbon emissions by 2040, a commitment we made with the Climate Pledge. These micromobility hubs allow us to increase the efficiency of our existing facilities and our suppliers' fleet of electric vehicles and are already transforming the way we deliver to customers in high-density areas,” commented Gabriele Sigismondi, Country Director, Amazon Logistics Italy.

As introduced earlier as a general benefit brought by the overall use of cargo bikes, it is not surprising that even according to Amazon's experience the use of three-wheeled electric scooters and cargo bikes is greatly contributing to alleviating the traffic jam problem in urban centers while improving air quality.

According to data released, in the city of Milan more than 25 percent of parcels in Area C - central area - are delivered by zero-emission electric scooters thanks to the Rogoredo hub, but this percentage is set to grow. The city of Naples stands out with 60% of parcels in ZTL delivered with electric scooters. In contrast, 100% of parcels with electric scooters in ZTL are delivered by the micromobility hub in Genoa (Rivers & Rivers, 2022).

Within the Micromobility framework, Amazon is also launching a new sustainable pilot, namely the HUB DP (Delivery Partners) Project.

3.6.3 HUB DP

The Hub DP program aims to increase efficiency and quality for customers in areas with limited delivery options, offer flexible capacity in urban settings, lessen carbon intensity by facilitating walker deliveries, produce savings by lowering stem and delivery costs, and create attainment.

The Project is divided in three models: Urban Hub DP model, Semi-Rural Hub DP model, and Rural Hub DP model, with respect to the area where the hubs need to be installed. Indeed, though urban areas are the most targeted ones – for all the reasons previously mentioned – the difference with the use of e-cargo bikes stands that central and dense areas are not the only one targeted.

There exist inter-regional differences in terms of the models defining the implementation of the Project and the maturity stage which has been reached to date, as well as the main concerns characterizing a country rather than another one.

Specifically,

- Urban Hub DP - Solves city center restrictions and reduces CO2 emissions.
- Rural Hub DP - Creates *new attainment* for AMAZON LOGISTICS (AMZL), increasing the geography the Firm serves.

Hub DP Italy consists in a partnership with local businesses (SME) which daily receive packages from their AMZL Delivery Station and then behave as Delivery Service Providers, *earning extra revenue* besides the one deriving from their own business activity.

Urban Hub DP in Italy launched for the first time in Q2 2022 and is currently active in Milan, Bologna and Rome.

By the end of 2022 there were 12 active stores overall, and Q1 of 2023 has been characterized by an expansion that almost tripled the hubs involved in the Urban IT HUB DP project: the launch of **7**, **5**, and **11** new stores respectively in Milan, Bologna and Rome, contributed in reaching a total of **35 stores** at the end of April 2023.

Each store has its own area of delivery, covering a maximum range of 500mt from the Hub location for ensuring the feasibility of the green delivery.

Due to the nature of the project itself, stores mainly cover crowded and dense central areas.

The **MOT** (Mode of Transport) characterizing the Project in Italy is strictly on foot/by bike, the only one ensuring the remediation of the two main AMZL IT concerns. Indeed, operational difficulties in reaching the areas of interest through conventional delivery options and the adoption of concrete sustainable measures are two points which can be properly addressed only through the delivery partner walking or biking to the final client.

3.6.4 HUB COUNTER & AMAZON LOCKERS

Finally, another approach that Amazon is undertaking in order to benefit both the client – in line with the *Customer Obsession* principle – as well as the environment, is the implementation of the so-called Hub Counters, inserted within the logic of the famous Amazon Lockers.

In such context, the van which usually performs the delivery will instead bring the parcels to the Amazon Locker or Counters. From those places, the client will be able to pick up its own parcel and bring it home.

The main difference between the two is that in the Amazon Locker's system is completely automatized while concerning the Amazon Counter, this is an assisted pickup point with human staff presence. Indeed, closer to the idea of the *Hub DP Project*, here third parties are involved (SME) who sign a partnership with amazon for hosting those parcels in their shops waiting for the client to collect it. Of course, this is an advantage for those merchants as well because they see the potentiality to increase their bundle of clients. (Viscito, 2020)

The procedure is a smooth and facilitated one, because through a notification the Amazon's client receives by e-mail, he/she will get to know when the parcel reached the chosen locker/counter and is ready to be picked up. In such a way, the client which prefers not to send the parcels home for a variety of reasons, has the possibility to choose the closest counter or locker as an alternative option.

Furthermore, the environment is protected because that same van who brings a certain number of parcels to the counter in question, avoids reaching, for example, 30 different addresses, which would have been those of the end customer. This calls in fact for both traffic congestion, noise and pollution notably diminish in urban centers.

Chapter 4

4. Survey Investigation on consumers' behavior toward green options

Introduction

This chapter will be focused on the results of a comprehensive and in-depth survey (Appendix), aiming to elucidate the potential role of customers in the e-commerce platform's journey toward sustainability, often referred to as the "Path to Green." Sustainability has emerged as a paramount concern in today's business landscape, and firms and industries are committed to aligning operations with eco-friendly practices. With this survey, the goal is to gauge the sentiments and preferences of the most valued customers in this endeavor.

The survey was thoughtfully designed to encompass a wide array of aspects related to sustainability and heterogeneity among samples. Customers' attitudes and awareness regarding eco-conscious shopping practices, their interest in purchasing environmentally friendly products, and their willingness to engage in conscious choices have been the focus of the conducted survey. Furthermore, the questionnaire probed into customers' openness to adopting greener shipping and packaging options, which are pivotal components of our sustainability strategy.

The results of this survey were inspiring in order to understand which targets to focus upon when committing to a sustainable strategy, and who are the customers mainly enthusiastic among the sample base for adopting sustainable choices while shopping online. A significant percentage of respondents did express a strong desire to support eco-friendly products and showed a keen interest in recycling. Additionally, a significant portion of the customers signaled their readiness to opt for greener shipping and green alternatives, even when facing tradeoffs.

On a firm's side, customers' active participation in the "Path to Green" initiative is not only welcomed but encouraged, and it is exactly on a firm's interest to embark the green journey with their most loyal customer base.

The survey that has been conducted aimed at understanding whether and how a firm's customer can support that same firm toward its path to green strategy; it is pivotal to understand how the customer is in fact able to be felt by the firm not as a threat but as an opportunity to be exploited.

The the sample under study is composed of 275 voluntary respondents of different ages, sex, habits, ranging from students to workers, with a small number of respondents involved which are older or supposed to be not used to the "E-commerce ecosystem".

4.1 Survey structure

The survey conducted followed a precise structure indeed. As a first step, the respondent under study answered generic questions concerning demographic information, for the sake of targeting subsamples in more homogeneous groups. Consequently, usual attitudes in terms of shopping behavior have been tested, concluding with an online purchase simulation, where the final object under study was the client propensity toward green choices.

