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Typologies of certifications regarding environmental sustainability

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## **Abstract**

Environmental sustainability has become for the last decade a primordial case all over the world, since the preservation of natural resources is essential for the continuity of future generations. In addition of all health benefits environmental sustainability offers, it has an important economic impact on all firms operating in the world.

In this report, the most important environmental certificates will be elaborated and it will be demonstrated what certificates logistic and warehouse companies all over the world, especially in Europe and Italy. In the end a conclusion showing the importance of those certifications will be placed in hand showing how they can help the improvement of the all over wellbeing.

**Key-words:** Environment sustainability, energy management, certifications, go green, logistic, green logistic, packaging, zero waste, carbon emissions, recycling.

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## **Chapter 1**

### **1.1 Introduction**

According to the United Nations (UN) World Commission on Environment and Development, environmental sustainability is defined as operating in such a manner that future generations have the natural resources they need to enjoy a life that is equal to, if not better than, present generations. It also develops alternative energy sources while reducing pollution and environmental damage. The future state, as measured in 50, 100, and 1,000 years, serves as the guiding concept for environmental sustainability (Brundtland, 1987).

Business wise, by being sustainable, companies work on strategies with a long term added value to the industry by considering how a company functions in its ecological, social, and economic contexts. The concept behind sustainability is that establishing such measures promotes firm lifespan, as well as the environment's wellbeing (Knut, 2016). Adding to that, Companies have a societal obligation to develop ecologically friendly practices, but these practices do not have to conflict with corporate objectives. When environmental sustainability is done correctly, revenues should be aligned with people and the world (Goodland, 1995).

### **1.2 Environment sustainability objectives**

Sustainable development has three objectives: reducing natural resource depletion, encouraging development without harming the environment, and optimizing the usage environment-friendly techniques (Brundtland, 1987). In other words, reducing severe poverty and ensuring equal pay for everybody, conserving the planet's natural equilibrium while minimizing the influence of human activities on the environment and ensuring universal access to fundamental resources and services are the pillars of sustainable development (Brundtland, 1987).

The basic goal of environmental sustainability is to enable long-term growth. Sustainable development guarantees that resources are utilized in a sustainable manner that does not harm economic progress. Environmental constraints, often

known as planetary boundaries, must be considered for sustainable growth. These limits define the greatest amount of deterioration a resource may withstand before becoming badly harmed. Resources must be properly managed at both the global and local levels to maintain environmental sustainability (Omer, 2008).

Sustainability standards and certifications are voluntary criteria used by producers, manufacturers, traders, retailers, and service providers to demonstrate their commitment to environmentally sound, socially responsible, ethical, and food-safe activities. Over 400 similar standards exist across the world. This is why in this thesis study, certifications regarding environmental sustainability will be elaborated. In addition, an evaluation of warehouse and logistic companies regarding the certifications they own.

Sustainability certifications are optional certifications granted to a firm, product, or service by an independent, second- or third-party organization. To be certified, a firm must demonstrate that its business methods and products satisfy particular standards that reflect its commitment to good environmental, social, and ethical practices. Certifications are significantly primordial because they motivate excellent behavior, promote openness, and demand responsibility. There are advantages for both customers and manufacturers/sellers of goods and services. These certifications cover a wide variety of environmental consequences, including resource management, carbon and greenhouse gas emissions, manufacturing techniques and pollution, materials sourcing and agricultural practices, waste management, circularity, and so on. This is the widest category, and many businesses will have multiple environmental certifications.

### **1.3 Benefits of Environmental certificates**

When companies implement environmental certificates, it benefits both consumers, workers and sellers.

Concerning consumers, those certifications are firstly considered to be a quick, simple and an efficient method to find products and services that match one's tastes, beliefs and ethics. Secondly, It's an easy approach to find items that meet many criteria without having to undertake product research or read the small prints and labels. In addition, it is considered to be a straightforward method for determining whether a

product or service has been reviewed and approved by an impartial third-party (Jarvis Nigel, et al., 2010).

When it comes to producers and sellers, environmental and sustainability certifications are considered to be a great approach to measure the environmental, social, and ethical effect by assessing how well the unique business standards are satisfied. This also enables the improvement of the procedures of productions. It also insures a better communication with the clients by clearly and rapidly demonstrating that the company's ethics matches the client's. Adding to that, it increases brand trust and credibility by demonstrating commitment to best practices and willingness to have a third party evaluate the business and products. Last but not least, having environmental certifications are highly cost effective.

A good sustainability certification validates an organization's sustainability plan by confirming claims and offering external validation on problems such as responsible supply chain management, legal compliance, and risk management processes and procedures. In addition, it motivates people to enhance their sustainability strategy and performance. Clients are increasingly demanding certification as part of their own sustainability program (Anon., n.d.).

In this report, the main focus is on the types of certificates used by logistic companies in Italy, and how these certifications affect the country's sustainability.

## **Chapter 2 Environmental sustainability certificates**

Sustainability is becoming a prominent and more important topic. Because logistics is such an important component of business operations, sustainability is becoming a major problem for the logistics industry. Enterprises can only be sustainable if they are sustainable in terms of their natural, economic, and social dimensions (GÜLMEZ, 2017). Companies in the transportation sector can also get their procedures accredited for environmental sustainability. ISO 14001 and the European legislation EMAS are two internationally recognized certifications (Eco-Management and Audit Scheme). These cross-industry certifications seek to ensure long-term and continual improvement in operational environmental performance within the context of an environmental management system. Paperless handling, transportation bundling, route optimization, avoiding empty runs, and the use of efficient engines are all areas of action in transportation (Dan Vermeer, 2010). In this context, green logistics improve a company's commercial success as well as its environmental image, allowing for more efficient resource usage while also enabling recycling and increasing market share (GÜLMEZ, 2017). What green logistics aim for, is calculating the carbon footprint of logistics activities as a starting point for planning and controlling sustainable actions. The UNE-EN 16258:2013 international standard is one of the most widely used procedures for measuring energy consumption and greenhouse gas emissions. By examining the effect of each logistical area, particularly those associated to transportation, their goal as well the eradication of air, soil and noise pollution (GÜLMEZ, 2017).

### **2.1 Leadership in Energy and Environmental Design (LEED) Certification**

LEED is a tried-and-true method for tackling climate change and designing buildings that are more resource-efficient, healthful, and resilient. Projects pursuing LEED certification get points for a variety of green building practices across numerous areas.

Depending on the amount of points earned, a project is assigned one of four LEED rating levels: Certified, Silver, Gold, or Platinum (Priscilla & Allan, 2010).



