



ENVIRONMENTAL PRACTICES IN LOGISTICS AND THEIR EFFECTIVENESS IN ORGANIZATIONS

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Abstract: Companies have been forced to take responsibility and act against climate change and what it entails to generate more sustainable operations. Logistics, as part of the supply chain, has a high relationship with a company's performance, so its eco-friendliness can be a significant step forward in response to the demands that the environment has presented in recent years. This work is a systematic review to recognize the contribution of the research that has been carried out regarding environmental practices in business logistics and how efficient they are in practice, as well as their permanence and updating over time. To this end, a selection of academic and scientific material from recent years is made.

Keywords: supply chain, environmental practices, business logistics.



I. INTRODUCTION

Logistics is responsible for planning, executing, and controlling the flow of materials and products from the point of origin to the point of destination to meet customer requirements. This discipline connects suppliers, manufacturers, distributors, and customers through a supply chain to ensure the availability of products and services at the right time and place. Logistics also manages the resources needed to transport, store, and manage products, such as route planning, inventory management, quality control, shipment management, and inventory management. Logistics encompasses a wide range of activities, including planning, design, and administration of material and product flows, financial administration, inventory management, and human resources management. These activities are carried out systematically to ensure the optimal functioning of the supply chain. Logistics also includes applying analytical tools to identify areas for improvement in operational efficiency and profitability, as well as implementing strategies to achieve business objectives. Therefore, it could be said that logistics is responsible for the planning, execution, and control of material and product flows to meet customer requirements, including the management of resources needed to transport, store, and manage products, as well as the application of analytical tools to identify areas of improvement in operational efficiency and profitability. This discipline helps businesses reduce costs, improve the quality of products and services, optimize delivery times, and increase customer satisfaction. It is essential for supply chain optimization, as it allows businesses to improve the flow of products and services through the planning, execution, and control of material and product flows. As a result, it enables businesses to achieve their business objectives and gain a competitive advantage in the marketplace.

Industry 4.0 is envisioned as a combination of innovative technologies, including advanced automation, the Internet of Things, artificial intelligence, cloud computing, advanced robotics, 3D printing, and augmented and virtual reality systems. The abovementioned technologies would work together to create a highly efficient, flexible, and connected production chain. This production chain will enable companies to produce higher quality products, in smaller quantities and with less waste, at a lower cost. In addition, using the data collected will enable companies to optimize their processes and make better business decisions. Industry 4.0 will also enable companies to create greater product customization, improve customer experience and increase the speed of product delivery. In addition, this revolution is based on the interconnection of machinery, devices, and software systems and the collection and analysis of data to improve productivity. This new industrial revolution has also been linked to improving environmental sustainability.

In this sense, Industry 4.0 provides technologies that allow companies to optimize production processes, reducing material waste, pollution, and energy consumption. These technologies include advanced robotics, the Internet of Things, Big Data, 3D printing, automation, and control systems. New technologies are also being developed to improve sustainability, such as energy sensors, data management systems, data security, storage systems, and power generation. In addition, Industry 4.0 is also helping companies to improve energy efficiency and reduce their carbon footprint by optimizing production and using renewable energy. For example, the Internet of Things allows companies to monitor the energy consumption of all their devices and make adjustments to improve energy efficiency, reducing energy consumption and environmental pollution while improving waste management practices. Furthermore, by collecting and analyzing data on production processes and using technologies such as 3D printing to create products from recycled materials, Industry 4.0 helps reduce material waste, improving sustainability.

In this way, the new industrial revolution has also produced more environmentally friendly products. It is achieved by using biodegradable materials and clean energy for manufacturing products. It enables companies to reduce their carbon footprint and improve sustainability significantly. Moreover, it offers companies a unique opportunity to improve environmental sustainability through advanced technologies. These technologies enable companies to reduce material waste, improve energy efficiency, reduce carbon footprint and manufacture more environmentally friendly products.

There is a growing consensus on the need for a green transformation of our economy to avoid a reduction in human welfare due to numerous environmental aggressions observed from more



affected habitats, in addition to increasing CO₂ emissions and water depletion. Although there is significant international concern about the adverse effects of climate change from this global environmental situation, many institutions and organizations have multiplied their conservation efforts. Moreover, they have adopted measures that allow in-depth knowledge about the dynamics and impacts [1].

As a result, new and better laws are being formulated to regulate environmental impacts, more information has been disseminated to consumers, making them increasingly demanding, and forming more competitive markets have proliferated [2]. Furthermore, the emergence of Green Supply Chain Management brings eco-efficiency into logistics, which means more effective environmental issues throughout the production chain [3]. Logistics, as part of the supply chain, emphasizes that it is the process of planning, implementing, and controlling the flow of raw materials, work in process, finished products, and related information from the place of origin to the place of consumption, efficiently satisfying the end customer [4].

