

The Role of Green Supply Chain Practices on Environmental Sustainability

Amasha Dassanayake¹, Tharindi Gamaarachchi¹, Isuri Ranathunge¹
and Navodika Karunarathna¹

Abstract

In the past decade environmental sustainability is one of the major considerations in supply chains all around the world. With noticeable environmental changes, companies couldn't look past the negative environmental impact of their supply chains. Many customers expect companies to adhere to these sustainable practices to achieve sustainability, not only in the environmental aspect but also in the social aspect as well. The main purpose of the study was to conduct an in-depth analysis on Green Supply Chain Practices (GSCP) and how this environmental sustainability can be achieved through this concept and how Sri Lankan companies embed GSCP into their supply chain to reduce environmental impact. For this, supply chain phases such as procurement, manufacturing, transportation, warehousing, and reverse logistics were considered when developing the framework for the study. In each of these stages it focuses on how the companies can use GSCP to reduce energy consumption, water usage, reduce waste and emissions of the supply chain. The data were collected from Sri Lankan manufacturing companies by referring to secondary sources. Gathered data were analyzed using the narrative analysis method and furthermore the study findings indicated that there is a positive effect on environmental sustainability by the implementation of GSCP.

Keywords: Environmental sustainability, Green supply chain practices, Manufacturing organizations in Sri Lanka.

Introduction

Environmental issues are one of the major topics in the current world. Climate change, waste management and ecological degradation are a few areas that companies and governments are more concerned on nowadays. The supply chain is identified as the most interactive part

¹ SLIIT Business School, Sri Lanka Institute of Information Technology, Malabe, Sri Lanka

of an organization with the environment. Academic studies have identified an effective supply chain will assist in improving the performance of an organization (Ibrahim et al., 2021). With the growing awareness of ensuring the environmental sustainability in supply chain, organizations started to adopt GSCP with the intention of reducing the environmental impact. And they identified that when questing for environmental sustainability, firms must take an approach on a supply chain basis rather than on a company basis (Pinto, 2020).

Green Supply Chain Management (GSCM) can be identified as the integration of green initiatives into the traditional supply chain which includes product design, material sourcing, manufacturing, logistic activities, and end of lifecycle management processes. Over the years different literature has provided different interpretations to GSCM. Most of the studies mainly highlighted how to manage internal and external activities according to environmental norms. Increment of energy and water efficiency, waste minimization, selection of appropriate suppliers who adhere to environmental practices and practices or implementation of the International Organization for Standardization, (ISO) 14,001 environmental certificate system into their organizations (Pinto, 2020). Past studies have identified a few reasons why companies take interest in GSCP. To identify the reasons a survey had been conducted in manufacturing sector identifying a few interesting reasons. They have identified that 42% of the companies are adopting GSCP because of government rules and other regulations, 21% because of pressure from customers and consumers and 20% with the hope of cost reduction in the overall process (Allcock, 2010). According to the study done by Jayarathna, (2016) has examine 125 manufacturing companies to identify the level of adaptation in Sri Lankan context and came up with following findings. A total of 32% of the responding companies are in the trial stage, 28.8% have already adopted the GSCP in their organizational context, and 24.8% are in the evaluation stage. Only 2.4% of the respondent companies are aware of GSCP, and 12% of the respondents are interested in adopting them.

As it was stated, even though most of the studies related to GSCP and environmental sustainability has been done at an international level, the researchers have identified few studies that have conducted on the Sri Lankan context highlighting the barriers behind the

implementation of GSCP into their organizations due to lack of resources, knowledge, and high initial cost of implementation. This research aims to fulfil the gap by studying how GSCP can be used in Sri Lankan manufacturing companies to overcome the negative environmental impact. The study includes two main objectives which are to identify GSCP used in international context to overcome negative environmental impact and to identify GSCP used in Sri Lankan organizations to overcome the negative environmental impact.

Literature Review

Green Procurement

Procurement, also called purchasing, is the process in which corporations acquire raw materials, component parts, finished goods, services or any other resource to perform their operations. Cost, quality, and delivery are the three main factors that influence traditional purchasing decisions. Green procurement (GP), usually referred to as environmental purchasing, considers all environmental concerns when making supply management decisions in addition to the three standard criteria. GP is described as "environmentally conscious purchasing strategy that decreases waste sources and promotes recycling and reclamation of acquired material without adversely compromising performance requirements of such products" (Min and Galle, 2001, p. 1222). Recently, GP has drawn a lot of interest from the academic community and business community, largely due to the urgency of halting further climate change and global warming while also preserving our rapidly decreasing natural resources.