A project receives points toward LEED certification by adhering to prerequisites and credits that address carbon, energy, water, waste, transportation, materials, health, and indoor environmental quality. The Green Business Certification verifies and reviews projects, awarding scores that correspond to a level of LEED certification: Certified (40-49 points), Silver (50-59 points), Gold (60-79 points), and Platinum (80+ points) (Todd, et al., 2013)

## **2.2 The EU Eco-Management and Audit Scheme (EMAS) certification**

This certificate is as a premium management tool for enterprises and other organizations to monitor, report on, and improve their environmental performance. EMAS is available to all types of organizations who want to enhance their environmental performance. It applies to all economic and service industries globally (Iraldo, et al., 2009).

It is simpler for an organization that already adheres to an environmental management system such as ISO 14001 to progress to EMAS [10]. Aside from the benefits of establishing an ISO 14001 environmental management system, the EMAS legislation assists organizations in contributing to the creation of a Circular Economy. It is necessary to develop environmental performance indicators to analyses and quantify resource efficiency from a life cycle viewpoint, as well as a risk-based approach.

It not only ensures legal compliance, but also allows users to plan ahead of time for future environmental regulations, allowing them to reduce risks and uncover new economic possibilities. In addition, Employee involvement is one of its necessary elements, since it makes them aware of the value of their participation in the management system. This method has been consistent with the EMAS Regulation since its inception.

The Environmental Statement, when confirmed by an independent and accredited monitor, is a strong communication tool that assists organizations in emphasizing the work involved in adopting an environmental management system. It also symbolizes a transparency effort that is acknowledged by all parties, including government bodies. It encourages innovation because, by fostering continuous improvement, the organization is forced to investigate new

consumption reduction objectives, process innovations, less polluting materials, and so on.

### **2.3 ISO 14064**

The ISO 14064 series establishes concepts and procedures for the measurement and reporting of greenhouse gas (GHG) emissions and removals at the organizational level. It specifies the standards for designing, developing, managing, reporting, and verifying an organization's GHG inventory (ISO, 2013).

ISO 14064-2 specifies the concepts and procedures for establishing baselines as well as monitoring, measuring, and reporting project emissions. It focuses on greenhouse gas (GHG) projects or project-based activities that are especially aimed to reduce GHG emissions and/or increase GHG removals. It serves as the foundation for GHG project verification and validation (ISO, 2013).

ISO 14064-3 specifies the standards for validating GHG assertions relating to GHG inventories, GHG projects, and product carbon footprints. It outlines the verification or validation process, including verification or validation planning, assessment methodologies, and the evaluation of GHG claims for organizations, projects, and products (ISO, 2013)

### **2.4 ISO 14001**

ISO 14001 provides guidance for businesses that want to systematically manage environmental characteristics or respond to the consequences of changing environmental circumstances in one or more environmental issue areas (ISO, 2019). The establishment of an Environmental Management System in line with the UNE-EN-ISO 14001 standard provides for the simple standardization of environmental issues emerging from any activity that takes place in the organization. It also encourages environmental conservation and pollution prevention while balancing socioeconomic issues. The implementation of an Environmental Management System in accordance with the international standard ISO 14001, The organization is positioned as socially responsible, distinguishing

itself from the competition, and strengthening its image with customers and consumers.

## **2.5 ISO 45001 Occupational Health and Safety Management System**

ISO 45001:2018 establishes standards for an occupational health and safety management system and provides guidelines for its application, allowing companies to offer safe and healthy workplaces by avoiding work-related injury and illness, as well as proactively enhancing its OH&S performance. It is applicable to any organization that wishes to establish, implement, and maintain an occupational health and safety management system in order to improve occupational health and safety, eliminate hazards and minimize OH&S risks (including system deficiencies), capitalize on OH&S opportunities, and address OH&S management system nonconformities associated with its activities (45001, 2018).

## **2.6 ISO 50001 certification for energy management**

ISO 50001 (certification for energy management) applies to every business, regardless of its kind, size, complexity, geographical location, organizational culture, or the goods and services it offers. It applies to actions influencing energy performance that the company manages and controls. It is considered to be relevant regardless of the amount, usage, or kind of energy utilized. In addition, ISO 5001 demands evidence of continuous energy performance improvement but does not specify the amounts of improvement to be achieved. Last but not least, it can be utilized separately or in conjunction with other management systems (für Normung, 2018).

## **2.7 ISO 9001 Certification for quality management system**

It is a globally recognized standard for developing, implementing, and maintaining a company's Quality Management System. As a worldwide standard, it is acknowledged as the foundation for any organization to develop a system to assure customer satisfaction and progress, and many corporations need this certification from their suppliers as a result.

ISO 9001 certification assures your clients that you have implemented a Quality Management System based on ISO 9001's seven quality management principles.

## **2.8 OCS Operation Clean Sweep**

Operation Clean Sweep is a global plastics industry program that is making progress by reducing the leakage of primary micro plastics into the environment in the form of pellets, flakes, or powdered resin. The implementation of this certification recognizes businesses who willingly and actively contribute to decreasing environmental waste, developing employee knowledge, and improving working conditions (Anon., n.d.).

## **2.9 Zero waste**

Zero Waste is a corporate/business/lifestyle philosophy that strives to reduce the amount of waste generated by corporations, governments, and individuals through reuse of existing materials, effective stewardship of waste materials, and preventing things from entering the waste stream in the first place (Anon., n.d.).

## **2.11 Go green Certificate**

Go Green Sustainability offers consultancy and genuine sustainable accreditation to businesses of all sizes and sectors. It is a small firm that provides hands-on personal service with a focus on developing supportive, tight working relationships with our clients. A personal manager is assigned to each of the customers to analyse, plan, and support them through their sustainable journey (Anon., n.d.).

## **2.12 DHL's Green Carrier Certification and Green certificate for sustainable logistics**

DHL Freight launched in 2021 a green accreditation to quantify the sustainability efforts of its subcontractors. DHL Freight established a new project to promote sustainable logistics as part of the company's GoGreen agenda.

DHL Freight's objective over the next few decades is to completely decrease greenhouse gas emissions and the company's carbon footprint. To that aim, the firm will continue to grow its offering of sustainable goods and establish connections with subcontractors who are already making strides toward a greener future. A green credential, such as DHL's Green Carrier Certification, aids in the identification of suitable subcontractors for such collaborations. "In the medium term," says Dr. Christoph Schönwandt, Head of GoGreen, "information from the DHL Green Carrier Certification will allow us to further fine tune the carbon footprint estimate for consumers." DHL Freight performed preliminary surveys of its service partners on their sustainable transportation solutions and strategy in preparation for the green certification (Cosimato & Troisi, 2015). According to DHL case study evidence, in logistics innovation, often based on emerging green technologies, is strictly related to the development of a much more sustainable and environment-friendly approach to SCM, based on reduction of core activities' ecological impact, cost saving, quality, reliability, performance and energy efficiency. In this context, the respect of environmental regulations is fundamental to achieve not only a reduction of ecological damage, but also to overall economic profit (Cosimato & Troisi, 2015).