In this way, it is intended to know the relevance of logistics and its impact and participation in ecology in this study, knowing that sustainable development and ecological aspects appear as crucial issues for logistics activities [5]. However, it is also necessary to state that, despite this being an integral part of economic and social development, they also harm the environment in multiple dimensions. There are currently two key concepts that are different from each other but related: green and reverse logistics. The practice of reverse logistics is recognized as the area that plans, operates, and controls the flow and logistic information corresponding to the return of post-sale and post-consumer goods to the production cycle through reverse distribution channels, adding value to them of different nature: economic, ecological, legal, logistic, corporate image [7]. On the other hand, some authors [8] explain that green logistics incorporates environmental particularities in logistics activities and the management of environmental aspects in each phase of decision-making in logistics networks. It can also be defined as a flow that connects the main green supply and demand to overcome the obstacles between space and time and green service activities in economic management [9]. It can also represent many forms of nature [10], the most distinctive ones are: reducing transportation costs, urban logistics, logistics strategy of environmental protection of the enterprise, and green supply chain to apply sustainable measures in the supply chain. By applying sustainability methods in green logistics, industry players will eventually contribute to resource conservation [11].

The growing concern for environmental issues directly affects business management and social practices [12]. Other authors [13] suggest that when companies incorporate environmental concerns into their supply chain activities, this offers them several opportunities that contribute to the economic, social, and environmental development of the countries in which they operate. Facilitating efficient and effective transportation and storing goods, information, and services are increasingly recognized as critical in fostering sustainable economic development and competitiveness in emerging countries. In recent years, it has been claimed that efficient green logistics performance and infrastructure significantly affect trade in services and the environment [15]. Improved green logistics performance reduces trade costs and eliminates standard shipping and handling inefficiencies. In addition, improving logistics performance is closely related to export diversification, trade expansion, access to foreign direct investment, and industry development: exports, trade expansion, attracting foreign direct investment, and economic development [16].

In this sense, ecological transformation is changing society towards a sustainable economy, government, and culture. This transformation involves adopting various policies, practices, and technologies to promote economic, social, and environmental sustainability. These changes include modifications in production, consumption, energy, natural resource management, transportation, infrastructure, and urban planning. These changes will help reduce greenhouse gas emissions, reduce pollution, improve air and water quality, and promote the development of a green economy. Green transformation also involves community participation in the decision-making process and the promotion of a culture of environmental responsibility. Green transformation is fast becoming a central objective of global policy. There is a growing need for governments and society to come together to address and solve global environmental challenges. It requires



international collaboration between governments, businesses, and civil society to develop long-term green transformation strategies. Green change is a priority for many countries and international organizations, which means that a variety of initiatives are being developed to promote the development of a sustainable economy globally. In short, green transformation involves a variety of measures to reduce society's impact on the environment and promote the development of a sustainable economy. These measures include adopting policies to reduce the use of fossil fuels, promote renewable energy, improve energy efficiency, and improve sustainable infrastructure and transportation. Implementing these measures requires a long-term commitment from governments, community, and business leaders to ensure a successful green transformation.

II. METHODOLOGY

The literature search focused on finding scientific literature on the environmental practices of green logistics, including business policies and practices. ScienceDirect, ProQuest, EBSCO, and Google Scholar databases were reviewed, as well as the Open Access Science Repository Network and The Reference. Keywords such as "logistics," "environment," and "relationship between logistics and environment," as well as related topics like "green logistics," "reverse logistics," and "green supply chain," were used in this conglomerate of documents.

In the case of ScienceDirect, one of the largest sources of scientific, technical, and medical research, the following search strings were employed: SEARCH-SCIENCEDIRECT (Logistic and environmental), AND (SUBJECT AREAS (Environmental Science)) AND (ACCESS TYPE (Open Access & Open archive)) with the specific years 2012-2022 indicated in the advanced search. Results indicated that the most relevant titles were in English, and the most frequently used keywords were "logistics," "green supply chain," and "green logistics." This database was found to have the highest percentage of articles meeting the research requirements.

The ProQuest database is the most comprehensive multidisciplinary resource in the market that offers a diverse mix of specialized journals, trade publications, magazines, and other point sources. The following search string was used: ("ENVIRONMENT" and "LOGISTICS," SUBJECT AREAS (All related to the environment, logistics management, administration, among others), TYPE OF RESOURCE (Scientific journals) to then indicate in the advanced search the years: 2012-2022. Some of the keywords in common in both databases were: "reverse logistics," "ISO 14001", "Business logistics," "Environmental improvement," and "sustainable development."

EBSCO is a database that offers full text, indexes, and academic periodicals covering different areas of the sciences and humanities. In this database, the search was refined as follows: ("ENVIRONMENT" and "LOGISTICS," SUBJECT AREAS (all related to the environment, business, management, among others), TYPE OF RESOURCE (journals) to then point out in the advanced search the years: 2012-2022. Some of the keywords mentioned in common are: "reverse logistics," "environmental improvement," "sustainable development," and "eco-friendly."

In the case of search engines such as LA REFERENCIA, a search engine that gives visibility to the scientific production of higher education and research institutions in Latin America, it promotes free Open Access to the full text. On the other hand, Google Scholar is a search engine that locates academic documents such as articles, theses, books, and abstracts from various sources. The searches made in these search engines were performed due to the secure access of specific titles found in the above databases that were highly related to the topic.

On the other hand, the inclusion and exclusion criteria were determined by the following:

- Papers contain topics related to logistics and the environment.
- Papers published between 2012 and 2022.
- Open access journals.

It was observed that the primary sources of information belonged to constantly updated journals of European, Asian, and African origin, which stand out with relevant explorations of the topic.

On the other hand, the exclusion criteria considered that the document had relevance to the topic, not only the title but all the content. Therefore, the exclusion criteria were:



- Year of antiquity corresponding to the study period.
- Subjects from other disciplines that, although they have the keywords, do not correspond to the subject matter.
- Papers from congresses or theses.