Key to the questionnaire has been the tradeoffs the respondents had to face when opting for a green choice, which really highlighted the differences among respondents, as well as the open questions that let the customer quantify (for example in terms of shipment costs or days for waiting time) how much they value the green option over the standard one – when dealing with green shipments and tradeoffs.

A detailed and visual representation of the questions asked and the results obtained follows, considered at a whole-sample level. Worth to mention that a first screening has been done checking whether the respondents under study are used or at least are willing to buy online.

For the sake of enabling all the respondents to properly and deeply understand the questions, the survey has been run in Italian language.

4.1.1. Demographics

As mentioned earlier, the respondents of the survey show the following demographics features:

Age

- Age range 15-30 years: 31% of respondents
- Age range 31-50 years: 33% of respondents
- Age range 50-73 years: 28% of respondents

The remaining percentage is composed of outliers, younger or older, which suggest a results direction but do not significantly impact conclusions; other people have been pooled out from the survey because they never purchased a good through an e-commerce platform.

Gender

Around 40% of respondents classify themselves as males, while the 60% of respondents classified themselves as females.

4.1.2 First habits screening

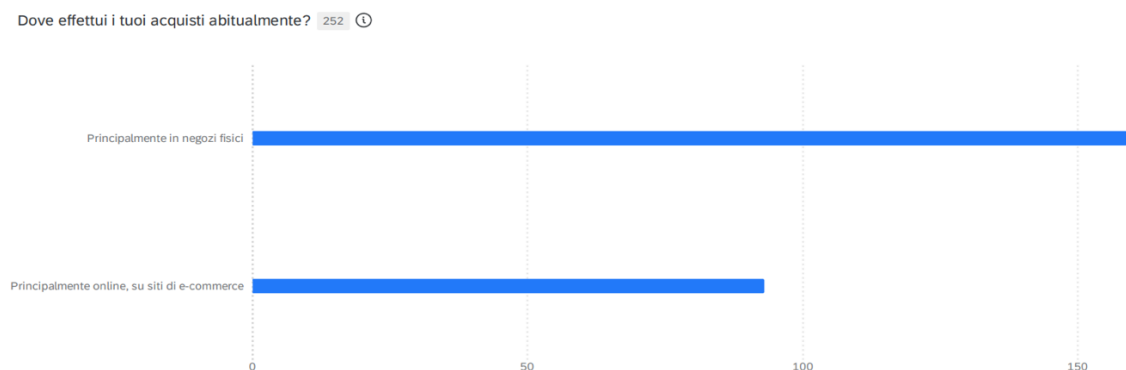


Figure 4.1

Dove effettui i tuoi acquisti abitualmente? 252 ⓘ

Q3 - Dove effettui i tuoi acquisti abitualmente?	Percentage
Principalmente in negozi fisici	63%
Principalmente online, su siti di e-commerce	37%
Sum	100%

Figure 4.2

At a first glance, it is possible to observe that among the whole sample, the majority of the people usually opt for physical stores to shop at (Figure 4.1), but the study immediately acquires significance because the 96% of them is anyway used to or interested in shopping online (Figure 4.3) – and among the lists of the most common e-commerce website, Amazon resulted in being the most utilized (Figure 4.4):

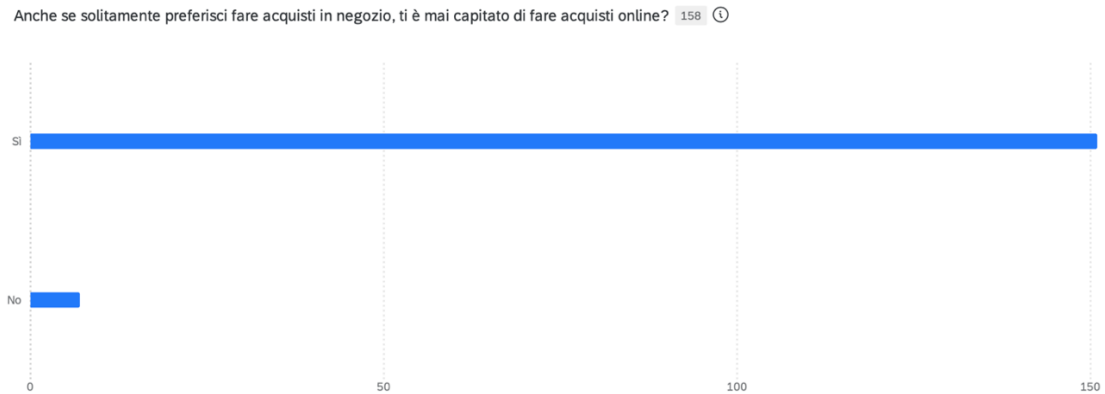


Figure 4.3

Quali sono i siti di e-commerce che frequenti abitualmente? 238 ⓘ

Q5 - Quali sono i siti di e-commerce che frequenti abitualmente? Percentage

Amazon	75%
E-bay	1%
Zalando	7%
Altro	17%
Sum	100%

Figure 4.4

At this point of the survey – once a screening of the respondents properly took place, the section testing Online Shopping itself follows.

4.1.2.1 Online Shopping

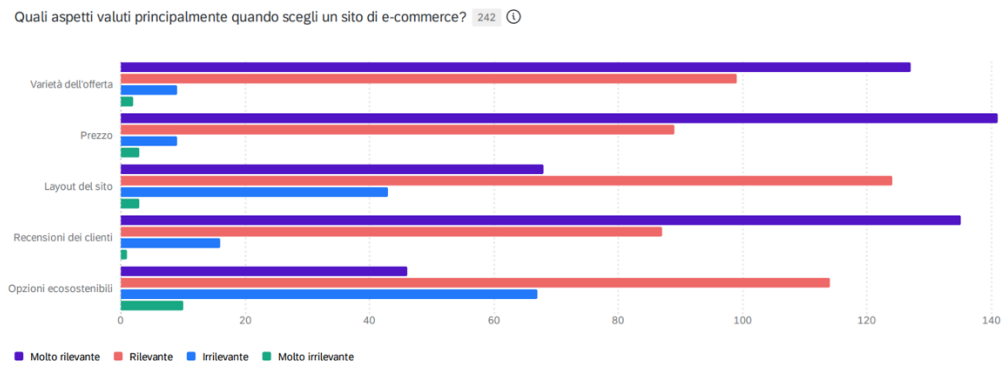


Figure 4.6

Throughout the survey evidence will show that green options are notably acquiring importance for customers, that are becoming more sensible toward this topic. Nonetheless, when asking customers to rate by subjective importance the following attributes - Offer variety, Price, Website layout, Customers' feedbacks, Green options - sustainable options are considered by most respondents from all subsets as “relevant” rather than “very relevant” (Figure 4.6). It is exactly for such a reason that the enterprises' mindset needs to be settled in a way that consumers behavior toward the environment, even if showing a positive inclination towards it, is to be acknowledged as a starting point upon which sensibilization's work needs to be prepared. The goal will be reached at the point where green options will be, without hesitation, homogeneously considered as “very relevant”.

