Design in the Sustainable Supply Chain in Agribusiness: A Case Study in a Citrus Business Company

Lila Margarita Bada-Carbajal
Senior Lecturer of Management
Instituto Tecnológico Superior de Álamo Temapache
Tecnólogico Nacional de México
Veracruz, Mexico
lila.bc@alamo.tecnm.mx

Luis Rocha-Lona
Senior Lecturer of Operations Management
Escuela Superior de Comercio y Administración, Unidad Santo Tomás,
Instituto Politécnico Nacional
Mexico City, Mexico
lrocha@ipn.mx

Abstract

The objective of this paper is to present the design of the sustainable supply chain based on the green supply chain framework of Ghobakhlo et al. (2013) and its management in the contribution to the Sustainable Development Goals (SDG) based on the SDG Compass of Global Reporting Initiative et al. (2016) in a Citrus Business Company. This research consists of a deductive method and action research. The sustainable practices identified sustainable supply chain are: solid waste reduction, purchase of non-polluting materials, providers with environmental certifications, recycling, reuse, and remanufacturing of materials, client cooperation for the formulation of environmental goals and programs to be implemented. The SDG identified are: 2 Zero Hunger, 4 Quality Education, 5 Gender Equality, 12 Responsible Consumption and Production, 13 Climate Action in Green Product Design, 3 Good Health and Well-Being in Green Material Management and Green Manufacturing Process, 6 Clean Water and Sanitation, 7 Affordable and Clean Energy, and 9 Industry, Innovation, and Infrastructure in Green Marketing, Green Distribution, and Reverse Logistics, and 8 Decent Work and Economic Growth. In conclusion, this study can be useful for those companies interested in designing their sustainable supply chain and its contribution to the SDG of the 2030 Agenda.

Keywords
Sustainable Supply Chain, SDG Compass, Citrus Agrobusiness, Sustainable Practices, Veracruz, Mexico.

1. Introduction

Being sustainable supposes an ideological vision centered on the system of values and ideas that should lead towards organization, and understanding such organization as a manner of doing and being (Kent, 2020). Pretty (2008) defines sustainability as the development that allows satisfying current needs without compromising the needs of future generations, as well as observing the impact of economic growth of natural resources. On the other hand, Hart and Milstein (2003) point out that the principles of sustainable business allow businesses to generate value through unique sustainable practices, simultaneously delivering economic, social, and environmental benefits that enable contributing to a more sustainable planet. Olmos and Gonzales (2013), contend that sustainable business adopts business strategies to satisfy the needs of businesses and interest groups while favoring the development of society and protecting and maintaining natural resources so they can last.

According to Dr. Anda-Montaño et al. (2020), sustainable practices in organizations are a strategy for businesses to base their activities on economic, social, and environmental axes to fulfill the Sustainable Development Goals (SDG)

of the 2030 Agenda (Carro et al. 2017; Čater et al. 2009; Jane 2013, Rodriguez and Ricart 2010; Paternoster 2011; Leal 2009), and with that contribute to assuring the future of humanity (Bell and Morse, 2018), paying back society environmental maintenance for allowing them to conduct their activities, generating economic benefits that guarantee their presence in the market, and generating value through their image and reputation (Carmona and Magán 2008; Orsato 2006; Carrillo 2011; Hart and Milstein, 2003; Zulueta et al. 2013). Based on the aforementioned, Escobedo and Garcia (2018) highlight that any business intending to work under sustainable development must perform their activities based on the three dimensions (economic, social, and environmental), giving consideration to the concept of corporate sustainability wherein the sustainable practices are their tools.

The main focus of the sustainable supply chain is two-sided, the first side being that it helps to improve environmental, social, and economic handling of the impact caused by the global supply chain, and the second side being that it offers a new perspective to promote the paradigm shift in business practices. Some authors have developed and implemented sustainable practices through the supply chain by means of different methods, for example the green supply chain framework (Ghobakhloo et al. 2013) reported in this research, the performance measurement for green supply chain management (Hervani et al. 2005), and the strategic model of green management practices in the supply chain (Salazar 2017), among others.

Evidence in Mexico of sustainable practices by means of green supply chains is The Program of Green Supply Chains (PCSV) in aid of Small and Medium Businesses (SMEs) for the betterment of their economic and environmental performance. According to Lyon and Hoof (2016), this program has been effective since the assisted businesses have reduced their water and electric energy consumption, as well as their carbon dioxide emissions and waste disposal. Businesses that participated in this program were multinational ones of the pharmaceutical, chemical, and food sectors in Mexico City coordinated by the Global Environmental Management Initiative, as well as aerospace and automotive manufacturing, electrical, advertising, and communication businesses in Queretaro selected and coordinated by The Secretary of Sustainable Development.

A factor that motivates the use of sustainable supply chains in businesses is the consideration of sustainability in their strategic plans, which is a key factor to: increase effectiveness, improve organizational goals accomplishment, incorporate the three dimensions of sustainability, improve competitiveness, improve customer service, and increase profitability (Bedor and Lema 2019).