Figure 1 describes the elements selected according to the inclusion and exclusion criteria.

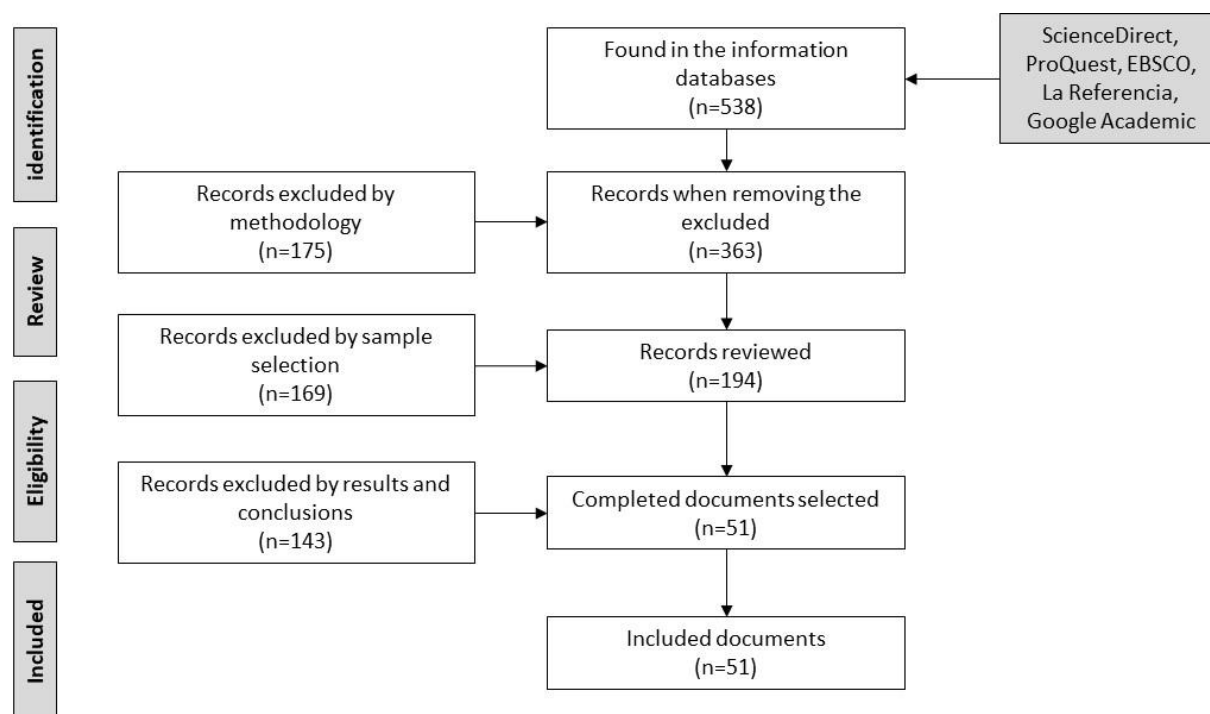


Figure 1. Methodological description, PRISMA.

III. RESULTS

Once the systematic review was completed, we proceeded to analyze the results found, among which the following stand out:

The primary source of information concerning the topic was ScienceDirect. Most of the documents were from European countries, suggesting that in this region, more research has been carried out in the last ten years. That also allows us to assume that in European countries, environmental practices have been considered for much longer than in other countries, even less than in Latin American countries. Unfortunately, there needed to be more relevance in scientific publications related to the subject.

It is essential to highlight that the countries with a higher index of scientific publications in environmental logistics also have more and better environmental plans in the industrial sector and in social and educational activities. It was also observed that the primary source of information among all those chosen was ScienceDirect, as shown in Figure 2. Although all the sources contributed significantly, the one that contributed least to the topic of study was La Referencia.

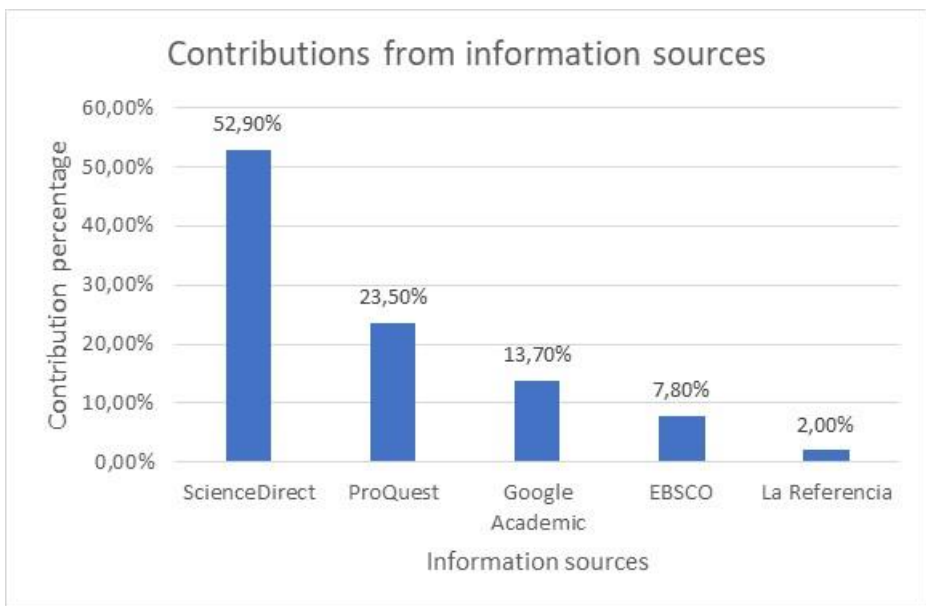


Figure 2. Contribution percentage of the information bases.