### **2.13 EN 16247 Energy audit verification**

The EN 16247 energy audit verification verifies, through a third party, that the energy audit was carried out in line with the standards stated in said standard, offering trust in its conclusions.

Energy audits conducted in compliance with the technical criteria of this standard meet the technical requirements of Article three of the recently issued Royal Decree 56/2016 on energy audits. They act as a reaction to the needs of said Royal Decree for major firms to execute required energy audits every four years if they are also completed by certified employees in line with the criteria of Article eight of the aforementioned Royal Decree (Tobias, et al., 2012).

## **Chapter 3 Logistic companies with sustainable certifications**

### **3.1 Green Logistics**

Logistics firms are third-party order fulfilment providers that provide services such as warehousing, picking, packaging, and shipping. Merchants' merchandise is received, processed, and stored by logistics businesses.

The process of decreasing the environmental effect of delivery and logistical procedures is known as green logistics. Shippers must reduce carbon dioxide emissions, deal with trash disposal and overall waste management, utilize recyclable products, and more as customers grow more environmentally conscious and prioritize picking green firms.

Green logistics comprises minimizing the supply chain's carbon footprint, dealing with carbon emissions from waste management and disposal. packaging, recycling, and reducing energy use, among other things. With several national and global authorities supporting or demanding more sustainability among businesses and more customers preferring green purchases, more corporations are promising zero-net aims in an effort to become as green as possible (Musvoto, et al., 2018)

### **3.2 Green Logistics: The Warehousing Approach**

The warehouse is an essential component of effective, long-term supply networks. Regardless of the industry served by a warehouse, organizations that employ warehouse logistics would be well to regard warehousing as more than just a place to keep raw materials and completed items. Know-how manufacturers nowadays utilize numerous types of warehouse management systems to maximize warehouse operating efficiency. Warehouse management systems (WMS) are becoming increasingly important in supply chains as a pillar of support inside the logistics network. A WMS's core originates from its capacity to connect retailers and distribution centers with warehouses, as well as manage shipping and ground transportation. Information is gathered at these several logistical points and then aggregated into a centralized database that businesses can use to track inventory movement. Furthermore, the visibility of the WMS allows businesses to maintain inventory management and identify areas for development (Rakhmangulov, et al., 2018)

Furthermore, businesses will discover that automated warehousing provides several options to decrease warehouse facilities' environmental and social footprints in ways that boost their financial bottom line (Dekker, et al., 2012)

There are various methods that warehouses may follow to provide long-term benefit. Automating both warehouse solutions and management operations, enhancing energy efficiency inside a warehouse, and optimizing warehouse architecture are three such techniques. To achieve a sustainable warehousing system, companies should incorporate other automated solutions such as order picking technologies (pick-to-light technology, voice technology, sortation systems, etc.), bar-coding, radio frequency identification (RFID), and automated storage and retrieval systems (ASRS), in addition to WMS (Rodrigue, et al., 2001).

Warehouses require a significant amount of energy in a typical logistics supply chain. However, because they can operate in both darkness and non-heated situations, automated warehousing systems can save considerable amounts of energy. This is in sharp contrast to traditional warehouse equipment, which has significant energy usage and operational expenses. It is best to implement a 'lights-out operation' for day-to-day operations in an automated warehouse because lights are often only required for routine maintenance inspections. Stacker cranes, for example, may operate autonomously without human intervention, therefore this investment is unnecessary.

While it is apparent that firms who implement sustainability measures in their warehousing may have financial and environmental sustainability, it must be stated that for activities to occur, sustainability must be strategically managed and given top management support.

Companies may use the ways mentioned above to improve the beneficial impact of their business operations on the environment as the logistics sector evolves. And, as a critical component of global supply chains, the warehouse may be a competitive advantage for organizations seeking to accomplish long-term financial and environmental sustainability goals (Dekker, et al., 2012)

In the upcoming section, several logistic companies will be illustrated, and their sustainability certifications will be detailed as well.

### *3.2.1 Green warehouse practices*

Many warehouse practices may be implemented by businesses to boost efficiency, save money, and promote sustainability. Some of the most typical green warehouses practices especially when it comes to being sustainable are Recycling and reusing, Energy-saving practices and warehouse management.

Firstly, when feasible, the reuse of pallets and storage materials is done in order to save money and protect the environment. Recycling obsolete materials keeps them out of landfills and reduces disposal costs. Secondly, Energy expenditures can be reduced by increasing warehouse insulation, employing energy-efficient or natural lighting, and automating lighting. And thirdly, Warehouse management systems automate and simplify numerous warehouse activities, lowering costs and waste. WMS, for example, may track inventory locations, advise personnel where to put products, and calculate the most efficient picking sequence. Warehouse management software also allows clients to be sent from the nearest warehouse, reducing transportation costs.

In addition to those sustainable practices, green warehouses work on storage optimization, the control of their inventory and cross-docking (Ramani & Premkumar, 2012).

### **3.3 Logistic companies**

#### *3.3.1 FM Logistic*

FM Logistic, is a logistics supply chain that has the power to create positive impacts for people and the planet. They operate across 14 European countries, Asia and Latin America. Their logistics solutions are designed to minimize environmental effect while adhering to stringent eco-design criteria. Furthermore, they are persuaded that logistics platforms may serve as a source of renewable energy for local communities, which is why they invest in on-site energy generation.

FM logistic has received ISO 50001 certification for its energy management system at all of its logistics locations in France (excluding subsidiaries). The total surface area of certified sites is 1.1 million square meters. FM Logistic has pledged to cut its energy use by 12% by 2022. It also plans to achieve carbon neutrality in its storage and co-packing operations by 2030.



FM Logistic France completes its collection of important worldwide standards in the field of sustainable development with this accreditation, which includes environmental management (ISO 14001) and occupational health and safety management (ISO 45001).

### *3.3.1.1 FM Logistic's warehouse solutions*

Their multi-client and multi-activity set up guarantees the flexibility and optimization of both warehousing processes and costs. They are working on the development of innovative and best-in-class warehousing services. A new storage and office complex for FM Logistic in Hanoi, Vietnam, is the country's first to be LEED Gold certified.

The design measures help the customer achieve their environmental goals while lowering operational expenses.