Unquestionably, the purchasing department plays a crucial role in the supply chain that links a company with its suppliers by acquiring the goods, services, and equipment needed for industrial processes. The major objectives of purchasing are to maximize customer happiness, provide efficient raw material flows at the lowest possible cost, and enhance the quality of the finished products (Wisner, Tan and Leong, 2012). In terms of packaging waste, shopping can pose a serious threat to the environment. The concern for businesses to "green" their purchases has grown as knowledge of global warming and other environmental challenges have grown dramatically over time. When making purchases, GP takes social and environmental responsibilities into account. The ecologically responsible purchasing strategies

include the acquisition of goods and services that support environmental goals like fewer sources of waste, recycling, reuse, resource conservation, and material substitution. GP uses long-lasting, recyclable, and reusable products to reduce the negative effects on the environment throughout the manufacturing and shipping processes. Businesses who used environmental strategy in their purchasing identified, cost savings, improved brand perception, and reduced liability. Businesses that can improve their overall cost structure and product quality by leveraging their green supply base's reduced cost, superior quality, and concern for environmental issues will have a competitive edge in their markets (Ai et al., 2020). By choosing items with the least harmful effects on the environment, procurement managers can play a significant role in the effort to reduce the impact of products on the environment. Foo et al., (2019), suggested that purchasing managers may switch out for less dangerous materials (materials that are less harmful to human health and environment). Also, researchers claimed that because it crosses functional boundaries, a company's procurement department may look for environmentally friendly products and collaborate with suppliers who share its values.

After analyzing and compiling the literature, three fundamental GP strategies green suppliers, green processes, and green products come to light. Although there is a lot of scholarly interest in green purchasing, there hasn't been enough focus on it in academic studies on Malaysian purchasing. Ai et al., (2020) conducted a survey to investigate challenges and strategies of Malaysian businesses and found two strategies that the firms should execute. The first strategy is to make sure sustainability is included in corporate branding. And to encourage suppliers and other business partners to enhance their sustainability performance. It is obvious that maintaining a competitive advantage requires GP. In conclusion, the results of the studies on GP demonstrated a significant and favorable relationship between GP methods, including green product, green process, and green supplier, and environmental performance.

Green Transportation

Undoubtedly, one of the key infrastructures required for the growth and development of the economy and of industry is the transportation sector, which carries both commodities and passengers. There are

several modes of transportation which is relevant to the industries such as road transportation, sea transportation, air transportation and a few others as well (Salimifard, Shahbandarzadeh and Raeesi, 2012). In the current world with the government rules regulation regarding environmental practices, meeting the environmental requirements of stakeholders and to enhance the value adding for customers it is very important to maintain a good transportation mechanism in an organization (Lin et al., 2014). The current road and air transportation system which mainly relies on Internal Combustion (IC) engines which has a high toxic emission including Carbon dioxide (CO₂), carbon monoxide (CO), nitrogen oxides (NO_x), and unburned hydrocarbons (HCs) have resulted in environmental pollution and climate change in significant quantities. Past studies have stated that the transportation industry is responsible for 23% of global CO₂ emissions. Over 60% of emissions from the transportation sector are caused by cars and small vehicles including trucks (Panday and Bansal, 2014). The sector that depends on fossil fuels the most is transportation, which in 2021 was responsible for 37% of all terminal sector CO₂ emissions (iea.org, 2022).

To answer the questions that arose from transportation companies have introduced Green Transportation (GT) to deliver goods with considering environmental factors of transportation both inbound and outbound (Lin et al., 2014). GT necessitates a new type of agility in which automotive systems interact with new business models that incorporate information technologies, infrastructure, services, financing, and continuous communications. The most adaptable and economical modes and alternatives for transportation will result from this convergence. This versatility occasionally might need the use of IC engines, but ideally only when necessary. Instead, the use of the most environmentally friendly electrical sources of energy is strongly advised. There are two methods for managing the reduction of pollution and greenhouse gas emissions (GHG). Both strategies presuppose operating without gas. These methods are connected to two systems, namely fuel cells and lithium-ion batteries for electric vehicles, which are the subject of active research and development now (Todorovic and Simic, 2019).