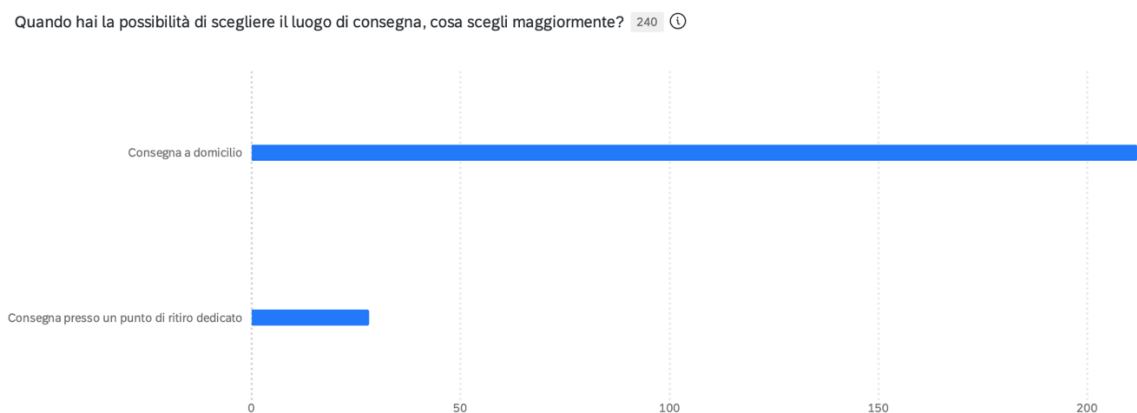


Figure 4.7

Quando hai la possibilità di scegliere il luogo di consegna, cosa scegli maggiormente? 240 ⓘ

Q7 - Quando hai la possibilità di scegliere il luogo di consegna, cosa scegli maggiormente?	Percentage
Consegna a domicilio	88%
Consegna presso un punto di ritiro dedicato	12%
Sum	100%

Figure 4.8

The 88% of the population under analysis prefers to receive the delivery at home (Figure 4.7) rather than at a dedicated service point, and the majority of them explained the main reason to be the fact that they find it more time saving and logistically speaking more efficient, because they do not have to make the effort to go to the store in question to pick up the parcel.

This result, strictly linked with the previous one, is a strong indicator of the fact that firms have to convey to their customer base the idea that more sustainable options should be valued more than a potential 10-minute walking for picking the parcel from a service point – of course, exceptions apply, such as oversize shipments or disability which may impair people from performing such activity.

In fact, the choice of shipping the order to a collecting point, even assuming that such delivery is not performed through a 0 or low emissions vehicle, is anyway a more sustainable choice because the driver would drop more than one parcel to that same location, saving on emissions deriving from the vehicle that has to go from home to home, single client by single client.

Until the above presented question (Figure 4.7), the respondent was not completely immersed in the main subject of the analysis investigation, being it sustainable logistics. Instead, from the following question and after the acknowledgments made so far – the third and final part of the questionnaire starts, properly dealing with sustainable logistics.

4.1.3 Sustainable Logistics

As follows, a role play is now required from the respondents in their effort to imagine their selves while effectively purchasing one or more goods from an e-commerce platform.

Below, the scenario described to the respondents:

Scenario 1: “You are about to buy a T-shirt online at an e-commerce site. You will be asked questions about choices to make in this case; we ask you try to imagine yourself in the situation as much as possible and answer honestly.”

Ti viene data la possibilità di scegliere se ricevere la maglietta con una consegna standard eseguita dal corriere o con una consegna sostenibile, ad esempio in bicicletta, a piedi, oppure tramite veicolo elettrico. Cosa sceglieresti? 237

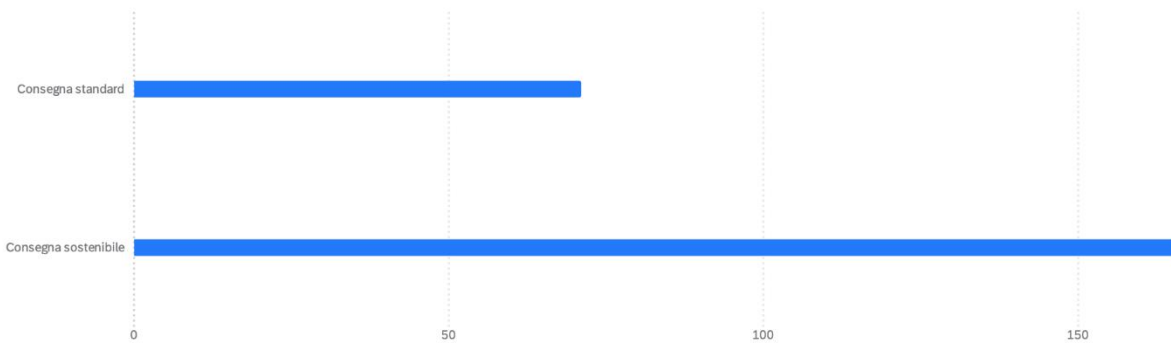


Figure 4.9

Q10 - Ti viene data la possibilità di scegliere se ricevere la maglietta con una consegna standard eseguita dal corriere o con una consegna sostenibile, ad esempio in bicicletta, a piedi, oppure tramite veicolo elettrico. Cosa sceglieresti?

Percentage

	Percentage
Consegna standard	30%
Consegna sostenibile	70%
Sum	100%

Figure 4.10

Once explicitly faced with the sustainable option - in terms of sustainable delivery itself (sustainable mode of transportation, such as electric van vs standard fuel van), the sample under analysis shows a clear bias toward environmentally sustainable delivery (Figure 4.9).

Worth to recall is, however, is that the customer is not currently been asked to face any tradeoff; in fact, the question is posed as stark, either first or second choice. The usefulness of not bringing up any compromise lies in the possibility to gain further confirmation that the pool of people attributes higher value, all else being equal, to the sustainable option. Again, the importance of the attention for the environment characterizing consumers’ mindset should be exploited as a starting point on which to leverage.

Scenario 2: “Not all delivery addresses are suitable for receiving a shipment via sustainable transportation mode. This is due to the fact that not all means of transportation can easily reach the delivery location.”

Q11 - Hai più di un indirizzo registrato per la consegna della maglietta, ti interessa sapere quale dei tuoi indirizzi ha una localizzazione adatta alla ricezione della consegna sostenibile?	Percentage
Si	66%
No	22%
Non so	12%
Sum	100%

Figure 4.11

The same propension is showed in the interest respondents have in knowing which is, among their addresses, the one which is suitable for the sustainable delivery (Figure 4.11). Recalling the preference participants showed toward receiving the purchase at home rather than at a dedicated service point, the answer they are now choosing show instead concern about the feasible delivery address for green shipments: the customer is indeed starting to change its attitude; previously it was all about comfort and time efficiency, while now it may be inferred that those attributes could potentially be overcome.