Energy savings of more than 35% are predicted, along with a 45% decrease in water use. During construction, trash was gathered in five different material streams, allowing for more than 80% of it to be repurposed.

### *3.3.2 Stante Logistics*

A logistics company operating all over Italy since 1973. It has offices in Bologna, Caserta, Como, Roma, Verona, and Vicenza, Italy. This company owns a global network that spans 62 countries, allowing providing transit links by land, air, and sea. This company was the first in Italy to employ road/rail multimodal transit to connect Southern Italy with nations in Eastern Europe in 2014. Nearly the last five years, they have averted the emission of over 805,000,000 kg of CO<sub>2</sub> into the environment. In addition, they have maintained their commitment to reducing emissions by expanding multimodal transportation to connect with Eastern Europe from Northern Italy beginning in 2020. They ensure workplace safety in accordance with UNI ISO 45001: 2018 standards, creating and welcoming environments by utilizing eco-friendly technologies, such as our air conditioning systems, which are among the most advanced in terms of comfort, energy and CO<sub>2</sub> savings (Anon., n.d.).

### *3.3.3 Prologis*

In 2008, this firm was the first logistics real estate company to receive ISO 14001 accreditation for environmental management for four areas (Southern Europe, Northern Europe, Central and Eastern Europe, and the UK). Prologis uses elements that maintain building environmental quality.

Wood is utilized on warehouse facades to assist the buildings blend in with their surroundings. LED or TP bulbs are the standard lighting recommendations. Many of the buildings incorporate rooftop solar panel installations. industrial sites are redeveloped and are constantly looking for ways to reuse and repurpose demolition materials.

All Prologis North American project managers are LEED-accredited experts, and all are educated in LEED sustainable design standards. Prologis, a LEED-certified industry leader, now has LEED-certified properties in Brazil, Canada, China, France, and Mexico. The LEED Volume Program, launched in 2011, accelerates the certification process for high-volume property owners by concentrating on commonalities in building design, delivery, and operations. This prototype-based strategy allows large-scale builders like Prologis to achieve uniformity in green building upgrades while gaining LEED certification sooner and at a lesser cost than individual building assessments would allow. Prologis is the first warehouse developer to participate in the LEED Volume Program.

### *3.3.4 AENOR Logistics*

AENOR is a friend of operators in the passenger and goods transport sectors, from metro to buses, as well as railway, airline, boat, tram, and cable car providers. The most prized qualification is the AENOR accreditation, which gives more confidence in all organizations.

Their environment certifications include ISO 14001 Environmental management, EMAS EC Regulation 1221/2009, ISO 14064 Carbon footprint of organizations (GHG Protocol and industry specifications), OCS Operation Clean Sweep and Zero waste. As for the energy management. Since 1996, AENOR has been ENAC recognized as an environmental tester with accreditation number ES-V-0001, and this certification has been updated to reflect the most recent revision to the EMAS Regulation, in compliance with EU Regulation 2018/2026. As for energy

management, They have ISO 50001 Energy efficiency management and EN 16247 Energy audit verification.

### *3.3.5 Grimaldi Group*

Provides logistics services based on ocean shipping to the world's top automakers. Through its maritime services, the Group transports cars, any type of rolling cargo, containers, palletized/unitized cargo and passengers.

The Grimaldi Group was the first Italian shipping firm to achieve the ISO 9001 quality certification as well as the ISO 14001 environmental certification.

Conformity with UNI EN ISO 9001:2015 standards and integration of the management system with the criteria of ISO 14001:2015 have further reinforced the Group's Quality and Environmental systems.

The integrated system's key document is the Environment and Quality Policy, which is communicated and followed by all workers.

### *3.3.6 Logistica Ambientale SAL*

Logistica Ambientale is a Porcarelli Group firm that specializes in waste management at public and private companies and businesses, as well as private people, from the point of production to the point of transportation to the destination plants.

It is critical for this firm to constantly have the most recent generation cars and Smart equipment, which are suited for lowering environmental consequences. As a result, they invest in and implement novel technologies to improve collection and storage, minimize the number of trips, and so cut CO<sub>2</sub> emissions. The certifications they have are EMAS certification, UNI ISO 45001, UNI EN ISO 14001 and UNI EN ISO 9001.

### *3.3.7 Adriatic Air Cargo*

They chose the only Green Data Centre in Southern Europe, located in Castel San Pietro Terme in the province of Bologna, Italy.

The data center structure is entirely composed of wood and meets the greatest energy efficiency standards. It is solar-powered for self-consumption, resulting in ZERO emissions from the data center.

### *3.3.8 Expotrans Srl*

It is a Licensed International Freight Forwarder with an integrated network of Ocean freight, Airfreight, and Ground freight facilities, as well as an E-Service and cargo tracking capabilities. Within the frame of Italy, Expotrans operates in the cities of Rome, Milan, Bologna, Rimini, and Vicenza.

For every stage of the shipping process, all of their branches are UNI EN ISO 9001:2015 certified.

### *3.3.9 Gondrand by Fercam*

They provide high-quality services that meet the interests of all parties while working with an eye toward environmental sustainability and adhering to current environmental and workplace safety regulations.

To do this, a Quality, Environment, and Safety system to manage internal operations efficiently and effectively was integrated, optimizing energy and raw material consumption and ensuring waste reuse and reduction, encouraging improved waste management. All of this while keeping social, environmental, and economic factors in mind.

This company has earned the International Organization for Standardization. It has released an international ISO standard. Since 1993, FERCAM has been ISO 9001 certified.

The Occupational Health and Safety Management System specifies the parameters that a firm must meet in order to control risks and operate with the goal of enhancing occupational health and safety performance. ISO 45001:2018 certification has been obtained by FERCAM.

### *3.3.11 Marexport*

Marexport Srl was founded in Genoa, Italy in 1966, when computer use was not as popular as it is now. The organization has vast expertise in all fields of marine transportation (conventional shipments, full bulk and groupage shipments, and

warehousing). In addition to UNI EN ISO 9001:2008 accreditation, the company's goal on implemented eco-friendly activities is highlighted in their sustainability report. It entails their attempts on reducing the negative effects of their activities on the natural environment in the areas of ecosystem health and biodiversity, waste, and pollution. This encompasses air pollution, resource consumption and circularity, as well as how we will continue to promote responsible ship recycling. And by 2050, their aim is to have a zero gas emission activity.

### *3.3.12 Niinivirta Transport S.P.A*

Founded in 1986, it specializes in road, air and sea transport all over Europe. This company has a multitude of certificates, such as UNI ISO 14001:2015 and UNI ISO 9001: 2015.