Referring to the above-mentioned studies, transportation accounts for a major proportion of Green House Gas (GHG) emission in the world.

This occurs mainly because of the utilization of non-renewable energy sources such as fossil fuel. To overcome this many worldwide organizations have taken interest in GT which focus on embedding green initiatives into the transportation sector. With this most of the companies were able to reduce some amount of environmental pollution which occur due to inbound and outbound logistic activities.

Green Manufacturing

With the increasing environmental impact in the past decade companies have been more focused regarding the impact of the manufacturing to the environment and the stakeholders are more demanding on environmental sustainability regarding the company products (Rusinko, 2007). Paying attention to these, many companies have developed practices that can help in achieving cleaner manufacturing processes which produce more recyclable products which has a lower environmental impact (Digalwar, Tagalpallewar and Sunnapwar, 2013). There are different approaches in achieving environmental sustainability in a manufacturing process such as pollution control pollution prevention and product stewardship (Rusinko, 2007). For pollution prevention and control many countries including European Union and countries such as India by the help of their environmental and forest ministry they develop new rules and regulations to support this attempt (Digalwar, Tagalpallewar and Sunnapwar, 2013). With all these demands and rules and regulation companies have shifted from traditional manufacturing to Green Manufacturing (GM).

Traditional manufacturing is differed from GM because in GM they consider about the environmental aspect of the manufacturing hand these green initiatives help organization in increasing productivity decreasing manufacturing cost and increasing the competitiveness in the marketplace (Digalwar, Tagalpallewar and Sunnapwar, 2013). In the initial level the cost of implementing GM will be high but it will be paid out by the money saved from the manufacturing cost reduction. Furthermore, by implementing GM organization can eliminate wasteful resource consumption of hazardous material and elimination and recycle product in manufacturing domain (Deif, 2011). Use off green machine tool is one of the well-known GM practices that companies are using. In this they focus on reducing the energy

utilization of machine tools by adopting more efficient and greener machines (Diaz et al., 2010). By using alternative energy generating techniques such as wind turbines solar panels bioreactors bioremediation companies can overcome the direct energy usage such as fossil fuel (Paul, Bhole and Chaudhari, 2014).

Karuppiah, Sankaranarayanan and Ali, (2020), identified 12 main barriers to implementing GM in an organizational context. Those are, weak legislation law enforcement, uncertain future legislations, low public pressure, high short-term cost, uncertain benefits, low customer demand, trade-offs, low top management commitment, lack of organizational resources, technological risk, and lack of awareness. Adopting GM applications benefits us by reducing raw material and transportation costs, as the growth of environmental safety leads to increased profits and huge market share. The foremost benefit of implementing GM is the environmental safeguard in manufacturing. But even if a company doesn't care much about the environment, making greener choices can be a wise financial decision for a company to cut unnecessary costs in the long run. Also, some of the efforts an organization is currently making are very likely to be environmentally friendly practices, especially if the organization is associated with lean manufacturing principles. In developing countries, it is not prioritized in GM implementation due to investment difficulties and lack of knowledge and other identifiable reasons. However, many organizations around the world have recognized and embraced the concept of GM and those companies are harvesting the benefiting from it.

Green Warehousing

The phrase "warehousing" simply refers to a facility or a structure that is used by businesses, third-party service providers, or the government to store products, such as raw materials, work-in-progress, or finished goods, until transporting them to the destination. For many companies involved in global or even local market they maintain several warehouses and distribution centers all over the country or the region to match the increasing demand (Buil and Piera, 2008). According to the World Economic Forum, (2004) from the global carbon dioxide emission 10.7% is initiated by warehousing activities. Due to these observable developments, many businesses have shifted their focus to

Green Warehousing (GW) practices that will reduce carbon footprint and GHG emissions that are directly related to warehouse activities of the organization. Energy conservation, the introduction of alternative energy sources, effective waste disposal, recycling, and material reuse are the primary goals of implementing these green practices in warehouses (HirawatyKamarulzaman, Hussin and Mahir Abdullah, 2012).