Limitations that exist for the development of sustainable supply chains, according to López (2019), are that more researchers related to the administration of the sustainable supply chain in environmental and social aspects are needed (Carter and Rogers 2008; Seuring 2011), they are based on long-term associations (Seuring and Müller 2008), they are costly and it is not clear how to implement them (Wolf 2011), and, additionally, they lack well-established metrics (Ahi and Searcy 2014).

Regarding the aforementioned, this paper presents a detailed proposal for the design of a sustainable supply chain. Two stages are taken into consideration, the first stage being the design of the sustainable supply chain, and the second being the contribution to the Sustainable Development Goals.

1.1 Citrus Business Company

Mexico is the fourth largest global producer of citrus fruits, behind Brazil, China, and The United States (Food and Agriculture Organization of the United Nations, 2020). Citrus fruit activity is of grand importance for Veracruz, being as it is the largest producer of citrus fruits in Mexico. The largest production is found in the northern region of the state. More specifically, the municipality of Alamo Temapache is the main producer of citrus fruits and where the majority of the agroindustry is located. The agroindustry there consists of businesses dedicated to the brushing, packaging, and waxing of the fruits, extraction of juice, concentration of juice, extraction of oil, extraction of pectin, and dehydration of peels (Bada-Carbajal et al. 2017).

The citrus agroindustry company mentioned in this paper is one of the most important businesses of northern Veracruz, Mexico. The company, located in the municipality of Alamo Temapache, is dedicated to the processing of citrus fruits (oranges, grapefruits, limes, and tangerines) for conversion into clarified, concentrated, fresh, and pasteurized juices, essential oils (regular and organic), and peels (fresh, dehydrated, and washed), all sold in bulk in isotanks, barrels, and bins to the food, pharmaceutical, and cosmetology industries in the international (80%) and national (20%) markets.

The company has international quality, industrial security, food safety, and organic certifications, among others, to sell in different countries, and it conducts sustainable practices carrying out green practices in the development of technology, operations, and its products.

1.2 Objectives

The objective of this paper is to present the design of a sustainable supply chain based on the green supply chain framework of Ghobakhlo et al. (2013), as well as its management in contributing to the SDG through the SDG Compass of Global Reporting Initiative et al. (2016) of a Citrus Business Company. To achieve this objective, the following steps are carried out:

1. Design the sustainable supply chain of a Citrus Business Company based on the green supply chain framework of Ghobakhlo et al. (2013).
2. Present the contribution of the sustainable supply chain of a Citrus Business Company to the SDG through the SDG Compass of Global Reporting Initiative et al. (2016).

2. Literature Review

This section presents a revision of the literature to identify research disparity and obtain thorough information to design the sustainable supply chain and manage its contribution to the SDG.

Souza et al. (2021) mention that the primary challenges of the United Nations 2030 Agenda for Sustainable Development are directly related to the food supply chains, as well as zero hunger, climate action, clean water, and sanitation. On the other hand, Yoo and Cho (2021) establish that sustainable practices refer to organizational efforts to establish patterns that reflect the worries of the environment and taking action to select providers and choose products while focusing on ecological packaging, recycling, and resource reduction and disposal (Pagell et al. 2010). The adoption of sustainable practices requires a well-designed collaboration between the participants and the relationships of the supply chain. In this case, the sustainable practices are essential for the development of the sustainable supply chain (Lui et al. 2017).

Lofti et al. (2021) state that initial models of supply chains looked to optimize costs in response to client demands. Meanwhile, recent research has been added to the literature regarding environmental laws, including carbon dioxide emissions and energy consumption, as well as social well-being in consideration of the sustainability problem (Eskandarpour et al. 2015; Noyan 2012). Mir et al. (2021) argue that sustainable supply chain management implies the achievement of social and environmental objectives, while at the same time ensuring long-term advantages with economic viability for the organization. The sustainable supply chain that is most focused on environmental and social matters is the green supply chain. (Sarache- Castro et al. 2015; Carter and Rogers 2008; Seuring 2011).

Green supply chain integrates environmental management to the operations in place, and is an innovative tool that has won the attention of the industry and has received big interest among researchers, operation professionals, and supply chain administrators (Rao, 2007). Srivastava (2007) defines it as "*The integration of environmental thought in supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to consumers, and the management of it after its useful life.*"

The above implies the addition of the 'green' component to the supply chain management. Therefore, the green supply chain acknowledges the disproportional environmental impact of the supply chain processes in an organization.