Niinivirta Transport has an environmental certificate stating their aware and responsible economic strategy, directed at the environmental issues coming from the logistics company activity. A continuous improvement of the environmental performance leads to significant commercial and economic benefits, which at the same time satisfy the expectations for environmental improvements.

They committed in this certificate to adapt a policy of continuous environmental improvement, minimizing, where technically possible and economically sustainable, each negative impact on the environment and they work as well on eradicating pollution caused by those activities. And this statement applies to both ISO 14001 and 9001 (S.P.A, 2017).

Moreover, businesses will discover that automated warehousing provides several options to decrease warehouse facilities' environmental and social footprints in ways that boost their financial bottom line.

## **Chapter 4: Green Packaging Management of Logistics Enterprises**

Green Logistics is a logistics activity that aims to decrease environmental pollution and resource consumption by utilizing sophisticated logistics technology in the design and implementation of transit, storage, packaging, handling, processing, and distribution. It is an effective and efficient flow of products that connects the primary green supply and the main green demand in order to overcome the hurdles of space and time and green services activities in the economic management process, also known as environmental logistics.

Green Logistics System consists of six components: green transportation, green storage and safeguarding, green loading and unloading system, green packaging, green distribution processing, and green information collecting and management (Zhang & Zhao, 2012).

Product packaging comes in a variety of levels. Inside packaging, which comes into direct touch with the product, is often disposable. Secondary packing or even multiple packaging is often required to make transit, storage, loading and unloading easier. There are many different types of logistics containers, such as trays, containers, container bags, corrugated boxes, cans, buckets, and other utensils with various materials and structures. Both the product's loaded packaging and the logistics package used a huge quantity of resources and produced a large amount of solid waste. As a result, the environmental effect of packing is Large. Green package, also known as "ecological package" or "environmental friendly package," is defined as an environmentally friendly package that is entirely made of natural plants, can be recycled or reused, is resistant to degradation, and promotes sustainable development, even throughout its entire lifecycle. In summary, green packaging is suitable packaging that may be reused, recycled, or degraded without causing pollution in humans or the environment over the product's life cycle (Yi, 2006).

### **4.1 Poste Italiane**

The largest infrastructure in Italy. they operate in the areas of deliveries, logistics, savings sector, in financial and insurance services and offer our products and services to individuals, companies and public administration. with a vast presence throughout Italy, is aware of the unique position it plays in producing value inside the country as well as the possible influence it may have on decreasing environmental consequences. For these reasons, the organization prioritizes environmental preservation and reducing the environmental effect of logistics. The company is nearing completion of its goal of carbon neutrality by 2030, which reflects the Group's revolutionary green business concept, meaning a comprehensive approach that encompasses all Poste Italiane goods, services, and processes. This is also manifested through increased consumer participation, which we have dubbed the "Green Challenge," programs for offsetting CO<sub>2</sub> emissions that reward our customers' "green behaviors." Environmental conservation is a non-negotiable issue for Poste Italiane when it comes to establishing long-term value.

The Company's goal is to create an environmental protection culture while methodically developing sectoral action plans for the effective management of energy resources, water resources, and trash from a circular economy viewpoint, in order to decrease its ecological impact. The company has ensured the compliance of the management system with ISO relevant requirements, and that all over Italy.

Poste Italiane has acquired 663 electric tricycles and built recharge stations. Furthermore, Poste Italiane was given the contract to acquire 5,000 Euro 5 thermal tricycles, which will be implemented in 2021. The green fleet thus reaches 14.2% of the total fleet of Poste Italiane: there are about 2,800 bifuel non-electric cars and vans and about 2,000 low-emission motorcycles. The interventions are in line with the goal of reaching 27,800 by 2022 to reduce fleet emissions by 40%. The joint company founded in 2020 by Poste Italiane and sender, the European leader in freight transport digitalization, has as its principal goal the efficiency of transportation and the reduction of logistics' environmental effect. CO<sub>2</sub> emissions have been reduced by 7,300 tones because to the usage of 10% LNG (liquefied natural gas) cars.

#### **4.2 FA DA imballaggi Industriali**

An Italian business with commercial expertise in sustainable packaging and a distinct entrepreneurial vision, the company's development is immediately Fabrizio and Davide Cozzoli want to help businesses grow through two key channels: customization and assistance. The client is at the heart of the project and the services provided to him in order to accompany him down the road of choosing and after sales. As a result, professional development and the constant pursuit of innovation led the organization to an essential and basic quality parameter: Company certified by iso 9001 since 2018 for Quality management for business success

### **4.3 Dynamic Service S.R.L**

Dinamic Service S.R.L. has a consolidated core business in the packaging, repackaging and labeling for third parties of medical products, for personal care and agri-food. The Spoltore plant, built in 2010, is equipped with a 1,400 m<sup>2</sup> warehouse with over 900 shelved pallet spaces and almost 200 on the ground for In & Out, a secondary production area of 500 m<sup>2</sup> with 2 compartmented areas of 18 m<sup>2</sup> each, for food. and medical products and a 40 sqm Clean Room. The organization is notable for its quick dynamism in reacting to client demands, its high degree of professionalism in offering solutions that are efficient and compatible with expectations, its exceptional flexibility and capacity to adapt to changes in the target market.

These characteristics highlight the synergistic work performed by all corporate resources while completely adhering with sector-specific binding legislation, the voluntary reference standard UNI ES ISO 9001:2015, and excellent processing standards.

### **4.4 The packaging industry in Italy**

The Packaging Industry in Italy was valued at USD 9.57 billion in 2020 and is predicted to grow to USD 11.99 billion by 2026, growing at a compound annual growth rate of 3.6 percent between 2021 and 2026. Despite the economic crises of the 2000s, which jeopardized various economic activity, Italy remains one of the major economies in the European Union.



Packaging materials are used to hold and preserve items, provide safe transportation, and notify end users about the material's qualities and contents. The packaging sector in Italy is influenced by several market trends. There is an improvement in living standards and personal disposable money, which is stimulating consumption across a wide variety of items, as well as following expansion in demand for product packaging.

Since of environmental issues, awareness is growing in this region, leading to the development of tiny pack sizes that are helpful to consumers because they are easy to carry and use.

These packs prove to be eco-friendly in a long run. Many government restrictions are being introduced in this region, which is fueling the expansion of this industry.

Increased packaging process innovation in the region, with an emphasis on easily recyclable materials. The rising desire of consumers in Italy to recycle the majority of waste materials in the packaging business is assisting the industries in further development in the packaging sector. The research looks at packaging material, package type, and end-user industry. In Italy, market growth in the first half of 2017 was driven by different government rules, such as a tax decrease for packaging materials that favor recycled plastic. Such actions by the Italian government are projected to aid the packaging industry's overall success throughout the projection period.