4.1.3.1 Testing behaviors

For checking the reliability of such a conclusion though, the following scenario has been proposed; results show that comfort is still the top priority for clients, but with respect to the question in Figure 4.7, differences in percentages are way less drastic.

Scenario 3: “Suppose you know which of your addresses has a location suitable for receiving sustainable deliveries, there is only one with this characteristic.”

In fact, assuming there is only one address suitable for green delivery:

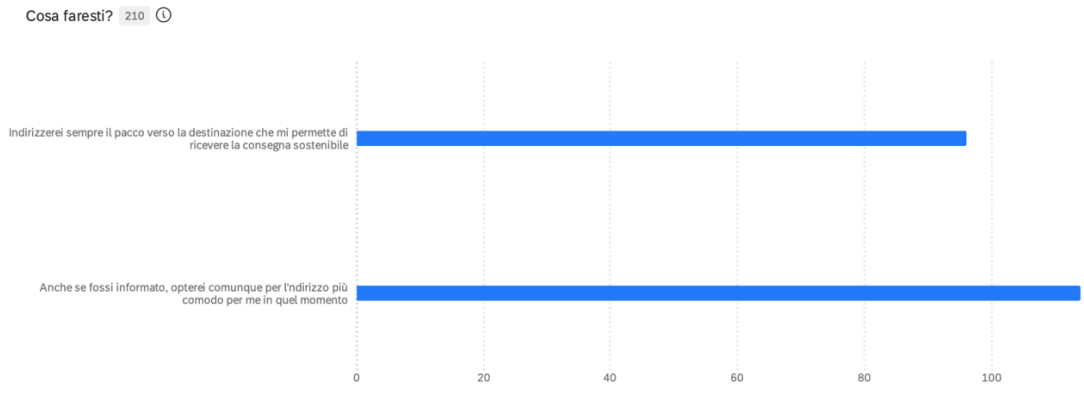


Figure 4.12

Cosa faresti? 210 ⓘ	
Q13 - Cosa faresti?	Percentage
Indirizzerei sempre il pacco verso la destinazione che mi permette di ricevere la consegna sostenibile	46%
Anche se fossi informato, opterei comunque per l'indirizzo più comodo per me in quel momento	54%
Sum	100%

Figure 4.13

Almost half of the population is now starting to consider the sustainable delivery as their first and preferred option, reaching a 46% of choices (Figure 4.12) toward the green direction vs the previous 88% from Figure 4.7, who was prioritizing delivery at home - without any premise/scenario involved.

Scenario 4: “*Deliveries on weekends often fail due to the customer not being able to be found at the delivery location or the delivery venue being closed. This results in multiple delivery attempts in the following days, causing in turn higher CO2 emissions.*”

Stai effettuando l'acquisto della maglietta un venerdì sera, opti per la ricezione direttamente il lunedì, per far sì che il tuo ordine non generi emissioni aggiuntive? 221 ⓘ

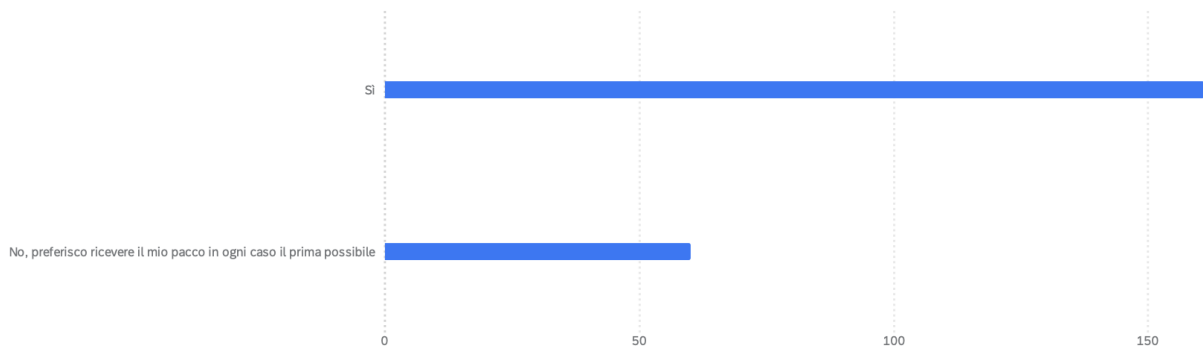


Figure 4.14

Q15 - Stai effettuando l'acquisto della maglietta un venerdì sera, opti per la ricezione direttamente il lunedì, per far sì che il tuo ordine non generi emissioni aggiuntive?

Percentage

Response	Percentage
Sì	73%
No, preferisco ricevere il mio pacco in ogni caso il prima possibile	27%
Sum	100%

Figure 4.15

Further evidence is demonstrated by the 73% (Figure 4.15) of the population being fine with waiting for more days in order to receive the package through green methods. Indeed, as introduced to the peers participating to the survey, here is being assumed that the purchase is made during the weekend; as of today, many firms - following the so-called customer obsession (*Leadership Principles, Amazon.com*)

– are performing deliveries also during Saturdays and Sundays, days in which the rate of successful delivery at home is extremely low if compared to weekdays.

4.1.3.2 Time & Price

As asked to the respondents in previous questions, there are many variables that need to be considered and for which a product or an e-commerce website could be valued more or less with respect to the competitor/s. Two main variables to take into account are *time* and *price*, which empirical studies (Wagner et al., 2011) as well as the questionnaire in question show them to be extremely valued by customers.

The questions that follow will address exactly those two themes: it will start with testing how the consumer deals with the variable “time” (shipping time for the website to deliver the item) when “compared” to the green option, followed by an open question aimed at allowing the respondent to specify, in terms of days, how much longer he/she is willing to wait in order to receive the order via environmentally sustainable delivery.

The same approach is followed for testing the same trade-off but with respect to the variable “price”.

Details follow:

Trade-off - Time

Scenario 5: “You realize that the t-shirt you are about to buy is available on two different e-commerce sites at the same price, but with one difference:

- website X will deliver the t-shirt through a standard delivery option in two working days
- website Y will deliver the t-shirt through a sustainable delivery in four working days”

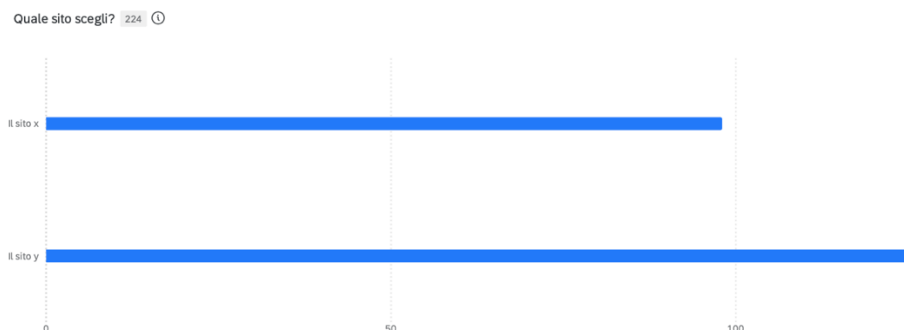


Figure 4.16

Quale sito scegli? 224 ⓘ

Q20 - Quale sito scegli?	Percentage
Il sito x	44%
Il sito y	56%
Sum	100%

Figure 4.17

Here, even though the two percentages between the choice of website X and website Y are not characterized by a striking difference, the majority of the respondents opted anyway for website Y (Figure 4.16), the one allowing for a sustainable delivery in 4 working days (rather than 2 working days).