Regarding the type of information source (Figure 3), published documents were found mainly in 2022 and second place in 2021. However, the years 2020 and 2019 had no significant relevance in the subject, but before this, the most prominent year was 2017, in Figure 3 can be provided the contributions in research on this subject for each year evaluated in the information sources.

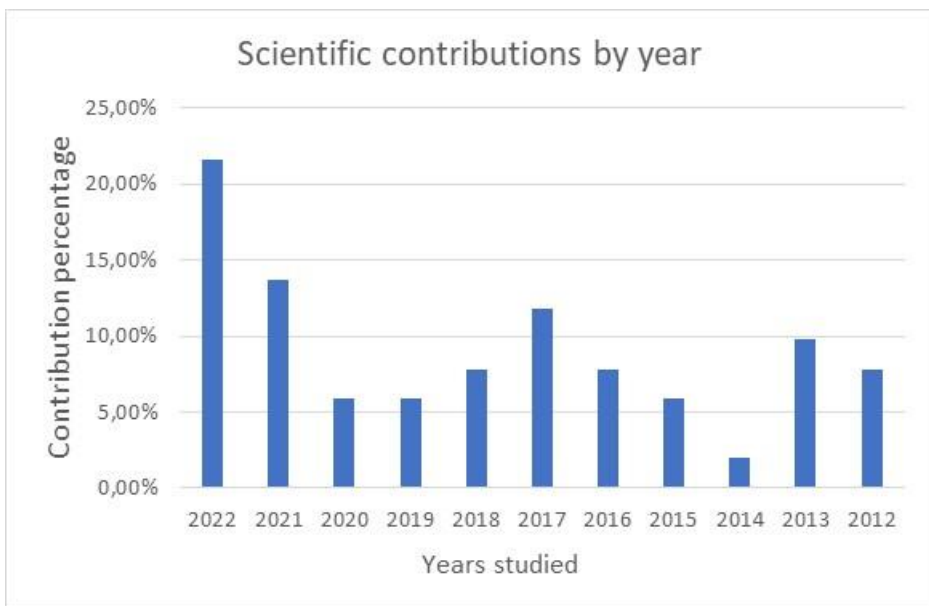


Figure 3. Bar graph of years of article publications.

In addition, the scientific contribution of the subject was evaluated by country, showing that, in South American countries, the main contribution is in Colombia and Brazil, followed by the United States in North America, Germany in Europe, and the rest of the European countries (Figure 4).

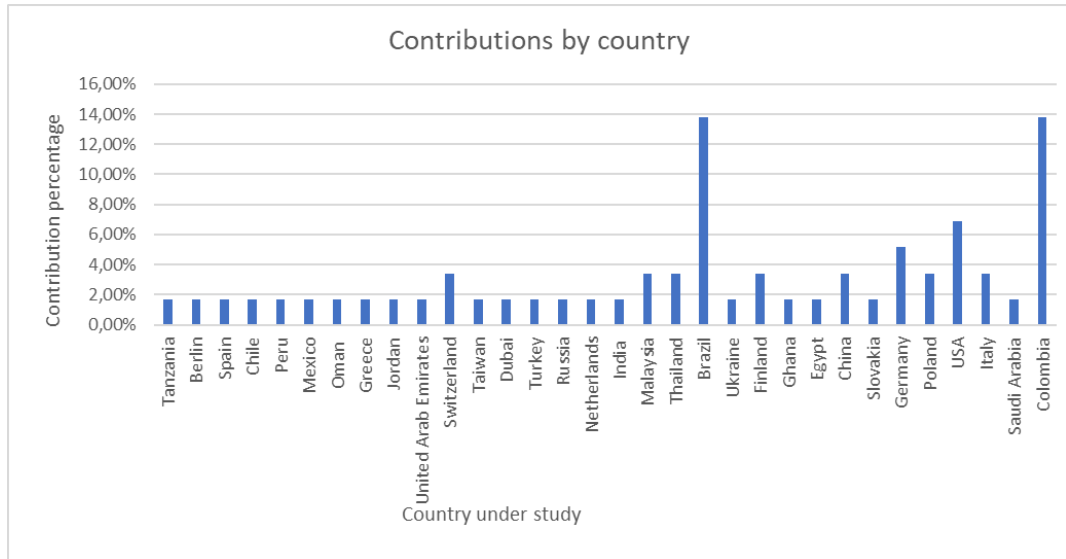


Figure 4. Bar chart of countries of articles.

Another factor studied in the literature review was the type of methodological design, which includes the type of research conducted, ranging from a literature review to an experimental, statistical, or applied design. Figure 5 shows the characteristics found.