Then shifting from traditional warehouses to GW, past studies have identified a few steps that navigate the process. The first step is to develop the energy efficient warehousing stage which focuses on cost and maintaining the minimum requirement by controlling and managing the energy performance of the warehouse. The second step is achieving low emission and green energy warehouse which focus on direct emission and upgrading the current performance of energy usage and utilization of more green and renewable energy. The last step is sustainable warehouse in this it highlights how to exceed the minimum standards of total lifetime emission cost, local sourcing, sustainable designing, and improvement of renewable energy generating sources (Luu, 2016). A program called sustainable logistic initiatives was developed by the International Warehouse Logistic Association (IWLA) to show how implementing green practices in warehouses can lower GHG emissions and enhance financial performance of an organization. The project's primary environmental indicators included electronic use, recycling, liquid fuel consumption, and water use (Rüdiger, Schön and Dobers, 2016). And using methods such as Cap-And-Tarde policy, companies can improve their warehouse emission management in a more efficient manner (Chen et al., 2016).

Many past studies can be found in GW which was conducted in the international context touching upon different aspects of warehousing. According to past studies, from the global CO₂ emission, warehouse is responsible for high proportion. To eliminate different gases GHG or other emissions, reduce energy usage, and water usage companies are adopting GW concept into their organizational context. To achieve this the studies have highlighted methods such as use of renewable energy, use of recycled water, and Cap-And-Trade policy etc.

Reverse Logistics

Reverse Logistics (RL) can be defined as a logistics function concentrating on the product movement from customers to suppliers in the opposite direction (Hazen, 2011). RL is an essential part of GSCM since it may reduce waste produced by processing and disposing of returned and used goods by using a variety of disposition alternatives. Manufacturing, distribution, and customer-related returns are just a few of the several supply chain locations where product returns might happen for various causes. Due to the numerous benefits associated with RL, all manufacturing companies are eager to participate in it. Product disposal involves decisions on what to do with worn or returned goods, and this process is a crucial component of RL. The common ways of handling RL have been identified as reuse, repair, remanufacturing, recycling, and disposal. A competitive advantage can be gained through better earnings, cost savings, and more customer satisfaction thanks to properly run RL programs (Banihashemi, Fei and Chen, 2019).

RL is a crucial tactic for contemporary industrial firms. Business must have a thorough understanding of the concept of RL as well as the obstacles that companies experience while applying it before RL can be integrated into organizational processes. Some businesses are having trouble in implementing RL due to a lack of expertise, skills, and resources. To overcome the uncertainties that arose in RL function, RL flexibility was more crucial. The performance of third-party RL providers was explained and debated by researchers, and this information will be useful in examining how RL flexibility is related (Bai and Sarkis, 2013). As per the studies, less willingness to pay, competition, a lack of assistance from retailers, dealers, and distributors, as well as particularly consumer perspective and interest, lack of interest in firms to adopt RL, can be identified as the problems RL implementation. Prior studies mainly concentrated on the RL network's reuse, remanufacturing, recycling, repair, and refurbishment factors from the point of consumption to the point of origin, RL was a cost-effective network flow. The three strategies for collecting used goods are from retailers, collection from end users, and collection from third-party logistics providers were presented by the

researchers. Organizations can gather and repurpose their returned products by utilizing these three dimensions (Ali et al., 2021).

Environmental Sustainability

Our environment is intricate, made up of interdependent systems of organic and inorganic substances, living things, and water, air, and land. Fossil fuel emissions are known to be a significant factor in climate change and can have an impact on air quality. A global issue is climate change. There will be global environmental and economic effects of climate change. Within this century, rising sea levels, changed growing seasons, altered rainfall patterns, and more frequent and severe weather disturbances are all predicted by current climate change models (Yazid and Shakouri, 2012). Concern over the environmental problems faced because of population increase worldwide, the depletion of nonrenewable resources, the overuse of renewable resources, and the buildup of waste and pollution gave rise to the idea of sustainability. This can be overcome by the concept circular economy which include use, reuse, remanufacture and recycling processes which helps in utilizing resources effectively. The commonly used term “sustainability” often refers to meeting the needs of the present without compromising the ability of the future generation to meet their own needs. With the deployment of GSCP, efforts to reduce carbon emissions, energy use, and packaging material use were made possible. According to GSCM theory, Supply Chain Management (SCM) should incorporate environmental sustainability. In addition to supply chain activities such product design, material resourcing and selection, manufacturing process, providing final product to the end customer, and end-of-life management, GSCP focuses on lowering or terminating wastes, carbon emissions, energy consumption, and solid waste.