Nonetheless, the small difference between the 44% and 56% suggests the pivotal role of speed in delivery – at least when client is faced with a choice.

As introduced, respondents have been asked to express in terms of days, how much they would be willing to wait more for a sustainable delivery. Considering the whole sample, results from the survey suggest that 3 days is the average that they are willing to wait in order to accept the tradeoff between sustainable delivery and longer waiting time.

Among the various responses received, one in particular is cause for reflection.

Indeed, a client responded:

“It's not a matter of time but of loyalty and usage of a platform you already know. People don't change habits easily. Therefore, in this context, companies should directly change their policies.”

The insight suggested by the answer above is that, faced with a choice, it is easier that clients will prioritize their habits and the online shop toward they are more loyal.

Nonetheless, if the e-commerce itself should no longer leave the customer room for choice, rather opting directly for the implementation of sustainable policies, the customer's trust in the company itself would probably not betray the frequency of purchases and direct the customer toward the adoption of new and potentially more ecological habits. Certainly, the risk rate for the company rises considerably, not so much in terms of retaining rate, but more in terms of expanding the network of new buyers needed for the investment in green growth.

Further research is then significantly recommended.

Trade-off - Price

Scenario 6: *You realize that the T-shirt you are about to buy is available on two different e-commerce sites at the same price, but with a difference:*

- *website X will deliver the T-shirt to you with standard delivery in two business days, no shipping costs.*
- *website Y will deliver the T-shirt to you with a sustainable delivery in two business days, shipping costs are 5€*

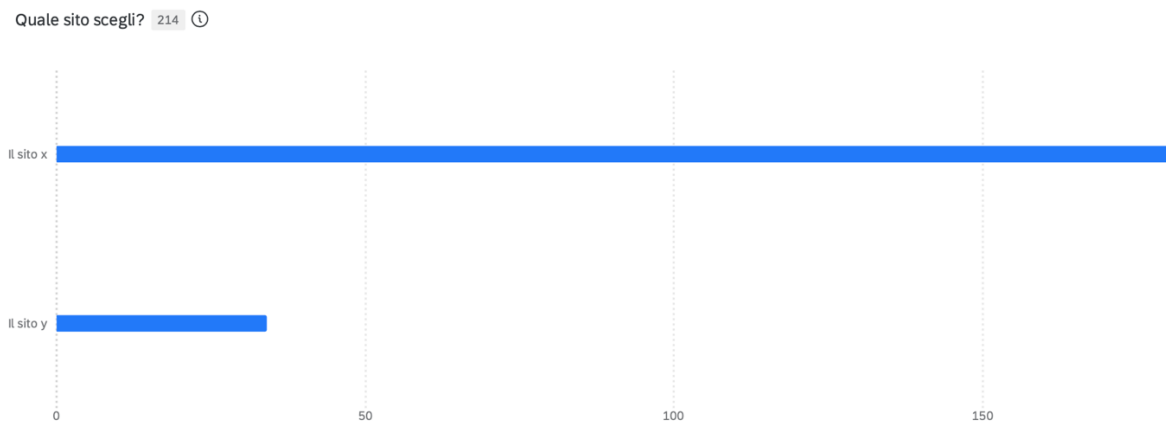


Figure 4.18

Quale sito scegli? 214 ⓘ	
Q23 - Quale sito scegli?	Percentage
Il sito x	84%
Il sito y	16%
Sum	100%

Figure 4.19

When faced with the variable “time”, there was not a drastic difference between respondents’ answers. When “price” enters the room, though, participants straightly prefer to purchase their items on the website allowing for free shipping – but with standard rather than sustainable delivery.

84% of the pool prefers in fact website X (Figure 4.18), suggesting that “price” is an extremely influential variable, way more than waiting time. Conducting the analysis in this consequential order

allows firms to understand what to prioritize, what drastic changes can be implemented from day 0 and which areas need instead a more conservative approach.

Consumers are willing to spend on average up until 4euros in order to opt for the sustainable delivery: willingness to pay of consumers is not enough – with respect to the example presented to them in the survey. Therefore, firms know at such point that, as an example, customers may be fine with waiting a little bit more in terms of days, but a price increase equal to 5 euros is not generally accepted.

4.2 Recommendations

Finally, assuming that customers' willingness to "sacrifice" time or money is reinforced through a deep belief of the importance of green commitment, how should firms begin to inform their clients pool about their green commitment?

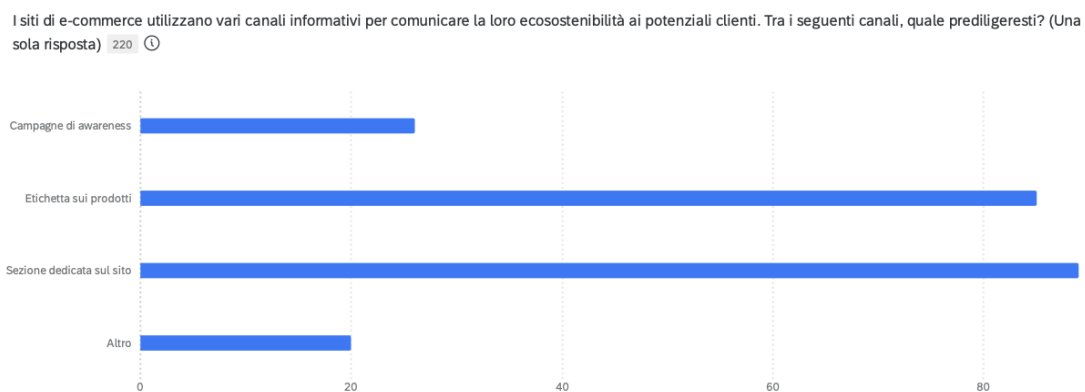


Figure 4.20

Both label on products and dedicated section on the website are prerogatives that clearly attract customer attention. (Figure 4.20). In fact, awareness campaigns seem to be outdated in the view of respondents, and for those who selected "other," there appear to be no specific suggestions in this regard. In fact, taking e-commerce itself into question, the answer with the largest number of choices leaves no room for doubt. Indeed, it certainly happens that when we – as customers - buy a product at a physical store, we also check their website, but this is not to be taken for granted; on the contrary, in the case of an e-commerce it is precisely their website that hosts the customer's purchase, which will for sure interact with the information on it.