#### **4.1.1 The Plastic packaging**

Demand for plastic packaging is predicted to rise modestly in the area, while GDP is expected to remain stable throughout the projection period. According to the Italian National Institute of Statistics, while Italy ranks third in the packaging market behind the United Kingdom and Germany, the annual turnover of plastic product manufacturing in Italy increased from EUR 30.96 billion in 2010 to EUR 32.12 billion in 2015. These are the primary elements influencing the growth of the country's plastic packaging market.

Because of expanding consumer goods demand, the country is pushing the growth of plastic packaging. Furthermore, an increase in retail and e-commerce sales is driving up demand for packaging. As a result of this megatrend, flexible packaging

solutions that provide maximum security for these objects are becoming more popular. This encourages the use of plastics for packaging since they can meet a variety of packaging needs, from electronic components to shelfable packaging for food commodities, making plastics the preferred kind of packaging.

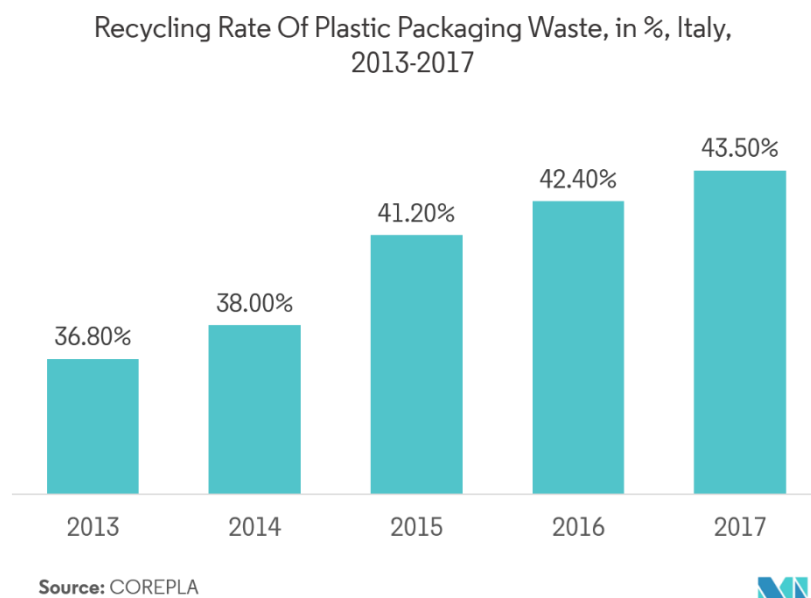


Figure 4.1 graph showing the recycling rate of plastic packaging waste in Italy

As the figure shows, the recycling rates have been moving forward since 2013, going up from 36.8% to 43.5 %.

In 2017, Italy recycled 987 thousand tons of plastic packaging, 562 thousand tons of sorted MSW (Municipal sorted waste) and around 400 thousand tons gathered through private platforms. MSW, commonly known as trash or rubbish, is nonhazardous material created by families, institutions, hospitals, and enterprises. It is made up of garbage, compostable items, and recyclable materials, and its disposal is overseen by the municipality.

Typically, this garbage is collected, segregated, and disposed of in a landfill or municipal recycling center.

In addition, Recycling saved 400000 tons of virgin plastic and prevented the release of 75 thousand tons of CO<sub>2</sub> in Italy. The recycling business employs over 6 thousand people, and its total net value in 2017 was 78 million Euro.

Following the European Circular Economy Action Plan, Italy aims to attain new objectives of 50 percent and 55 percent recycled plastic packaging by 2025 and 2030, respectively.

#### **4.5 Major Players**

The major Italian players in the packaging field are Tetra Pak Italiana SpA, Smurfit Kappa Italia SpA, Wipak Bordi SRL, DS Smith packaging Italia SpA. In the next section, those companies will be elaborated, along with the green certificates they own.

##### *4.5.1 Tetra Pak Italiana SpA*

Tetra Pak has created a variety of packaging to maintain both the nutritional content and the flavor of the items contained therein. Tetra Pak technology has greatly facilitated the packaging and distribution of liquid products to consumers, particularly because the company works to reduce packaging costs by developing and offering sustainable and innovative food processing and packaging solutions that can make a difference, helping to protect and restore our planet's climate, resources, and biodiversity. They make certain that food safety and quality are not jeopardized (Sax, 2010).

Tetra pak owns a Forest Stewardship Council certification for labelling. In 2018, they created over 500 billion FSC-labeled boxes and distributed 12 billion entirely renewable products. In addition, tetra pak aspires to achieve net zero greenhouse gas (GHG) emissions in its own operations by 2030, with the goal of achieving net zero GHG emissions throughout the value chain by 2050. The company has been investing since 2011 in lowering energy-related emissions through energy conservation, energy efficiency improvements, on-site solar photovoltaics (solar PV), and the purchase of renewable energy. They created a long-term recycling value chains with clients, waste management firms, recyclers, municipalities, industry groups, and equipment suppliers. Tetra Pak's objective is for all beverage cartons to be collected for recycling, with no beverage cartons becoming trash or being disposed of in a landfill (Madlala, 2021).

##### *4.5.2 Smurfit Kappa*

Smurfit Kappa is a Food Contact Packaging company dedicated to making an impact and contributing to a greener, bluer earth. And with that Purpose, they are

doing the right thing for people, communities, and the environment by developing products and processes that make a genuine impact for customers and across our whole value chain. The company has reduced since 2005 41.3% of CO<sub>2</sub> emissions, chemical oxygen demand by 38.5%, and reduced 29.2% of waste to landfill from their paper mills and removed annually 100 thousand kilos of plastic. In addition, they are the first packaging company in the world with a certified by the vegan society (Kappa, 2021).

They can provide right-weighted, fit-for-purpose packaging solutions that minimize inefficiency and waste. They design sustainability into every fiber in collaboration with suppliers and customers. Their circular concept is centered on making a good difference. It all starts with their product being circular, with 76% of raw material coming from recycled boxes and the remainder from sustainably managed forests having a positive impact (Silva, 2021).

#### *4.5.3 Wipak*

Wipak Group is a global provider of packaging solutions and services for food, medical devices, and pharmaceutical products. We collaborate closely with our clients to develop as we strive to become the world's most sustainable packaging company.

The more efficiently resources can be conserved, the better products are safeguarded, or in the case of food, the longer it can be stored. It is for this reason that the firm creates new packaging solutions and collaborates with its customers to generate sustainable designs.

Sustainability is more than just thinking about future generations by developing sustainable packaging solutions. Their purpose includes their deeply entrenched family values of making honest, long-term decisions that benefit all stakeholders and society as a whole.