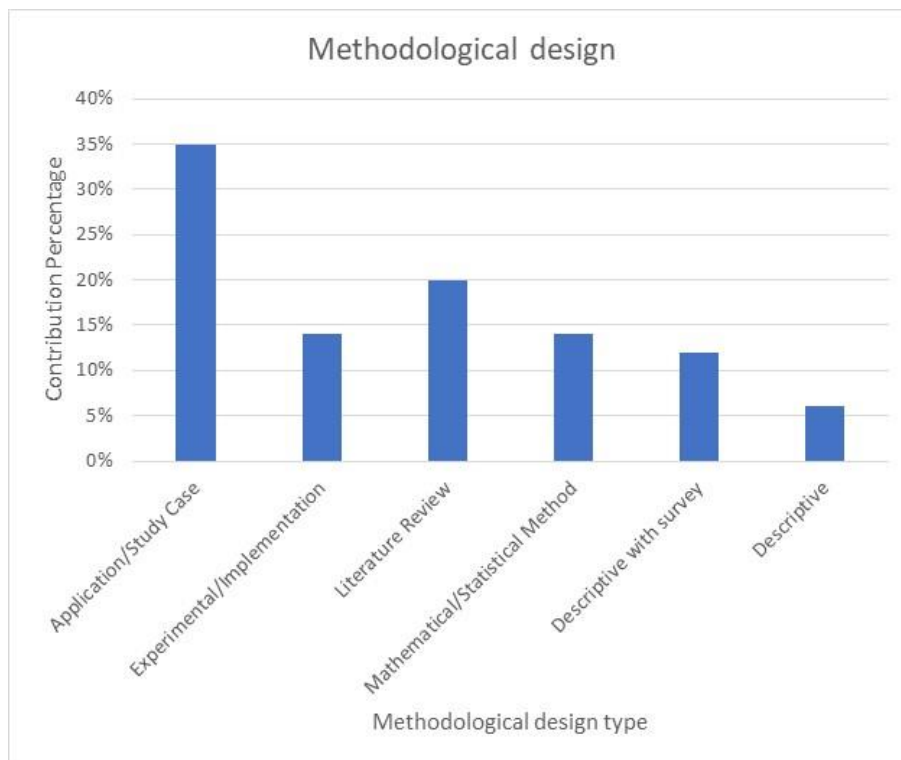


Figure 5. Methodological design found in the review.

A. Selection of items according to the design methodology:

Application/Study case:

As described in reference [17], with the arrival of digital technologies and digital factory tools, it is possible to design a logistics system in a digital environment or create an exact virtual copy of an existing system. To mention a standout case, [18] aimed to develop and validate a CEDI model based on implementing management practices that aim for efficiency in operation and reduction of



CO₂ produced in kilograms. As a result, the company reduced CO₂ equivalent emissions by 731 kg or 37% of emissions since it went from a value of 1933 kg per month to 1205 kg per month. On the other hand, [19] conducted a study to identify post-consumption reverse logistics practices carried out by a recycling cooperative in Esteio city. As a result, it was obtained that reverse logistics practices help generate income for better solid waste management.

Mathematical statistical method:

It consists of procedures for handling qualitative and quantitative research data. For example, the work proposed in reference [20] shows the development of eight different models to analyze the proposed hypotheses, which were empirically tested using sample data from 37 Organization for Economic Cooperation and Development (OECD) countries, thus confirming the effectiveness of inverse logistics.

Descriptive with a survey:

It is sought to know the environment through a data collection study. Therefore, as proposed in reference [21], green waste management positively affects the environment, and increasing waste management practices increases the green environment. Therefore, waste management and recycling are mandatory parts of organizations. Furthermore, the results revealed the degree of importance of implementing the Code of Sustainable Business Ethics to be more transparent among the partners and the development of Corporate Social Responsibility programs as soon as possible in order to contribute to society and the environment from the unity of all companies affiliated to the association [22].

Experimental and / or implementation:


It studies the effect of several factors to analyze the relationship between logistics and the environment. The work presented in reference [23] demonstrated the need for an approach to modeling reverse logistics processes by describing the direct production flow. It allowed ratifying how Petri nets are a handy tool in modeling production processes, demonstrating increased organizational benefits such as profits, productivity, and process effectiveness. Likewise, reference [24] argues that System logistics, transportation, and inventory are the main components of the order fulfillment process in terms of cost and service levels. Adding added value after the final stage of their product life cycle also suggests the consolidation of the fifth logistics stage: the Reverse Supply Chain (RSC) [25].

Literature review:

It is a paper that examines and includes published reports, articles, and studies of a scientific and academic nature. The authors chosen [26] show that most of the studies used are from the United States with their concern for public health, and Brazil with studies related to the environment. Finally, both countries significantly recognize the need to improve how unused medicines are collected by consumers and returned to the reverse logistics system. Another review [27], summarizing the findings of solid waste logistics not only in Colombia but in other Latin American countries concerning some of the world's major economies, revealed several problems related to economics, technology, regulations, and political concerns common to several countries in the world.

Studies linking environmental sustainability to company performance have increased as more companies contemplate implementing sustainable practices internally and coordinating with other companies throughout their supply chains. However, the results of these studies have found both positive and negative associations, leaving practitioners perplexed as to which actions would be beneficial.

It may be contradictory as green supply chain practices have more impact on dimensions of company performance but not on environmental performance [28]. Their report revealed that only green procurement contributes to economic benefits, and only reverse logistics practices can positively impact a company's social performance. However, other studies [29] suggest that the practical application of reverse logistics not only helps to increase business but is also



helpful in the green arena and leads to a competitive advantage for the company. Finally, other authors [30] demonstrated significant distribution and CO2 emission cost reductions for some organizations.