4.3 Subsets

4.3.1 Cluster 1

This subset is composed of those people located in the range 15-30 years old, both men and women. 42 over 79 people answered they usually buy goods in physical stores, both man and woman in the same percentages; at the same time though, 100% of the respondents is used to online shopping and frequents e-commerce. Indeed, this is a pivotal target to be attentioned. Nonetheless, when purchasing a good through a website, 32% of people in this subsample consider as irrelevant or very irrelevant the website focus on eco-sustainable options: this is considered a high number given that the target under analysis is the one expected to be way more sensible toward the environment with respect to the other two. This suggests that even though their “green” sensibility is high, it is still not a top priority.

When approaching the pro-active part of the questionnaire, as presented at the outset, the survey aims at testing the interest people have in getting to know which one of their addresses registered on the platform is suitable for a sustainable delivery. Indeed, 63% of people show such a precise interest. Although, the question assumes there is only one of those addresses suitable for such delivery, and only the 27% percent expressed its commitment in sending the parcel toward the sustainable address – while the biggest part of them values more comfort and convenience, and thus it would in any case indicate the address that is most appropriate for him/her at that moment.

It is crucial to make some considerations about the variables “time” and “price.”

Recalling the two scenarios proposed to the respondents:

Scenario 5: *“You realize that the t-shirt you are about to buy is available on two different e-commerce sites at the same price, but with one difference:*

- *website X will deliver the t-shirt through a standard delivery option in two working days*
- *website Y will deliver the t-shirt through a sustainable delivery in four working days”:*

45% of the respondents prefer website X. Anyway - in terms of the price difference that one is willing to accept for receiving delivery in a sustainable manner - despite the average is virtually the same as

the whole initial sample, it is exactly this subset that contains the outliers who would be willing to wait up to 14 days more for receiving the delivery through a sustainable manner.

At the same time, price-speaking (Scenario 6):

“You realize that the T-shirt you are about to buy is available on two different e-commerce sites at the same price, but with a difference:

- website X will deliver the T-shirt to you with standard delivery in two business days, no shipping costs.*
- website Y will deliver the T-shirt to you with a sustainable delivery in two business days, shipping costs are 5€”*

Here again most people 74,6% selected the first website; when attributing a value in price increase for receiving a sustainable option, such price though is not higher than 3 euros on average. Also, a respondent clearly wrote that between time and price he prefers to wait two days more rather than paying more money. This confirms the hypothesis made at a whole sample level: if choosing what variable to “compromise” more in terms of customer experience, it is better to propose them to wait a couple of days more, while explicitly stating that there will not be an increase in shipping cost (and if there, it is recommended to set an irrelevant difference in price between option 1 and option 2).

To conclude, here the 62% of the target states to be more inclined to acknowledge the presence of sustainable options within an e-commerce when found in the product label or in the website itself, confirming the other important claim made at the outset, and significantly suggesting firms where to focus upon when conveying such green options “alert”.

4.3.2 Cluster 2

This subset is composed of those people located in the range 31-50 years old, both men and women.

37 over 88 people of this subset have the habit to buy goods online, here again both man and woman in the same percentages; such a target it is the intermediate in terms of age, entailing active participation and high information about the current climate change issues, as expected by the first target analyzes. Even though the remaining and higher percentage of the sample is more into purchases at a physical store, the entire sample is anyway a user of e-commerce platforms.

Rating of sustainable options here results as being “relevant” and “very relevant” only for 20 respondents in the sample, a lower number than expected. The 15-30 years subsample of respondents still results the one that should be under the market primary’s focus. In fact, even though the first target did not show a huge percentage of people showing great interest toward the presence of sustainable options, for sure the results were anyway more positive than the ones currently under analysis and there is room for them to - short to medium term - considering sustainability in purchases as a real priority.

On the contrary, a high percentage (75%) of the 31-50 years old sample prefers to receive their package at a dedicated service point rather than home: here the reasoning turns out differently. In fact, the convenience here is for people working or not being home most of the time during the day; contrary to the previous analysis, here the clients’ research for a convenient solution aligns with the more sustainable choice: when receiving the delivery at a dedicated store rather than home, customer X is receiving the parcel at the same place as customer Y, contributing to lower the CO2 emissions – allowing the vehicle performing the delivery to travel less and toward a single destination.

Though, only the 29,5 % of people will prefer the sustainable delivery (through an electric bike, on foot etc.) rather than the standard one: as shown by the open answers, here respondents are concerned with the driver experience; in fact, a portion of the customers believe that drivers riding a bike or delivering on foot could struggle more and their work could result too strenuous.

Such customers’ concern is another important suggestion for firms, which will have to focus on drivers’ experience and quality of work; indeed, once a customer it is ensured on the viable and positive conditions for a driver to perform a sustainable delivery, they may more easily opt for such method. Ensuring a safe and not strenuous work for driver may signify to ensure shifts and rests when delivering by bike, or the distribution of equipment for temperatures that are too hot or too cold – and in general those kinds of expedients.

- Scenario 5: “Time” speaking, 43% of the sub-sample choose website X over websiteY, meaning that more than half of the population is fine with waiting two days more as long as the delivery is performed in a sustainable way. And in fact, the difference in shipping time between standard and sustainable shipment may in fact be seen as deriving, among others, from the firm not putting extreme pressure on drivers and allowing them more days for completing the delivery – considering the weather conditions and the other struggles that may be encountered.

Also, especially for those (the majority) who chose website Y over website X, they state they would be willing to wait even more than two days: a further silver lining characterizing this target.

- Scenario 6: When shipping costs are considered (Scenario 6), the 86% is opting for the standard delivery instead: further confirmation that customers' willingness to pay more for a green option is way lower than customers' willingness to wait more days – as already tested at a whole sample level as well as for the 15-30 years old sample.

The trend it is confirmed by the average of 2euros when asking clients to express the difference in price they would be fine with.

4.3.3 Cluster 3

This subset is composed of those people located in the range 51-80 years old, both men and women.

Such sample initially counts 77 people, where the 71,5% usually shops at physical stores. Furthermore, eight participants of those never purchased online, so the sample has been automatically reduced by 8. The sample will be then composed by 69 participants.

Of those, 43 people consider the presence of sustainable options as either “relevant” or “very relevant”, which means that even though the sample is not made up of people who are leaders in online shopping, at the same time when they do it – they seem to consider the potential path to green which is offered by the website.

But to confirm this assumption, it is key to further consider the evolution of the questionnaire. Indeed, 63,7% of people prefer to receive their parcel home and only 29 people would choose the sustainable shipment method – probably the same concern as the previously analyzed survey is the one that impacts such low percentage. Also, only the 36% is interested in getting to know which one of their addresses is suitable for a sustainable delivery. This to say, the analysis of this sample will allow to gain some insights, but such target will not receive that focus from firms such as the other two previously addressed. Furthermore, among those who showed interest in terms of suitability for green delivery of the address, only 6 respondents showed commitments in delivering their parcels toward those addresses.