There are green supply chain studies that propose integrating the environmental commitment of organizations. Shibao et al. (2017) analyze the models and frameworks of the relationship of the green supply chain. Consequently, five important aspects are noted: internal and external sustainable practices, green investments, ecological design, and reverse logistics. Ghobakhloo et al. (2013) proposes a green supply chain framework where five key concepts that should be integrated into a green supply chain are discovered: greening the product design, material management, manufacturing process, distribution and marketing, and reverse logistics. In their *Performance measurement for green supply chain management* study, Hervani et al. (2005) argue that a major contribution of their study is the introduction of various topics and worries of green supply chain management that come from various internal and external pressures, types of metrics that need to be developed, potential designs, tools, and results. Lastly, in the model of analysis structure of green supply chain management practices, Salazar (2017) identifies external factors that influence

the strategic decisions of organizations like legislations, economic trends, policies, technological evolution, and social aspects determined by consumer behavior.

Two of the needs of sustainable supply chains are achieving environmental goals and having metrics to be carried out. According to Mancera (2015), the contribution of businesses to the SDG can be addressed by three approaches: philanthropic actions not related to the company's activities looking to improve the social and environmental conditions of the surroundings where it operates to obtain a good reputation; implementation of initiatives in the company's operations to reduce and eliminate negative impacts, such as operational efficiency, cost reduction, talent acquisition and retention, and customer service and loyalty; and the development of innovative products and services that contribute to the established goals of the SDG, which are also protocol objectives of the SDG Compass. With that in mind, to help companies contribute to the SDG, Global Reporting Initiative (GRI) et al. (2016) developed the SDG Compass, which is a business tool that provides orientation to companies regarding how to align their strategies and measures and manages their contribution to the achievement of the SDG, which themselves propose a procedure to design a sustainable strategy in the sustainable supply chain.

3. Methods

The research method used is deductive. The research type is action research using two methodologies: the first for the design of the sustainable supply chain through the green supply chain framework of Ghobakhloo et al. (2013), and the second for the contribution to the SDG through the SDG Compass of Global Reporting Initiative et al. (2016), which is developed to mitigate the constant monitoring the company has over environmental matters due to the emissions of waste that could be generated.

The research features two stages as illustrated in Figure 1. In the first stage, the interactive framework of the green supply chain is laid out. This framework of green product design includes environmentally conscious design and life-cycle assessment and analysis of the product. The green manufacturing process consists of resource consumption reduction, waste reduction, and emissions reduction. Reverse logistics closes the loop of generic supply chain and includes reuse, remanufacturing, and/or recycling of materials into new materials or other products with value in the marketplace. In the second stage, the five steps of the SDG Compass are displayed, which revert to the knowledge of the responsibility of all the companies in complying with the relevant legislation, respecting the minimum international standards, and, as a priority, addressing all the negative impacts regarding human rights.

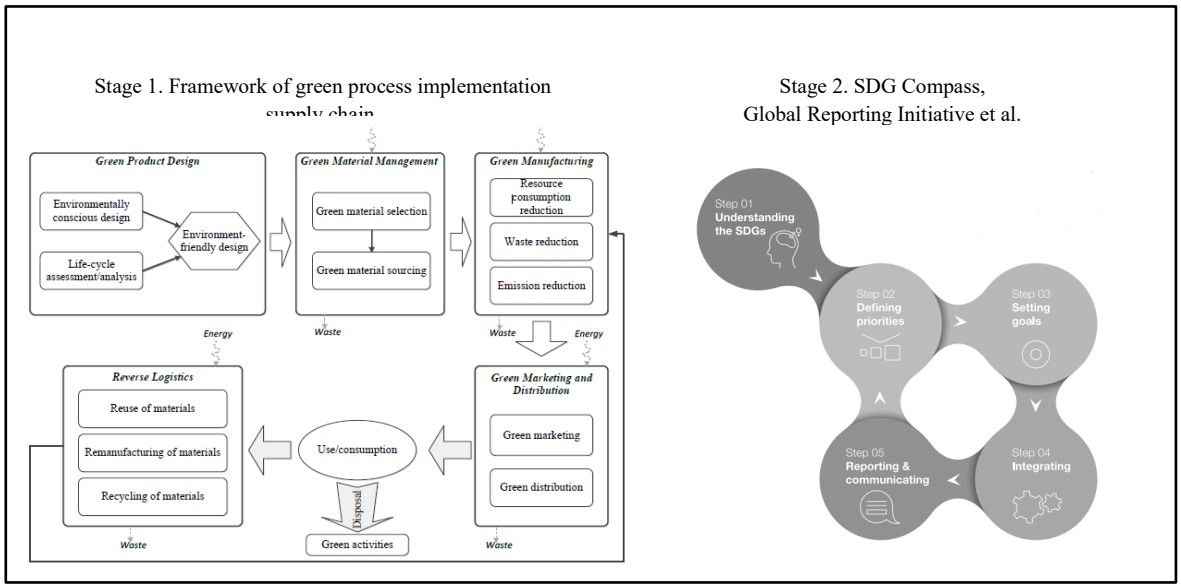

Figure 1. Stages of research

3.1 Stage 1. Sustainable Supply Chain

The design of the sustainable supply chain of the citrus business company was developed based on Ghobakhloo et al. (2013) where Green Supply Chain Management = Green Product Design + Green Material Management + Green Manufacturing Process + Green Distribution and Marketing + Reverse Logistics. Information was gathered through a measuring device, which was a questionnaire designed based on the 8 measures of the processes and 32 sustainable practices introduced for the focus of the green supply chain management of Sarache-Castro et al. (2015). The questionnaire was given to every regional manager selected to identify the sustainable practices carried in the supply chain. Subsequently, with the information gathered, information matrices of each link of the supply chain were elaborated to identify the relations of each component of the network separately. The validation method used was expert judgment. Lastly, a tracking map of the supply chain was made based on the methodology of Pupo (2009) supply chain tracking system.