IV. DISCUSSION

This work has observed that various authors agree that a company's supply chain and logistics must be constantly updated and moving over time. Concern for the environment and the inclusion of ecological practices in the supply chain is a topic that has gained current relevance in academic literature [31]. Uncertainties and risks are central to creating vulnerabilities in logistics service operations [32]. An example of this was the worldwide pandemic experienced by COVID-19. While the deployment of technological innovation could prevent a devastating fall of the global supply chain due to this disease, little is known about the potential environmental cost of such achievement [33], and formal research on the contribution of supply chain logistics is less abundant. Today, logistics is a critical issue for developing a country's economy, as it is crucial for companies to succeed [34].

In recent years, there has been increased concern and awareness of ecology in the vision of business activities. In the current demands of the global environment, the focus of organizational performance has changed, previously, the center was economic performance, but now it focuses on environmental performance while achieving wealth and optimal levels of sustainability [35]. Other works [36] maintain that ambidexterity in logistics operations improves the link between environmental and financial results. According to [37], this means that companies can preserve the environment, avoid costly fines, and contribute to the welfare of society, thereby solidifying their social and economic benefits. In the search, it was possible to differentiate that reverse logistics considers the environmental aspects of all logistics processes and is more focused on direct logistics.

In contrast, green logistics is focused on the consumption of non-renewable natural resources, emission of pollutants, use of roads, noise pollution, and waste disposal [38]. Since consumers are the sources of the profitability of manufacturing companies, companies are interested in understanding to what extent they also play an essential role. In developed countries, marketing campaigns in which the main message is environmental or green have traditionally been widely evaluated by environmental groups in search of their transparency in information [40]. Although the practices and measures that can be suggested are diverse, some works [41] recognize the implementation of a waste management system as beneficial since it is the reduction in the generation of these, in addition to improvement in relations with the administration and the image of the company. Other authors [42] suggest that companies should invest in technology and new product development to minimize the environmental impact of their production processes. Finally, it is necessary to highlight that logistics operations have a substantial impact on the environment; therefore, the design and implementation of sustainable logistics systems are necessary to reduce their environmental impact [43].

CONCLUSIONS:

After analyzing the environmental practices in the logistics of organizations, it is concluded that:


- The growing concern for environmental issues directly affects business management and social practices. -Since the early 21st century, the ecological modernization theory has been based on the premise that companies must simultaneously agree on reforms in their practices and acquire pragmatic business measures to ensure environmental preservation.
- The role of innovation in all supply chain stages has been largely ignored in previous empirical research and is almost always disconnected from economic and environmental metrics. Therefore, it is necessary to ask whether innovative applications can moderate the impact of logistical outcomes on economic growth and pollutant emissions.


-Due to the evidence, this topic remains updated and is crucial for researchers concerning sustainable practices, green growth, and recently approved international community climate goals.

-Although supply chain performance and reliability are not new, nations' dependence on global supply networks has increased with globalization. That is why companies must not only have the resources to cope with the constant changes in modern life management and follow an ecological model in their functions, but they have also acquired greater recognition of the challenges posed by the COVID-19 pandemic and its aftermath.

REFERENCES:

- [1] C. R. Córdova, A. Zorio-Grima y M. Garcia-Benau, "New trends in corporate reporting: information on the carbon footprint in Spain," *Revista de Administração de Empresas*; São Paulo Tomo 58, N.º 6, 537, 2018.
- [2] C. Teixeira, A. Assumpção, A. Correa, A. Savi y G. Prates, "The contribution of green logistics and sustainable purchasing for green supply chain management", *Independent Journal of Management & Production* Volume 9 2018
- [3] B. Mach y A. Furtak, "Green Supply Chain. Developing Logistics With Care for the Environment," *Acta Universitatis Nicolai Copernici. Zarządzanie*, vol. 2, Issue 1, P. 65-73, 2020
- [4] C. G. González, "La logística inversa y su impacto al medio ambiente", *Boletín Científico de las Ciencias Económico Administrativas del ICEA*, vol. 1, nº 2, 2013.
- [5] N. El-Berishy, I. Rügge y B. Scholz-Reiter, "The Interrelation between Sustainability and Green Logistics," *IFAC Proceedings Volumes*, Volume 46, Issue 24, Pages 527-531, ISSN 1474-6670, 2013
- [6] E. Blanco y Y. Sheffi, «Green Logistics," *Sustainable supply chains* (pp. 147-187). Springer, Cham. 2013.
- [7] M. P. Martínez, K. T. S. Dias, S. S. Braga, Junior y D. da Silva, "La logística inversa como herramienta para la gestión de residuos de los supermercados de venta al por menor," *Revista de Gestão Ambiental e Sustentabilidade*; Sao Paulo Tomo 6, N.º 3, 150-165, 2017
- [8] O. Abduaziz, J. Cheng, R. Mat Tahar y R. Varma, "A Hybrid Simulation Model for Green Logistics Assessment in Automotive Industry," *Procedia Engineering*, Volume 100, Pages 960-969, ISSN 1877-7058, 2015
- [9] G. Zhang y Z. Zhao, "Green Packaging Management of Logistics Enterprises," *Physics Procedia*, Volume 24, Part B, Pages 900-905, ISSN 1875-3892, 2012.
- [10] P. Bajdor, "Comparison between sustainable development," *Polish journal of management studies*, vol 5, 2012.
- [11] S. Mangla, P. Kumar y M. Barua, «Risk analysis in green supply chain using fuzzy AHP approach: A case study,» *Resources, Conservation and Recycling*, vol. 104, pp. 375-390, 2015.
- [12] E. D. de Souza, J. C. Kerber, M. Bouzon y C. M. T. Rodriguez, "Performance evaluation of green logistics: Paving the way towards circular economy," *Cleaner Logistics and Supply Chain*, Volume 3, 100019, ISSN 2772-3909, 2022
- [13] B. Antwi, D. Agyapong y D. Owusu, "Green supply chain practices and sustainable performance of mining firms: Evidence from a developing country," *Cleaner Logistics and Supply Chain*, Volume 4, 100046, ISSN 2772-3909, 2022.
- [14] A. Ali, T. Gruchmann y A. Melkonyan, "Assessing the impact of sustainable logistics service quality on relationship quality: Survey-based evidence in Egypt," *Cleaner Logistics and Supply Chain*, Volume 4, 100036, ISSN 2772-3909, 2022.
- [15] A. Gani, "The Logistics Performance Effect in International Trade," *The Asian Journal of Shipping and Logistics*, vol. 33, nº 4, pp. 279-288, 2017.
- [16] Y. Yang, M. Zhang, Z. Lin, K. Bae, A. Avotra y A. Nawaz, "Green logistics performance and infrastructure on service trade and environment-Measuring firm's performance and service quality," *Volume 34, Issue 1*, 101683, ISSN 1018-3647, 2022.