In most emerging nations, a significant threat to human health is the sharp rise in air pollution. In Sri Lanka, the effects of air pollution are not sufficiently addressed. Sri Lanka is quickly urbanizing; by 2050, it's predicted that 34% of the country's people would live in cities, up from 17% in 1990 (Clean Air in Sri Lanka, 2008). The massive volume of gas and particulate matter emissions from businesses, thermal power plants, and automobiles might be thought of as the most promising cause of air pollution (Clean Air in Sri Lanka, 2008). Contamination of

water resources is a serious environmental problem in Sri Lanka. Water is necessary not only for all living things, but also for other products. Many people die each year from water-borne diseases such as typhoid fever, cholera, and kidney disease. Water pollution in Sri Lanka is mainly caused by residential, agricultural, and industrial activities. The dissolved oxygen content of the lakes in the Kandy and Nuwara Eliya districts is too low to support a significant fish population, according to a recent water quality analysis of those lakes. The primary cause of environmental contamination is the direct dumping of sewage, household garbage, and industrial waste into waterways (Ranaraja, Arachchige and Rasenthiran, 2019). An overview shows that the pollution caused by manufacturing workplaces affects the health of an estimated 440000 workers. Pollution generates production problems that have an impact on production quality and profit margins. The health of the workers is immediately impacted if manufacturing enterprises do not adhere to the correct procedures. By expressing their preference for green items, customers can avoid the market for goods that cause pollution and thereby help to alleviate the situation.