3.2 Stage 2. SDG Compass

The contribution to the SDG was done based on the 5 steps of the SDG Compass of Global Reporting Initiative et al. (2016). The method in order to define the priorities was using the judgment of experts and the information collected in the questionnaire. In Step 1: Understanding the SDG, each of the 17 SDG was studied, whereby each is identified in the processes that the Citrus Business Company undergoes. In Step 2: Defining priorities, designing of the sustainable supply chain of stage 1 was done, and measures were selected. In Step 3: Setting goals, the SDG that impact the sustainable supply chain links were identified. In Step 4: Integrating, the sustainability objectives inside the company were anchored. The company is still working on its reports for Step 5: Reporting and communicating.

4. Results and Discussion

Stage 1. Sustainable Supply Chain; figure 2 shows the Sustainable Supply Chain of a Citrus Business Company, the results found were the following:

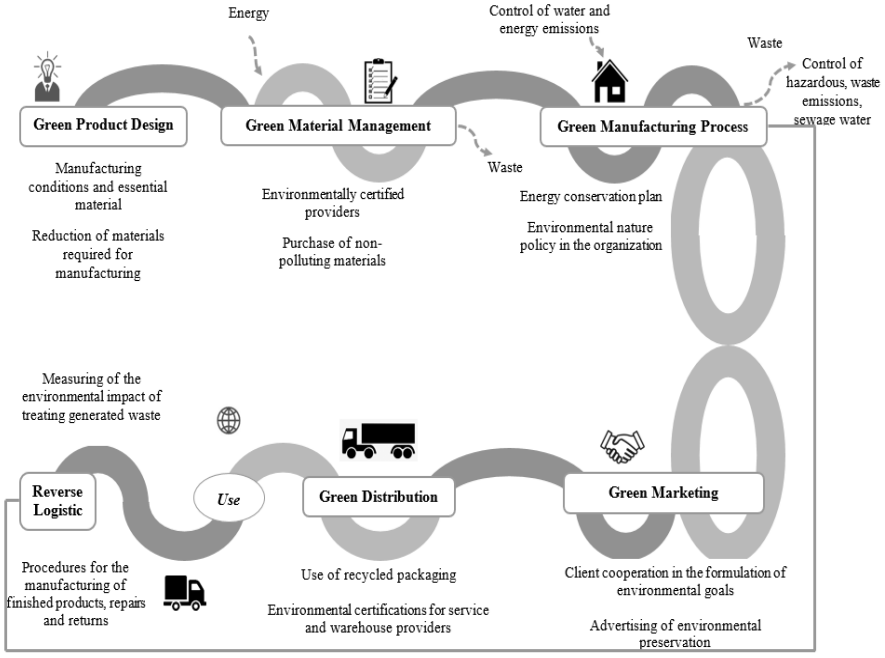

Figure 2. Displays the design of the Sustainable Supply Chain of the Citrus Business Company

Green Product Design designs products with certain environmental considerations such as waste reduction (Gurnor and Gupta, 1999). The Citrus Business Company manages diverse products found in the first stage of primary industrialization given that they are used as raw material for other companies in the agroindustry sector. It possesses products that are 100% organic and conventional. Concentrated juice and essential oils are handled in an organic manner. That is, chemicals are not used in their manufacturing. Citrus consumables come from organically certified orchards. The processes are certified under international food regulations and industrial security and hygiene. Furthermore, they comply with special requirements desired by clients. Regarding the delivery of the products,

concentrated fruit juice is transported in isotanks, bins, barrels, and buckets. The isotanks have a cooling system in place for transportation purchases, and are previously sterilized. The bins (juice transportation containers) are in conditions suitable for reuse, depending on the season and need. The barrels (also used for essential oils) and buckets are mainly manufactured using quality processes complying with food policy standards. Concerning the dehydrated peels, green practices for the design of the product have yet to be implemented.

Green Material Management, one of the operations of sustainable supply chain, replaces a potentially hazardous material or product (material selection, separation, and recovery) for another less problematic one (Hervani et al. 2005). As previously mentioned, the company adopts sustainable practices such as organically certified raw material, production processes certified under food policy and industrial security and hygiene standards, as well as strict treatment in relation to organic wastes and water use. The sustainable practices in place are: solid waste reduction, the purchase of non-polluting materials, and environmentally certified providers.