It is anyway useful to verify the components “time” and “price” to confirm or contend the assumption on those variables that have been made during the whole study:

- Scenario 5: Only 6 people in the sample will chose website X, the remaining part will be fine with waiting a couple more days for receiving the parcel in a sustainable way; the number of days respondents will be willing to wait is anyway no more than 5 days (difference in days between standard delivery or sustainable delivery). The result is in line with the hypothesis, meaning that only a small percentage of customers is not willing to wait more for a green purpose.
- Scenario 6: 12 people will choose the website with non-sustainable options but free delivery: this is an insightful result because this is the first sample where the majority of people would be fine with paying more for such a service. Probably, this result is link with the age range and lifestyle.

Conclusion

In conclusion, the exploration of the complex interplay between ESG (Environmental, Social, and Governance) factors, the intricate grid of European and Italian regulations, and the growing urgency of embracing sustainability within the logistics sector, bring to the evidence that adapting to the evolving landscape of eco-sustainability is not just a choice but a necessity for businesses.

Our study has underscored the fundamental shift in societal expectations, where ESG principles have moved from being mere corporate values to legal obligations. Additionally, the tightening regulations, especially those governing access to urban areas for non-electric vehicles, are compelling companies to reevaluate their operations and business strategies.

The paper’s primary focus has been on the logistics industry, which plays a crucial role in global supply chains, and the Amazon.com’s case study has been considered due to the Company’s global presence and commitment to sustainability: it's apparent though that customer engagement is key to driving progress in this direction.

To this end, the findings of a comprehensive survey conducted among a diverse group of respondents are presented, including both potential and existing customers of Amazon.com and other e-commerce platforms. The survey results validate the central thesis that customers shouldn't be seen as obstacles

or threats, but as an opportunity, partners in change. Their preferences and willingness to embrace sustainable alternatives are valuable insights for businesses navigating the complexities of sustainability.

Notably, the survey indicates a notable preference for eco-sustainable solutions, especially among respondents aged 15 to 50: this presents an opportunity for businesses to leverage this inclination and communicate a long-term vision that not only aligns with their compliance efforts but also contributes to the greater well-being of individuals and the environment.

In this partnership between companies and customers, a shared vision emerges, and collaboration becomes essential. Companies must act as facilitators of change, utilizing insights into customer behaviors to inspire active participation in the pursuit of a sustainable future.

Navigating these challenges and opportunities, it's essential to recognize that collaboration, transparency, and a shared commitment to sustainability will be the linchpins of success in this transformative journey towards a greener world. The logistics sector, exemplified by industry leaders like Amazon.com, holds a pivotal role in driving change, where proactive adaptation to eco-sustainability isn't just an ethical imperative but a strategic pathway to future growth, innovation, and global well-being.

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Appendix

Questionario sulle scelte dei consumatori relative alla logistica sostenibile – Italian version

Benvenuto/a e grazie della tua partecipazione a questa indagine.

Nel rispondere alle domande, ti ricordiamo che non ci sono risposte giuste o sbagliate: rispondi liberamente sulla base delle tue abitudini e preferenze.

A. DEMOGRAFICHE

Prima di iniziare, abbiamo bisogno di conoscere la tua età e il genere in cui ti identifichi.

Q1. Età (numero)

Q2. Genere (M/F/Altro)

Q3. Dove effettui i tuoi acquisti abitualmente?

- a. Principalmente in negozi fisici
- b. Principalmente online, su siti di e-commerce

Q3.1 Anche se solitamente preferisci fare acquisti in negozio, ti è mai capitato di fare acquisti online?

- a. Sì
- b. No

B. ACQUISTI ONLINE

Q4 Quali sono i siti di e-commerce che frequenti abitualmente?

- a. Amazon
- b. eBay
- c. Zalando
- d. Altro

Q5 Quali aspetti valuti principalmente quando scegli un sito di e-commerce?

	Moito rilevante	Rilevante	Né rilevante, né irrilevante	Irrilevante	Moito irrilevante
Varietà dell'offerta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Il prezzo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Il layout del sito	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Le recensioni di altri clienti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La presenza di opzioni ecosostenibili	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6 Quando hai la possibilità di scegliere il luogo di consegna, cosa scegli maggiormente?

- a. Consegna a domicilio
- b. Consegna a un punto di ritiro dedicato

Q6.1 Perché opti per la consegna a domicilio?

Q6.2 Perché opti per la consegna ad un punto di ritiro?

C. LOGISCTICA SOSTENIBILE

D'ora in poi per la parte restante del questionario immagina il seguente scenario: sei sul punto di acquistare una maglietta online su un sito di e-commerce. Ti verranno poste delle domande riguardo delle scelte da fare in questo caso, ti chiediamo di cercare di immedesimarti il più possibile nella situazione e di rispondere onestamente.

Q7. Ti viene data la possibilità di scegliere se ricevere la maglietta con una consegna standard eseguita dal corriere o con una consegna sostenibile, ad esempio in bicicletta, a piedi, oppure tramite veicolo elettrico. Cosa sceglieresti?

- a. Consegna standard
- b. Consegna sostenibile

Non tutti gli indirizzi di consegna sono adatti a ricevere una spedizione tramite modalità di trasporto sostenibile. Questo è dovuto al fatto che non tutti i mezzi di trasporto possono raggiungere facilmente il luogo di consegna.

Q8. Hai più di un indirizzo registrato per la consegna della maglietta, ti interessa sapere quale dei tuoi indirizzi ha una localizzazione adatta alla ricezione della consegna sostenibile?

- a. Sì
- b. No
- c. Non so

Supponi di conoscere quale tra i tuoi indirizzi ha una localizzazione adatta a ricevere consegne sostenibili, ce n'è uno solo con questa caratteristica.

Q8.1 Cosa faresti?

- a. Indirizzerei sempre il pacco verso la destinazione che mi permette di ricevere la consegna sostenibile
- b. Anche se fossi informato, opterei comunque per l'indirizzo più comodo per me in quel momento

Le consegne durante i fine settimana spesso non vanno a buon fine a causa della mancata reperibilità del cliente nel luogo di consegna o della chiusura del locale di consegna. Questo comporta molteplici tentativi di consegna nei giorni che seguono, ovvero maggiori emissioni di CO2.

Q9. Stai effettuando l'acquisto della maglietta un venerdì sera, opti per la ricezione direttamente il lunedì, per far sì che il tuo ordine non generi emissioni aggiuntive?