It adheres to a 'zero harm' attitude in order to ensure the safety of its workers. It also manifests itself in their dedication to protecting their clients by safeguarding vulnerable value chains in Food and Medical Packaging. The firm's goal is to be the most sustainable flexible packaging company, with a five-year goal of reducing carbon footprint to zero.

GreenChoice by Wipak, their new brand, symbolizes for progress and rapid transformation. It brings their carbon-zero plan to life in our product line. By grouping all of their sustainable packaging options under one brand, they have made it easier than ever to choose between them. GreenChoice is shouldering its share of the duty for environmental conservation and offering clients with the finest quality sustainable solutions for future generations. Every action they've done has purposefully led to the creation of this varied and comprehensive portfolio.

All Wipak locations have received ISO 9001:2008 certification. Strict requirements are also used to the selection and processing of raw materials and additives, as well as recycled resources. In addition, the company holds ISO 9001:2008 for management, ISO 22000:2005 for hygiene, ISO 4001:2004 for environment, ISO 4001:2004 for Energy management, and an ISO 50001:2011 for Supply-chain safety

#### *4.5.4 DS Smith*

DS Smith is a global leader in sustainable packaging solutions, paper products, and recycling services.

Sustainability is key to DS Smith's business strategy and their mission of Redefining Packaging for a Changing World. They unveiled their new Now and Next sustainability strategy, which focuses on the world's current sustainability concerns as well as those that will affect future generations. The Now and Next Sustainability Strategy focuses on completing the loop via improved design, safeguarding natural resources by using every fiber, decreasing waste and pollution through circular solutions, and empowering people to lead the transition to a circular economy (DS Smith, 1982).

Climate change was identified as a high priority for stakeholders in their recent study, who increasingly expect corporations to assist mitigate the worst consequences of climate change. Although they have reduced costs by 31% in the last 10 years while considerably increasing the business, they want to go even further and quicker.

Their 2030 objective is for at least a 40% decrease in CO<sub>2</sub> emissions per ton of output compared to 2019, with a goal of reaching Net Zero emissions by 2050. This

goal will be met by strategically investing in renewable energy sources, green power, and energy efficiency, as well as converting steam from manufacturing to heat their facilities. In addition, an Anaerobic digester expansion, the acquisition of green power, and the usage of Aero derivative gas turbines will be carried out (Saccocci, 2019).

They will seek validation of the aim from the Science-Based Targets initiative (SBTi) in the coming months, clearing the door for circular packaging to play a key role in assisting companies and customers in reducing their carbon impact.

By 2025, they will have optimized the usage of fibre in all of our innovative packaging solutions for unique supply chains, applying circular solutions for waste and pollution reduction, they will employ packaging and recycling to replace problematic plastics, minimize customer carbon, and eliminate consumer package waste by 2030. All of these goals will be handled by sustainable and by developing the right strategies.

DS Smith has earned many certificates such as quality management: ISO 9001, environmental management: ISO 14001, safety management: ISO 45001, energy management: ISO 50001, chain of custody: forest stewardship council (FSC) and chain of custody: programme for the endorsement of forest certification (PEFC) (Smith, 1940)

Now that the major companies were well elaborated, it can be well noticed that all of them include a sustainable development plan and that because they benefit the financial, economic and environmental scales of the whole world.

## **Chapter 5 discussion and conclusion**

The previous chapters elaborated everything needed to know about environmental sustainability and its benefits. In addition, the environmental certificates as well as the logistic companies and the packaging companies that use a green and a sustainable strategy. In this chapter, the impact of sustainability on the economic growth and development will be elaborated, as well as the challenges that companies can face when trying to become sustainable.

### **5.1 Economic Growth and Environmental Sustainability**

One of the most repeated says in the business and environmental world is that running an ecologically friendly business allows companies to minimize your environmental effect and protect natural resources. Thus, there are political and commercial leaders who do not care if economic expansion produces environmental harm, and there are environmental campaigners who do not believe economic growth can occur without inflicting environmental damage (Cohen, et al., 2015).

A green business serves the best interests of the local and global environment, which means it helps the community and economy that rely on a healthy earth.

An environmentally conscious firm analyzes its influence on society and the environment in addition to earnings. Such a business is sustainable since it contributes to the health of the structure in which it works, hence assisting in the creation of an environment conducive to the business's success (Yaacob, et al., 2015). Simply said, if corporations do not act properly as global citizens, the majority of many species will not survive the twenty-first century. According to Environmental Sustainability, "the current human-caused rate of extinction of species of both plants and animals is hundreds of times higher than the natural rate in the past.

According to a study published in 2018, the world is on track to generate 27 billion tons of solid trash by 2050 as a result of a business climate that values quick product creation and turnover for maximum profits. Unchecked CO<sub>2</sub> emissions are expected to lead to a two-degree Celsius temperature increase by 2050, causing sea levels to rise and catastrophic weather events to become more common. According to one analysis, only 100 corporations are responsible for 71% of worldwide emissions.

Now is the moment for companies to join the solution, reduce emissions and waste, and contribute to the cultivation of a habitable world. The good news is that, according to the Paris Climate Accord, corporations may have a significant influence, accounting for 60% of emissions reductions by 2030. In other words, as governments and industry speed the transition to a net-zero economy, companies must embrace innovation and sustainability to open up new growth possibilities and remain relevant in the new low carbon economy (Kaza, et al., 2018).

## **5.2 Business Implications**

According to The New Climate Economy, 95% of plastic packaging is discarded after the first use every year, amounting to \$120 billion, and micro plastics have been discovered in 114 aquatic species. If current trends continue, about 140 million people will be displaced from their homes by 2050. To keep the earth from rising more than two degrees Celsius, industries must reduce carbon emissions by 40% by 2060.

Businesses that take action on climate change by adopting green policies, technology, and growth strategies may earn a total of \$26 trillion in economic benefits when combined with action by governments and other stakeholders.

The case for long-term sustainability is compelling. Businesses must engage everyone who may contribute in order to become sustainable. This is why, what logistic and warehouse companies have been achieving, by raising certifications, introducing recycling methods and working on reducing CO<sub>2</sub> emissions is making the environment stay on the right path (Puga, et al., 2021).

## **5.3 Relationship between Green logistics, Economic and Environmental Sustainability**

The logistics business is crucial for economic progress, but it is also harmful to long-term environmental sustainability.

A panel study was conducted to assess the variables impacting green logistics in the BRICS member nations. According to the findings, green logistics solutions are positively connected with long-term economic and environmental improvement.