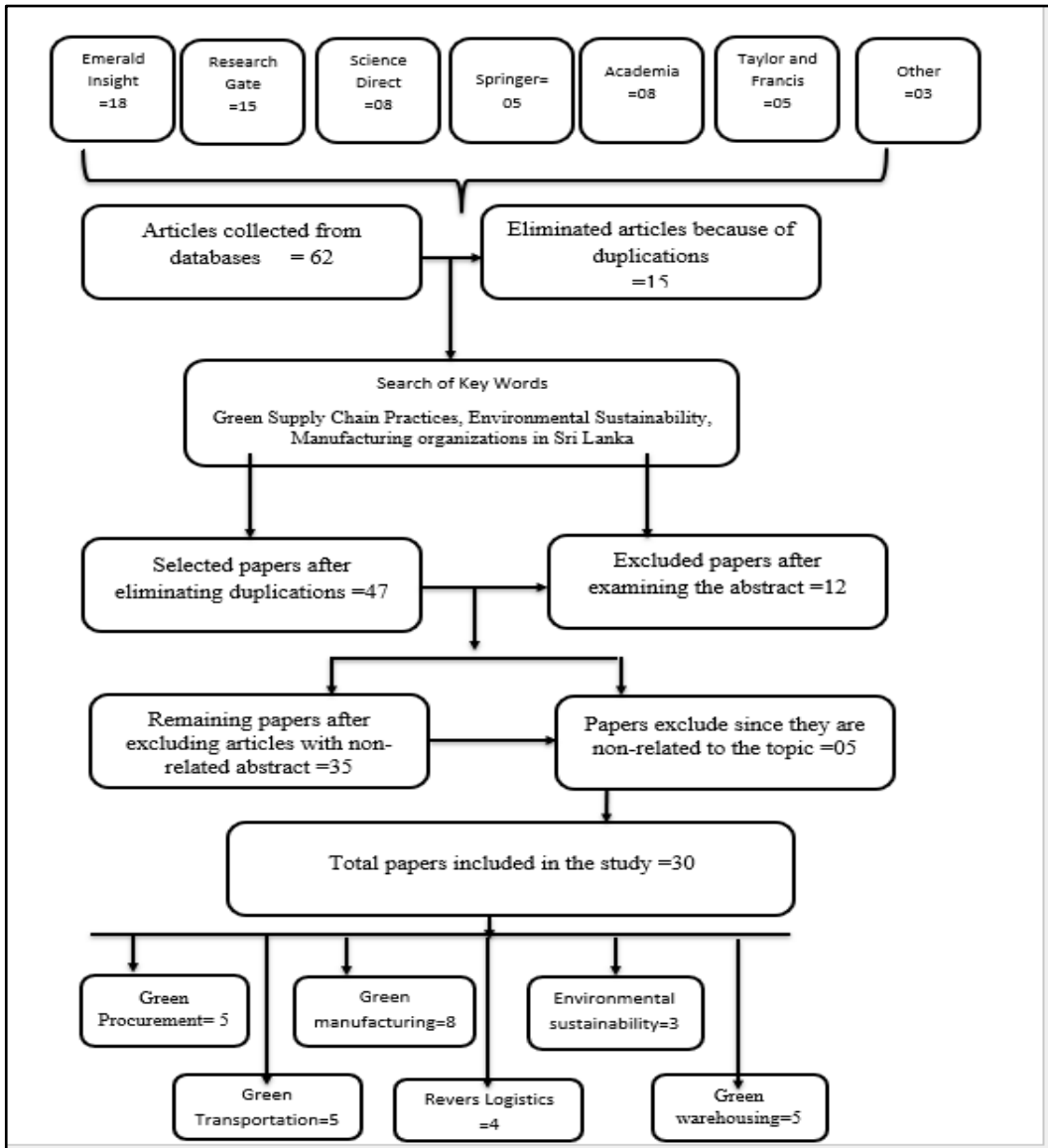
Methodology

The objective of this study includes identifying the GSCP used by the international and Sri Lankan organizations to eliminate the negative impact towards the environment. Due to the increasing number of environmental issues arising through traditional supply chain activities, the topic was selected. The study has adopted qualitative methods which is known as non-statistical techniques for data analysis to gather in-depth insights on the topic. The research is based on secondary data consisting of past literature and annual reports. To analyze the past studies on the topic, 15 peer-reviewed journals including Journal of Cleaner Production, International Journal of Logistics Management, and international journal of Supply Chain Management were searched within the timeline of 2000-2022. Emerald Insight, Research Gate, Science Direct, Elsevier, Springer, Taylor and Francis are some databases this research has used to search articles. The articles were selected from research databases, based on keywords such as GSCP, Environmental Sustainability and Manufacturing Organizations in Sri Lanka. The literature was then organized based on the variables identified in reviewing the past studies and it includes

Green Procurement (GP), Green Transportation (GT), Green Manufacturing (GM), Green Warehousing (GW) and Reverse Logistics (RL), and Environmental sustainability. The selectin criteria for the literature is mentioned below.

The companies were selected by using simple random sampling method. From the initial search the researchers have identified there are only few companies in Sri Lankan context which have documented data on GSCP and their achievements in environmental sustainability. The online available annual reports from the year 2018-2021 were selected to find GSCP related information in the selected sample. The gathered data from annual reports of companies has been analyzed by using the narrative method. Narrative analysis method can be defined as a qualitative descriptive analysis method that can be used to represent human experiences, activities, and the knowledge discovered through journals, newspapers, books, reports or interviews about people, society, or any data, and it is narratively produced and comprehended through the study of the content and structure of stories (Belve.com,2020).

Figure 1: Literature Pathway



Source: Authors' compilation

Narrative Analysis

Ceylon Cold Stores

At Ceylon Cold Stores (CCS), which is a food and beverage manufacturing company in Sri Lanka, they are conducting operations in a socially and environmentally responsible manner by the aim of continuous commitment to sustainability. To achieve this goal, they

have transformed their traditional supply chain activities which causing environmental pollution, to an eco-friendly/ sustainable practice by adding greener to the phases like procurement, manufacturing, distribution, warehousing and many more.

The group's sustainability agenda is consisted with different aspects like generating clean energy by the usage of solar power at retail outlets and manufacturing plants, efforts on increasing energy efficiency including the use of Light Emitting Diodes (LED) lightning and inverter air conditioning, reducing polythene usage in supermarkets, implementation of sustainable production practices across supply chain, initiating 'Trash to Cash' project by the aim of reducing the plastic pollution etc. Another sustainable priority at CCS was to reduce single-use polythene across outlets. By achieving that objective, they were able to reduce 35% of single-use polythene bags, 165 plastics collections bins were deployed over last 4 years, and around 12,655kg of plastics wastage were collected and recycled (CCS, 2021).

As a result of the above-mentioned strategies on environmental prevention, the company was able to reduce 57% of plastic usage in supermarkets. Around 54% (66 outlets) of total outlets were converted into solar powered outlets and introduced solar power systems in Ranala and Seethawaka plants with a generation capacity of 15 (kW) and 995kW respectively. By this strategy, the company got the ability to improve carbon intensity of retail sector by 3%. The strategies contributed to value creation by achieving cost efficiencies, preventing water etc. After the usage of renewable energy, the retail sector at CCS has recorded a gradual decrease in its energy bills by achieving both environmental and commercial objectives. They received ISO 14001; 2015 certificate for Ranala plant for their achievements on environmental sustainability.