- a. Sì
- b. No, preferisco in ogni caso ricevere il mio pacco il prima possibile

Oltre alla maglietta, stai acquistando anche un libro. Puoi scegliere di ricevere i tuoi due ordini in un'unica spedizione, ovvero con un unico imballaggio e un'unica tratta di trasporto, anche se comporta tempi di attesa maggiori, oppure la ricezione degli articoli in momenti diversi, quando ognuno di essi è disponibile, e quindi il prima possibile.

Q10. Cosa scegli?

- a. Opterei per la ricezione in un'unica spedizione
- b. Opterei per la ricezione in un'unica spedizione, a condizione che la ricezione dei miei articoli in unica soluzione non comporti un notevole ritardo rispetto alle tempistiche della ricezione dei due prodotti individualmente
- c. Preferisco ricevere gli articoli uno per volta il prima possibile

Ti rendi conto che la maglietta che stai per acquistare è disponibile su due diversi siti di e-commerce allo stesso prezzo, ma con una differenza:

- *il sito X ti consegnerà la maglietta con una consegna standard in due giorni di lavorativi*
- *il sito Y ti consegnerà la maglietta con una consegna sostenibile in quattro giorni lavorativi*

Q11. Quale sito scegli?

- a. il sito X
- b. il sito Y

Q12. Quale sarebbe la differenza di tempo che saresti disposto ad accettare tra la consegna due magliette per scegliere sempre la piattaforma che consegna in modo sostenibile? Esprimi la tua risposta in numero di giorni:

Ti rendi conto che la maglietta che stai per acquistare è disponibile su due diversi siti di e-commerce allo stesso prezzo, ma con una differenza:

- *il sito X ti consegnerà la maglietta con una consegna standard in due giorni lavorativi, senza costi di spedizione.*
- *il sito Y ti consegnerà la maglietta con una consegna sostenibile in due giorni lavorativi, i costi di spedizione sono di 5€.*

Q13. Quale sito scegli?

- a. il sito X
- b. il sito Y

Q14. Quale sarebbe la differenza di prezzo che saresti disposto ad accettare tra la consegna due magliette per scegliere sempre la piattaforma che consegna in modo sostenibile? Esprimi la tua risposta in euro:

Q15. I siti di e-commerce utilizzano vari canali informativi per comunicare la loro ecosostenibilità ai potenziali clienti. Tra i seguenti canali, quale prediligeresti? (Una sola risposta)

Opzioni:

- Campagne di awareness
- Etichetta sui prodotti
- Sezione dedicata sul sito
- Altro (Risposta aperta)

Survey on consumer choices related to sustainable logistics – English version.

Welcome, and thank you for your participation in this survey.

As you respond to the questions, please remember that there are no right or wrong answers; feel free to share based on your habits and preferences.

A. DEMOGRAPHICS

Before we begin, we need to know your age and the gender with which you identify.

Q1. Age (number)

Q2. Gender (M/F/Other)

Q3. Where do you usually make your purchases?

- a. Mainly in physical stores
- b. Mainly online, on e-commerce websites

Q3.1 Even if you generally prefer shopping in physical stores, have you ever made online purchases?

- a. Yes
- b. No

B. ONLINE SHOPPING

Q4. Which e-commerce websites do you frequently visit?

- a. Amazon
- b. eBay
- c. Zalando
- d. Others

Q5. What aspects do you primarily consider when choosing an e-commerce website?

	Very relevant	Relevant	Neither relevant nor irrelevant	Irrilevant	Very irrilevant
Product variety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Website layout	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer reviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of sustainable options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6. When you have the option to choose the delivery location, what do you prefer the most?

- a. Home delivery
- b. Delivery to a dedicated pickup point

Q6.1 Why do you opt for home delivery?

Q6.2 Why do you opt for delivery to a pickup point?

C. SUSTAINABLE LOGISTICS

From this point forward in the remaining part of the questionnaire, please imagine the following scenario: you are about to purchase a T-shirt online from an e-commerce website. You will be asked questions related to choices you would make in this scenario. We kindly request that you try to put yourself in this situation and respond honestly.

Q7. You are given the option to choose whether to receive the T-shirt through standard delivery by a courier or through a sustainable delivery method, such as bicycle, on foot, or via an electric vehicle. What would you choose?

- a. Standard delivery
- b. Sustainable delivery

Not all delivery addresses are suitable for receiving shipments through sustainable transport methods. This is because not all modes of transportation can easily reach every delivery location.

Q8. Do you have more than one registered delivery address for the T-shirt, and are you interested in knowing which of your addresses has a location suitable for sustainable delivery?

- a. Yes
- b. No
- c. I don't know

Assuming you know which of your addresses is suitable for sustainable deliveries, there is only one such address.

Q8.1 What would you do?

- a. I would always direct the package to the address that allows me to receive sustainable delivery.
- b. Even if I were informed, I would still choose the most convenient address for me at that moment.

Weekend deliveries often fail due to the customer's unavailability at the delivery location or the closure of the pickup point. This results in multiple delivery attempts in the following days, leading to increased CO2 emissions.

Q9. You are making the purchase on a Friday evening. Would you choose to receive the T-shirt on Monday to avoid generating additional emissions?

- a. Yes
- b. No, I prefer to receive my package as soon as possible.

In addition to the T-shirt, you are also purchasing a book. You can choose to receive both orders in a single shipment, with a single package and a single transport journey, even if it entails longer waiting times. Alternatively, you can choose to receive the items separately, as soon as each of them is available.

Q10. What would you choose?

- a. I would opt for receiving them in a single shipment.
- b. I would opt for receiving them in a single shipment, provided that receiving my items together doesn't cause a significant delay compared to receiving the two products individually.
- c. I prefer to receive the items one at a time as soon as possible.

You realize that the T-shirt you are about to purchase is available on two different e-commerce websites at the same price, but with a difference:

- *Website X will deliver the T-shirt with standard delivery in two working days with no shipping costs.*
- *Website Y will deliver the T-shirt with sustainable delivery in four working days, and the shipping cost is €5.*

Q11. Which website would you choose?

- a. Website X
- b. Website Y

Q12. What would be the maximum time difference you would be willing to accept for the delivery of two T-shirts in order to consistently choose the platform that delivers sustainably? Please express your answer in the number of days:

You realize that the T-shirt you are about to purchase is available on two different e-commerce websites at the same price, but with a difference:

- *Website X will deliver the T-shirt with standard delivery in two working days with no shipping costs.*
- *Website Y will deliver the T-shirt with sustainable delivery in two working days, and the shipping cost is €5.*

Q13. Which website would you choose?

a. Website X

b. Website Y

Q14. What would be the maximum price difference you would be willing to accept for the delivery of two T-shirts to consistently choose the platform that delivers sustainably? Please express your answer in euros:

Q15. E-commerce websites use various communication channels to convey their eco-sustainability to potential customers. Among the following channels, which one would you prefer? (Select one response)

Options:

3. Awareness campaigns

4. Product labels

5. Dedicated section on the website

6. Other (Open-ended response)