Several firms have begun to implement ecological practices in their logistics operations in order to gain economic and social benefits without jeopardizing



environmental sustainability. Ecological product design, customer engagement, green purchasing of raw materials and components, and green transportation and distribution were revealed to have a significant positive relationship with environmental performance (Aldakhil, et al., 2018).

The emphasis of green logistics operations is on waste reduction, which is commonly associated with ecological sustainability and enhances the monetary act of businesses.

Green logistics operations, according to (Jayaraman, et al., 2012), improve market share, buyer loyalty, and promote company financial growth. (Cosimato & Troisi, 2015) investigated the influence of green logistics on economic performance and company profits and discovered that the use of renewable assets in green logistics operations may reduce environmental footprints while also significantly advancing economic conditions. Green logistics, according to (Fang, 2016), may allow economic variables in the "Belt and Road" region to gather quickly, realize the effect of scale economy, and boost regional economic volume and quality to enter a double-up track.

(Cosimato et al. 2015) investigated the influence of green logistics on economic performance and company profits and discovered that the use of renewable assets in green logistics operations may reduce environmental footprints while also significantly advancing economic conditions. Green logistics, according to (Fang, 2016), may boost regional economic volume and quality to enter a double-up track.

(Chu, 2012) indicates that logistics (transportation, warehousing, mailing, and telecommunications) had a beneficial influence on economic growth in 30 Chinese regions from 1998 to 2007. Furthermore, the positive impact of logistics was more pronounced in less developed provinces. According to (Jing, et al., 2020), telecommunications infrastructure has a favorable influence on economic growth in both developed and developing countries.

The preceding studies stress the importance of green logistics and encourage its operation through continuous economic policies to achieve competitive returns, but they fail to examine the promotion of economic development in the process of green logistics operation.

#### **5.4 Challenges of logistic companies**

The logistics business is not recognized for its high level of sustainability today. Companies have major challenges in implementing environmental rules in the logistics industry. This is due to a number of factors. First, there is a reliance on fossil fuels, particularly in transportation.

Effective, economically feasible alternatives for weaning the sector's fuel dependency on goods transport have yet to be discovered. Second, e-commerce deliveries have significantly increased the amount of delivery trucks in major cities, with many operating without full loads when faced with mixed orders. Furthermore, local governments are in the process of establishing emission limitations. A cross-sectoral agreement, however, is required to put in place steps to create new facilities that fulfil the needs of individuals involved in logistical operations.

Moreover, whether logistics activities are performed in-house or outsourced, the low rates and margins do not often allow for the consideration of infrastructure, process automation, or more efficient handling equipment.

In general, neither logistics nor the customer are sustainable. Another issue is that logistics is becoming invisible to the client. Green logistics policies are difficult to implement when customers want, for example, 24-hour delivery that impede load consolidation or making the most of transportation flows. Furthermore, logistics expenditures are sometimes not listed in an invoice or are insignificant. As a result, their relevance declines and the motivations for a corporation to engage in environmental sustainability decrease (El-Berishy, et al., 2013).

## **5.5 Facing challenges**

In the logistics chain, transportation has a significant carbon impact. Aside from purchasing cleaner-running vehicles, it is vital to deploy tools that aid in delivery route planning and emphasize load sharing to reduce emissions. Not only can you improve fleet management efficiency, but you also reduce overall transportation emissions.

It is critical to have a warehouse that adheres to sustainable building and management standards. The boom in the logistics sector is driving demand for new warehouses or forcing companies to redesign their infrastructure to meet market requirements.

As a result, there are several approaches to include eco-logistics into warehouse design:

Logistics buildings take center stage: their design and construction contain environmental protection measures that ensure long-term building management. The seals that support logistics warehouse sustainability are sustainability certifications. These certifications are awarded after a thorough examination of concerns such as water and energy consumption efficiency, the use of alternative energy sources, the selection of building materials, and waste management throughout the whole process. Monitoring and promotion of energy savings in the warehouse: these may be achieved in a variety of ways. For example, fully automation of some warehouse procedures allows for a reduction in the requirement for artificial illumination (emulating the methodology known as lights-out manufacturing). Another strategy to adhere to sustainable logistics practices is to use as little packaging as feasible on items to reduce resource waste, or to employ more adaptable adaptive packaging choices. In addition, the implementation of green energy, and the aim for zero carbon emissions along with recycling packaging (Murphy, et al., 2000).

Green Blue, an environmental nonprofit, has announced the creation of a recycled-material certification program. The Recycled Material Standard (RMS) is the project's core, establishing requirements for third-party certifications and enabling chain-of-custody tracking.

"We believe the RMS has the potential to transform supply chain transparency around the use of recycled materials, increase supply, and improve consumer visibility of recycled materials," said Nina Goodrich, executive director of Green Blue, in a statement issued in February 2021.

"Ultimately, brand owners must demonstrate progress toward their recycled content targets, and the RMS will be a vital instrument in achieving that," she noted.

## **5.6 Recommendations and conclusions**

This report has illustrated from the beginning the most important environment sustainability certification along with companies that used those certificates. In addition, the Italian pioneer companies were highlighted, and it was well elaborated how each and every logistic company starting from warehouse to transport to

packaging, works on the aim of reaching a maximum sustainability, and holding the going green slogan. And after seeing all the provided information in previous chapters, the impact of those certifications on the environment showed an important relationship with the economic growth. Promoting the enhancement of logistics infrastructure quality in each nation is critical for the healthy economic growth of the countries along the route, particularly developing countries. Furthermore, governments should adopt green logistics regulations that restrict the use of fossil fuels, minimize pollution, and ameliorate environmental deterioration in global logistics operations in order to accomplish environmental protection and economic gains. Micro-data samples of green logistics performance may be used in future study to solve the challenge of economic development and environmental sustainability. Businesses will be more sustainable if their environmental effect is reduced. When a company becomes less reliant on natural resources than its rivals and develops strategies to deal with growing expenses due to climate change, the company has a higher chance of long-term success, and therefore a better economy is attained.

Long-term eco-friendly logistics policies should be developed to encourage the use of renewable energy and green practices in logistics and supply chain activities in order to reduce the adverse impacts of greenhouse gas emissions and carbon emissions on environmental beauty.

Logistics performance indices are viewed as a viable tool for measuring the effectiveness of a country's policies toward long-term economic growth and environmental performance. Furthermore, green logistics operations reflect a worldwide rivalry battle between economic expansion and environmental conservation. Policies implemented by regulatory bodies to reduce carbon and greenhouse gas emissions, preserve natural resources, and reduce global warming and climate change problems that seriously harm fauna and flora can be carried out by implementing green initiatives in logistics and supply chain operations.

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Figure 4.1 graph showing the recycling rate of plastic packaging waste in Italy 22