Green Manufacturing Process has as an objective the reduction of virgin material use and other resources and energies to indirectly decrease waste (Yilmaz, 2013). The company conducts diverse sustainable practices related to the recycling and reuse of materials. It has water, noise, and total suspended particulates emission control programs in place, along with hazardous waste control, a water treatment system, and project implementation for the acquisition of instruments, controllers, and progressive change towards more efficient equipment for energy conservation.

Green Marketing comprises not only the advertisement of environmentally friendly products, but also product modifications, production process modifications, and packaging modifications (Polonsky, 1994). The sustainable practices in this stage are almost nonexistent; the ones in place are the contributions of clients for the formulation of environmental goals and advertisement of their products via the internet.

Green Distribution is based on green transportation focused on investigating the environmental state of producers as well as informing and educating said producers in environmental matters (Björklund, 2010). The distribution of finished products in the citrus business company is carried out by external providers that provide the transportation service for distinct external warehouses. Although external regulations are followed, concrete information over the contaminants produced in the distribution process of finished products to their different points of sale does not exist. However, external warehouses demand environmental features that fulfill the training and auditing with the corresponding specifications.

Reverse Logistics functions include recycling, reuse, and remanufacturing (Govindan et al. 2015). The use of certain sustainable practices of reverse logistics in the supply chain of the citrus business company is the procedure that involves the return of defective products by clients, leaving the door open to recover finished products under unique circumstances. In this case, the returned product passes through the internal procedure involving the recycling of the product (in this case barrels and bins) and its components, or the destruction of the non-conforming product. It is worth mentioning that one of the company's practices to avoid misuse of the distribution fleet is returning products using pallets for the unloading of barrels.

Stage 2. SDG Compass; figure 3 shows the contribution of the Sustainable Supply Chain of the Citrus Business Company to the SDG.
As can be seen, 5 SDG were identified throughout the supply chain: 2 Zero Hunger, 4 Quality Education, 5 Gender Equality, 12 Responsible Consumption and Production, and 13 Climate Action. Their metrics are based on the company's certifications, which are: ISO 9001:2015 - Quality Management, ISO 22000:2005 - Food Safety Management, NMX-SAST-001 OHSAS 18001:2007 - Occupational Health and Industrial Safety Management, FDA - Food and Drug Administration of the United States, HACCP - Danger Analysis and Critical Control Points System, SGF - IRMA Sure-Global-Fair, HALAL - HALAL Certification, EU 834/2007 - EU 889/2008 - Organic Certification for sale in the European Union, USDA NOP - Organic Certification for sale in Mexico, Citrus Fruits Processing Plant (Naturland), KRAV: private label to commercialize in Sweden, Biosuisse: private label to commercialize in Switzerland, Rainforest, AMFORI BSCI to improve social yield in the supply chains, and SEDEX to manage its activities regarding labor rights, health and safety, environmental and commercial ethics.

Figure 3. Contribution of Sustainable Supply Chain of the Citrus Business Company to the SDG

In the *Green Product Design*, manufacturing conditions and essential material reduction for the manufacturing and selection of organic products are carried out. The sustainable development goal identified in the sustainable supply chain is 3 Good Health and Well-Being, with its respective steps: 3.4, 3.5, 3.8, and 3.9. The metrics are provided by programs the company has in relation to SDG 3, which include: the integral vision of the community, a social organizational responsibility policy, good business practices, safety, occupational hygiene and health, and relationships with the community and authorities. In the *Green Material Management* the certification by the providers and purchase of non-polluting materials are realized. In the *Green Manufacturing Process* emissions control, an energy conservation plan and an environmental nature policy in the organization is carried out. In both stages, 3 SDG of the sustainable supply chain are identified: 6 Clean Water and Sanitation, 7 Affordable and Clean Energy, and 9 Industry, Innovation, and Infrastructure. In SDG 6, the identified steps are: 6.3, 6.4, 6.5, 6.6, 6.a, and 6.b. The metrics are provided by the programs the company has: water supply source, wastewater treatment system, Natura Project (environmental impact project), and the sanitary wastewater system. In SDG 7, the identified steps are: 7.2, 7.a, and 7.b. The metrics are provided by the following programs: environmental impact mitigation, electric energy consumption reduction program, environmental operating license, noise emission control, handling of generated waste, hazardous waste generation, soil emission control and air emission control. In SDG 9 the identified goals are: 9.1, 9.2, 9.4, 9.5, and 9.c. The metrics are in relation to the following certifications: ISO 9001:2015 - Quality Management (management and control requirements of the assigned processes to achieve the improvement of said processes, as well as the management of the processes that confine the product, with the goal of guaranteeing the confidence of the process) and ISO 22000:2005 - Food Safety Management (guarantees that there are no weak links in the supply chain of the finished products and involves those responsible for safety in the development of the finished products). In *Green Marketing*, client cooperation in the formulation of environmental goals and advertisement of environmental preservation actions are performed. In *Green Distribution*, the use of recycled packaging and environmental certifications for service and warehouse providers are performed. In *Reverse Logistics*, procedures for the manufacturing of finished products, repairs and returns, and the measuring of the environmental impact of treating generated waste are carried out. In the three stages, 1 SDG is identified: 8 Decent Work and Economic Growth. The steps identified are: 8.1, 8.2, 8.3, 8.8, and 8.a. The metrics are provided by the following certifications: HACCP Policy, which implements strategies and mechanisms to protect consumer health and avoid economic losses caused by the poor state of food or the withdrawal of products from the market; SGF - IRMA Sure-Global-Fair, which ensures and achieves legal and industrial quality and safety standards of the fruit juice market; HALAL - certification, which