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- [17] I. Antoniuk, R. Svitek, M. Krajčovič y B. Furmannová, "Methodology of design and optimization of internal logistics in the concept of Industry 4.0," Volume 55, Pages 503-509, ISSN 2352-1465, 2021
- [18] R. A. Gomez-Montoya, A. A. Correa-Espinal y J. D. Hernández-Vahos, "Modelo de centro de distribución verde: amigabilidad con el medio ambiente y eficiencia operacional usando un enfoque de procesos y un metaheurístico de búsqueda tabú," Revista Ingenierías Universidad de Medellín Vol. 16, núm. 31, 2017.
- [19] R. Krupp, R. M. da Silva y G. B. B. Vieira, "Logística inversa del posconsumo: un estudio de caso en la cooperativa Cootre de esteio-rs," Revista de Gestão Ambiental e Sustentabilidade; Sao Paulo Tomo 6, N.º 1, 72-86, 2017.
- [20] T. Ivanova, R. Rogaczewski y I. Lutsenko, "Influence of Reverse Logistics on Competitiveness, Economic Performance, Ecological Environment and Society," LogForum, vol. 18, Issue 1, P. 49-58, 2022.
- [21] C. Kerdpitak, "The role of green logistics and supply chain management of recycling waste management on green environment of thailand," Ilkogretim Online; Vol. 20 Issue 4, p1843-1855, 13p, 2021.
- [22] L. A. Pérez, M. A. Garzón y M. A. Ibarra, "Green company breakdown of necessity of a model," Dimensión Empresarial; Barranquilla Tomo 14, N.º 1, 67-78, 2016.
- [23] L. O. Vega de la Cruz, C. E. Marrero Fornaris y P. Pravia, "Contribución a la logística inversa mediante la implantación de la reutilización por medio de las redes de Petri," Ingeniare: Revista Chilena de Ingeniería; Arica Tomo 25, N.º 1, 154-169, 2017.
- [24] E. Causado Rodríguez y I. Reatiga Charris, "Cadena logística de subproductos residuales en la industria de tajada de plátano para exportación," Dimensión Empresarial; Barranquilla Tomo 11, N.º 2, 9-16, 2013.
- [25] L. C. Zucatto, I. Welle y T. N. D. Silva, "Cadena inversa del aceite de cocina: coordinación, estructura y aspectos relacionales," Revista de Administração de Empresas; São Paulo Tomo 53, N.º 5, 442-453, 2013.
- [26] P. A. B. Lima, F. C. M. Delgado, T. L. dos Santos y A. P. Florentino, "Medications reverse logistics: A systematic literature review and a method for improving the Brazilian case," Cleaner Logistics and Supply Chain, Volume 3, 100024, ISSN 2772-3909, 2022
- [27] D. C. Lopera, G. I. E. Lopera y H. C. Lopera, "Logistics as an essential area for the development of the solid waste management in Colombia," Informador Técnico; Cali Tomo 83, N.º 2, 131-154, 2019
- [28] H. Younis, "The impact of implementing green supply chain management practices on corporate performance," 2016.
- [29] N. K. Sharma, V. Kumar, P. Verma y S. Luthra, "Sustainable reverse logistics practices and performance evaluation with fuzzy TOPSIS: A study on Indian retailers," Cleaner Logistics and Supply Chain, Volume 1, 100007, ISSN 2772-3909, 2021.
- [30] G. D. Konstantakopoulos, S. P. Gayialis, E. P. Kechagias, G. A. Papadopoulos y I. P. Tatsiopoulos, "An algorithmic approach for sustainable and collaborative logistics: A case study in Greece," Volume 1, Issue 1, 100010, ISSN 2667-0968, 2021.
- [31] T. Laosirihongthong, D. Adebajo y K. C. Tan, "Green supply chain management practices and performance," Industrial Management & Data Systems, Vol. 113 No. 8, pp. 1088-1109, 2013.
- [32] B. Gultekin, S. Demir, M. A. Gunduz, F. Cura y L. Ozer, "The logistics service providers during the COVID-19 pandemic: The prominence and the cause-effect structure of uncertainties and risks," Computers & Industrial Engineering, Volume 165, 107950, ISSN 0360-8352, 2022.
- [33] C. Magazzino, A. A. Alola y N. Schneider, "The trilemma of innovation, logistics performance, and environmental quality in 25 topmost logistics countries: A quantile regression evidence," Journal of Cleaner Production, Volume 322, 129050, ISSN 0959-6526, 2021.
- [34] T. N. A. T. Aziz, H. S. Jaafar y R. M. Tajuddin, "Green Supply Chain: Awareness of Logistics Industry in Malaysia," Procedia - Social and Behavioral Sciences, Volume 219, Pages 121-125, ISSN 1877-0428, 2016.