establishes apt practices, goods, and services for Muslims; and EU 834/2007 and EU 889/2008, which are necessary, organic certifications for sale in the European Union.

5. Conclusion

The design of the sustainable supply chain of the citrus business company and its contribution to the SDG displays the importance of conducting sustainable practices in the supply chains that support the preservation of the environment, economic development, and social well-being. The present is a study of the contribution of being a sustainable supply chain focused on *an environmental and social dimension, and the established metrics* that is proposed by the green supply chain framework of Ghobakhlo et al. (2013) and the SDG Compass of Global Reporting Initiative et al. (2016) in contribution to the SDG.

The proposal presented in this paper is offering the possibility of using these methods in companies to have processes that allow the reduction of carbon dioxide emissions, water conservation, energy conservation, implementation of environmental projects, and clean energy use, all through the constant implementation of sustainable practices throughout the supply chain.

The area for improvement in the Green Product Design for the dehydrated peel; where there are no sustainable practices is the use of clean energy such as solar, biomass, and biogas for the peel incineration process in the production of pectin.

Both methods used in this research complement each other to achieve an effective diagnosis regarding the sustainable practices in the supply chain and contribution to the SDG.

Lastly, this paper shows the benefits that businesses have when contributing to the SDG through the implementation of sustainable practices in the supply chain since it is an essential topic in business activities related to energy efficiency, business reputation, identification of business opportunities, drawing in capital, encouraging the value of corporate sustainability, strengthening relationships with interest groups, aligning with legislative progress, and strengthening risk prevention (Mancera, 2015).

5.1 Research Limitations

The main limitation is that the sustainable supply chain proposed in this paper is heavily focused on the environment. Nevertheless, this has a positive effect in the economic and social dimensions, in the decrease of production costs by its reduction, reuse, and remanufacturing, and in health by the decrease of pollution in the environment. Other limitations include the nonexistence of sustainable practices in the *green marketing* stage as incorporation of clean energy is still in the works, and the pending environmental certification ISO-14000. Finally, the citrus business company is in the process of independently finalizing reports, as stated by step 5 of the SDG Compass.

5.2 Recommendations for future research

Sustainable supply chain agroindustry studies on the agricultural, farming, and fishing products that involve sustainable practices in support of the SDG are recommended since little literature exists related to this type of research of important agroindustry companies for the demand of the food that exists on this planet. Also, through this type of research, it can be assured that food is 1) processed under the certifications of hygienic and safe food, 2) processed under sustainable practices in support of the environment, and 3) distributed in a proper manner to the final consumer.

References

Ahi, P. and Searcy, C. Review. An analysis of metrics used to measure performance in green and sustainable supply chains, *Journal of Cleaner Production*, vol. 86, no. 1, 360-377, 2014.

Bada-Carbajal, L., Rivas-Tovar, L., and Littlewood-Zimmerman, H., Model of associativity in the production chain in Agroindustrial SMEs. *Contaduría y Administración*, vol. 62, no. 4, 1118-1135, 2017.

Bedor J., and Lema, K., Determinación y aplicación de indicadores claves de rendimiento (key performance indicators – kpis) en la cadena de suministro sustentable de la empresa Inspectserv S.A*., Tesis de licenciatura para obtener el título de Ingeniero en Comercio Exterior,* Universidad de Guayaquil Facultad de Ciencias Administrativas, Colombia, 2019.

Bell, S., Morse, S., Sustainability Indicators Past and Present: What Next? Sustainability*,* vol.10, no. 1688, 2018.

Björklund, M., Influence from the business environment on environmental purchasing, Drivers and hinders of purchasing green transportation services, *Journal of Purchasing and Supply Management*, vol. 17, 11-22, 2010.

Carmona, E., and Magán, A., La estrategia ambiental: definición y tipologías, *In University, Society and Global Markets*. European Academic Publishers, 541-555, 2008.

Carrillo, G., Sustentabilidad en las Organizaciones: Nuevos enfoques y formas de entender del concepto. *Administración y Organizaciones*, vol. 27, no. 14, 5-11, 2011.

Carro, J., Reyes, B., Rosano, G., Garnica, J., and Pérez, B., Modelo de Desarrollo Sustentable para la Industria de Recubrimientos Cerámicos. *Revista Internacional de Contaminación Ambiental*, vol. 33, no. 1, 131-139, 2017.

Carter, C., and Rogers, D., A framework of sustainable supply chain management: moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, vol. 38, no. 5, 360-387, 2008.

Čater, T., Prasnikar, J., and Čater, B., Environmental strategies and their motives and results in Slovenian business practice. *Economic and Business Review*, vol. 11, no. 1, 55-74, 2009.

De Anda-Montaño, R., Portillo-Molina, R., López-Noriega, M., and Cervantes-Rosas, M., Elaboración y validación de instrumentos para medir prácticas sustentables que crean valor en organizaciones agrícolas. *Revista de Investigación Agraria y Ambiental*, vol. 11, no. 2, 59–70, 2020.

Escobedo, G., and García, C., Responsabilidad Social Empresarial. En G. Escobedo, & M. Andrade, *Desarrollo Sustentable. Estrategias en las empresas para un futuro mejor*. México: Alfaomega, 2018.

Eskandarpour, M., Dejax, P., Miemczyk, J., and Péton. O., Sustainable supply chain network design: An optimization-oriented review, *Omega*, vol. 54, 11-32, 2015.

Food and Agriculture Organization of the United States, *FAOSTAT Production Indices. World state of citrus,* Available http://www.fao.org/faostat/es/#data/QI, December 28, 2020.

Ghobakhloo, M., Tang, S., Zulkifli, N., and Ariffin, K., An Integrated Framework of Green Supply Chain Management Implementation. *International Journal of Innovation, Management and Technology,* vol. 4, no. 1, 86-89, 2013.

Global Reporting Initiative (GRI), The United Nations Global Compact (Pacto Global) and the World Business Council for Sustainable Development (WBCSD), *SDG Compass. The guide for business action on the SDGs,* Available https://sdgcompass.org/wp-content/uploads/2015/12/019104_SDG_Compass_Guide_2015.pdf , December 15, 2016.

Govindan, K., Soleimani, H., and Kannan D., Reverse logistics and closed-loop supply chain: A comprehensive review to explore the future, *European Journal of Operational Research*, vol. 40, no. 3, 603-626, 2015.

Gungor, A., and Gupta,S., Issues in environmentally conscious manufacturing and product recovery: a survey, *Computers and Industrial Engineering*, vol. 36, 811-853, 1999.

Hart, S., and Milstein, M., Creating sustainable value, *Academy of Management Executive,* vol. 1, no. 2, 56-69, 2003.

Hervani, A., Helms, M. and Sarkis, J., Performance measurement for green supply chain management, *Benchmarking: An International Journal*, vol. 12, no. 4, 330-353, 2005.

Jane, M., Environment Strategy. *Universidad de Winchester*, 1-6, Reino Unido, 2013.

Kent, P., Gestión y evaluación de la sustentabilidad organizacional, *Ciencias Administrativas Revista Digital FCE-UNLP*, vol. 8, no. 15, 87-96, 2020.

Leal, J., Desarrollo Sostenible en la empresa: Herramientas de Gestión. *División de Desarrollo Sostenible y Asentamientos Humanos de la Comisión Económica para América Latina y El Caribe (CEPAL)*, 2009.

Liu, Y., Zhu, Q. and Seuring, S., Linking capabilities to green operations strategies: the moderating role of corporate environmental proactivity, International Journal of Production Economics, vol. 187, 182-195, 2017.

López, S., The Sustainable Supply Chain Management and the Small and medium-sized enterprises of emerging economies: The case of Mexico. *Revista Iberoamericana de Contaduría, Economía y Administración,* vol. 8, no. 15, 1-28, 2019.

Lotfi, R., Zare, Mehrjerdi, Y., Pishvaee, M., Sadeghieh, A., and Weber, G., A robust optimization model for sustainable and resilient closed-loop supply chain network design considering conditional value at risk. *Numerical Algebra, Control and Optimization*, vol. 11, no. 2, 221-253, 2021.

Lyon, T. and Hoof, B., Evaluación del Programa de Cadenas de Suministro Verdes en México. *Gaceta de Economía*, vol. 16, no. 1, 301-348, 2016.

Mancera, *¿Cómo pueden contribuir las empresas a los objetivos de Desarrollo Sostenible? EY Construyendo un mejor entorno de negocios,* Available http://www.andi.com.co/Uploads/C%C3%B3mo%20pueden%20contribuir%20las%20empresas%20a%20los%20ODS.pdf , July 8, 2015.

Mir, S., Fugate, B., Johnson, J., and Blessley, M., What should you be talking about? The communication pathway to sustainable supply chain contagion, *International Journal of Physical Distribution & Logistics Management*, vol. 5, no. 7, 711-737, 2021.

Orsato, R., Competitive Environmental Strategies: when does it pay to be green? *California Management Review*, vol. 48, no. 2, 127-143, 2006.

Pagell, M., Wu, Z. and Wasserman, M., Thinking differently about purchasing portfolios: an assessment of sustainable sourcing, *Journal of Supply Chain Management*, vol. 46, no. 1, 57-73, 2010.