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- [35] T. A. Chin, H. H. Tat y Z. Sulaiman, "Green Supply Chain Management, Environmental Collaboration and Sustainability Performance," *Procedia CIRP*, Volume 26, Pages 695-699, ISSN 2212-827, 2015.
- [36] O. Rintala, S. Laari, T. Solakivi, J. Töyli, R. Nikulainen y L. Ojala, "Revisiting the relationship between environmental and financial performance: The moderating role of ambidexterity in logistics," *International Journal of Production Economics*, Volume 248, 108479, ISSN 0925-5273, 2022.
- [37] K. Hobson y N. Lynch, "Ecological modernization, techno-politics and social life cycle assessment: a view from human geography," *The International Journal of Life Cycle Assessment* volume 23, pages 456-463, 2018.
- [38] G. Maquera, "Logística verde e inversa, Responsabilidad universitaria, socioambiental, corporativa y productiva," *Apuntes Universitarios; Tarapoto Tomo 2*, N.º 1, 31-54, 2012.
- [39] J. Loaiza-Ramírez, C. Moreno-Mantilla y T. Reimer, "Do consumers care about companies' efforts in greening supply chains? Analyzing the role of protected values and the halo effect in product evaluation," *Cleaner Logistics and Supply Chain*, Volume 3, 100027, ISSN 2772-3909, 2022.
- [40] C. Uribe-Saldarriaga, "Mercadeo verde de una empresa dorada," *Estudios Gerenciales; Santiago de Cali Tomo 30*, N.º 130, 95-100, 2014.
- [41] U. T. Orbegozo, M. A. V. Molina y J. I. Olaizola, "La gestión de residuos en la empresa: motivaciones para su implantación.," *Investigaciones Europeas de Direccion y Economia de la Empresa; Madrid Tomo 18*, N.º 3, 216-227, 2012.
- [42] D. Ortega, "La logística en Colombia, factores clave: las Tics, la infraestructura vial y el medio ambiente," *Biblioteca Digital Universidad de San Buenaventura*, 16 páginas, 2016.
- [43] M. Forkan, M. M. Rizvi y M. A. M. Chowdhury, "Multiobjective Reverse Logistics Model for Inventory Management with Environmental Impacts: An Application in Industry," *Intelligent Systems with Applications*, Volume 14, 200078, ISSN 2667-3053, 2022.
- [44] H. Younis, B. Sundarakani y B. O'Mahony, "Investigating the relationship between green supply chain management and corporate performance using a mixed method approach: Developing a roadmap for future research," *IIMB Management Review*, Volume 32, Issue 3, Pages 305-324, ISSN 0970-3896, 2020.
- [45] P. Wild, "Recommendations for a future global CO2-calculation standard for transport and logistics," *Transportation Research Part D: Transport and Environment*, Volume 100, 103024, ISSN 1361-9209, 2021.
- [46] S. Seuring, S. Aman, B. D. Hettiarachchi, F. A. de Lima, L. Schilling y J. I. Sudusinghe, "Reflecting on theory development in sustainable supply chain management," *Cleaner Logistics and Supply Chain*, Volume 3, 100016, ISSN 2772-3909, 2022.
- [47] O. Seroka-Stolka y A. Ociepa-Kubicka, "Green logistics and circular economy," *Transportation Research Procedia*, Volume 39, Pages 471-479, ISSN 2352-1465, 2019.
- [48] L. Franchina, A. Calabrese, G. Inzerilli, E. Scatto, G. Brutti y M. Bonanni, "Thinking green: The role of smart technologies in transforming cities' waste and supply Chain's flow," *Cleaner Engineering and Technology*, Volume 2, 100077, ISSN 2666-7908, 2021.
- [49] G. B. Pelegrín, "Base para la sostenibilidad medioambiental a través de la contratación y la licitación ecológicas," *Revista Geografica Academica; Goiana Tomo 14*, N.º 1, 52-68, 2020.
- [50] J. A. Bergendahl, J. Sarkis y M. T. Timko, "Transdisciplinarity and the food energy and water nexus: Ecological modernization and supply chain sustainability perspectives," *Resources, Conservation and Recycling*, Volume 133, Pages 309-319, ISSN 0921-3449, 2018.
- [51] M. Dauda, "Ecological Modernization Theory and Sustainable Development Dilemmas: Who benefits from technological innovation?," *The African Review*, 46(1), 68-83, 2019.