Paternoster, A., Herramientas para medir la sostenibilidad corporativa, Tesis de Maestría, *Universidad Politécnica de Cataluña*, Cataluña, España, 2011.

Polonsky,M., An Introduction to green Marketing, *Electronic Green Journal*, vol. 1, pp. 1-10, 1994.

Pretty, J., Agricultural sustainability: concepts, principles and evidence. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, vol. 363, no. 1491, 447–465, 2008.

Pupo, Y., Procedimiento para la gestión de un sistema de trazabilidad en la cadena de suministro. Aplicación en la empresa Copextel S.A., *Tesis para obtener el título de master en ingeniería industrial, Universidad de Holguín, Cuba*, 2009.

Rao, P., Greening of the Supply Chain: An Empirical Study for SMES in the Philippine Context, *Journal of Asia Business Studies*, vol. 1, no. 2, 55-66, 2007.

Rodríguez, M. and Ricart, J., Estrategia medioambiental y creación de valor, *Documento de investigación No.408. División de investigación de IESE. Universidad de Navarra*. Barcelona, España, 2000.

Salazar, K., Análisis estratégico a partir del modelo de prácticas de gestión verde en las empresas industriales del sector metalmecánico de Manizales, Caldas Colombia, *Tesis para obtener el grado de Magister en administración. Universidad Nacional de Colombia*, 2017.

Sarache-Castro, W,. Costa-Salas, Y., and Martínez-Giraldo, J., Evaluación del desempeño ambiental bajo enfoque de cadena de abastecimiento verde, *Dyna*, vol. 82, no. 189, 207-215, 2015.

Seuring, S., Supply chain management for sustainable products. Insights from research applying mixed methodologies. *Business Strategy and the Environment*, vol. 20, no. 7, 471-484, 2011.

Seuring, S. and Müller, M., From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, vol. 16, no. 5, 1699-1710, 2008.

Shibao, F., De Oliveira, G., Da Silva, F., and Pompone, E., Corporate profile, performance and green supply chain management: a research agenda. *Revista de administração mackenzie*, 18(3), 117–146, 2017.

Souza, R., Macchione, M., Lara, V., and Bassetto, F., Shaping the sustainable supply chain of organic milk in Brazil, *Journal of Cleaner Production*, 297, 1-10, 2021.

Srivastava, S., Green Supply Chain Management: A State-of-The-Art Literature Review. *International Journal of Management Reviews*. vol. 9, 53 – 80, 2007.

Wolf, J., Sustainable Supply Chain Management Integration: A Qualitative Analysis of the German Manufacturing Industry. *Journal of Business Ethics*, vol. 102 no. 2, 221-235, 2011.

Yilmaz, K., Natural environment as a strategic issue for firms theoretical perspectives, *Procedia Social and Behavioral Sciences, 9th International Strategic Management Conference*, vol. 99, 143-153, 2013.

Yoo, J., and Cho, M. , "Supply chain flexibility fit and green practices: evidence from the event industry", *International Journal of Contemporary Hospitality Management*, vol. ahead-of-print, no. ahead-of-print. (2021).

Zulueta, A., Asencio, J., Leyva, D. and Montero. J., Sustentabilidad empresarial de proyectos mineros: el análisis multicriterio como perspectiva acertada para su evaluación. *Minería y Geología*, vol. 29, no. 4, 79-94, 2013

Biographies

Lila Margarita Bada-Carbajal is a Senior Lecturer of Management at the Department of Postgraduate Research and Department of Engineering Administration at Tecnológico Nacional de México, Instituto Tecnólogico Superior de Álamo Temapache, Veracruz, Mexico and Visiting Lecturer at the Department of Postgraduate Research at Instituto Politécnico Nacional, Escuela Superior de Comercio y Administración in Mexico City. She has led projects of business sustainability to help organizations in implementing a sustainability and research projects funded by the Program of Faculty Professional Development for Higher Education (PRODEP) in Mexico. Dr. Bada-Carbajal has published over 18 articles and scientific journals, and participated in various international conferences. Her research applies in the areas of management, competitiveness, supply chain, value chain, clusters, quality management and business sustainability.

Luis Rocha-Lona is a Senior Lecturer of Operations Management at Instituto Politécnico Nacional de Mexico. He has led international research projects sponsored by the Mexican Government, the British Council, and the British Academy. He has published papers in journals such as the International Journal of Engineering and Technology Innovation, International Journal of Business, Management and Social Sciences, Journal of Manufacturing Technology Management, Total Quality Management & Business Excellence, International Journal of Productivity and Quality Management, and International Journal of Lean Six Sigma. Dr Rocha-Lona has also published two books, delivered conferences, and published in more than 20 international conferences. Dr Rocha-Lona is also an active reviewer for international conferences and journals such as the International Journal of Supply Chain and Operations Resilience, International Journal of Organizational Analysis, International Journal of Cleaner Production, and Journal of Manufacturing Technology Management.