As a food and beverage manufacturing company, they consume a considerable range of agricultural raw materials like milk and sugar as well as packaging materials in their manufacturing process. According to the CCS, (2021), some initiatives were taken to reduce plastic consumption in the manufacturing including the reduction of Polyethylene Terephthalate (PET) bottles and reducing polythene

gauge among others. Also introducing compostable bags for top crust bread, using paper straws at outlets, and introducing compostable bags in fresh, meat and fish counters are some other measures that was taken by the company in order to reduce the usage of polythene. The plastic cycle bins have been placed at their stores and other public locations to collect the plastic waste and sent for recycling that will recycle around 12,655kg of plastic waste.

Due to the large network of retail outlets around the country, the consumption of energy has also increased, and the company is committed to achieving energy efficiencies through different proactive steps. To reduce the usage of fossil fuel, they have started a project to convert their retail outlets to solar power and installed solar generation units at their two factories which generates 1.145kW (CCS, 2021).

Dilmah Ceylon Tea

According to Dilmah Ceylon, (2018), the company's long-term goal is to develop a tea sector that is truly sustainable and beneficial to communities, people, and the environment. The company, which began its packaging process in 2000, concentrated primarily on implementing the sustainability concept. They keep an eye on and minimize both our direct and indirect environmental consequences while completely complying with all applicable environmental standards and laws. Dilmah's Environmental Management System (EMS) includes six major elements including water management, material management, waste management, noise management, energy and fuel management and managing atmospheric emissions and climate changes.

Electricity, solar energy, and diesel are the company's principal energy sources. The national grid supplies most of the electricity, with diesel and solar power producing 9% and 11%, respectively, of it. The company employs several strategies to lower energy emissions. Their shipping and warehouse activities are as energy efficient as possible since they keep an eye on their own energy consumption. By erecting 100 kW solar panel units in 2013, Dilmah made an investment the biggest privately operated solar array in Sri Lanka. In April 2016, a second 150 kW solar panel installation took place. Every year, atmospheric emission levels are monitored. The year's emission levels

were considerably within the Central Environmental Authority's (CEA) established standards. The activities of Dilmah do not cause the emission of Nitrogen Dioxide (NO₂) or Sulfur Dioxide (SO₂) through initiatives like energy efficiency, "Greening Batticaloa," "Biochar Application," and compensating practices, the company was successfully able to minimize its carbon footprint to zero, which marked a historic net zero release of carbon into the atmosphere.

On March 24, 2018, Dilmah opened "Dilmah Recycling," which is a facility that will turn a substantial a fraction of the tea packaging waste from Dilmah into recyclable things as part of its efforts to minimize its plastic impact and become more sustainable. The facility wants to successfully up cycle 10% of the waste packaging from Dilmah. When considering water stewardship at Dilmah, they build a culture of water awareness among their employees and customers to guarantee that both groups have a thorough understanding of the global water issues and their reliance on freshwater. To reduce inconvenience to individuals nearby, noise emissions from all the company's facilities are rigorously regulated. The business strictly complies with all regulations governing noise emissions. Routing testing, identifying issues, and addressing, evaluating periodically are the steps that they have taken to manage dust and noise in the facilities. At the Dilmah Conservation Sustainable Agriculture and Research Center (DCSARC) in Moratuwa, Sri Lanka, the One Earth Urban Arboretum that Dilmah created is home to 500 plant class, model water bodies (reservoirs), paddy fields, conventional farming, and domestic resource centers. Dilmah conservation aims to educate urban neighborhoods and young generations about the value of trees for our society, environment, and future subsistence. (Dilmah Ceylon, 2018).

John Keells Holdings

Founded in 1870, John Keells Holdings (JKH) is the largest publicly limited liability company active in Sri Lanka's many business portfolios. JKH started as product brokers in the tea industry and have evolved over time using investment and reinvestment strategies. They operate in the food and consumer goods, hospitality, transportation, finance and many other industries. The consumer food category includes Ceylon Cold Stores PLC, Keells Food Products (PLC) and Colombo Ice Company (Pvt) Ltd. The group operates in many sectors

and has been accused of high energy consumption and high environmental impact. In areas such as energy use, water use, emissions, waste, and biodiversity. With new sustainable policy implications, they are paying more attention to implementing sustainable practices to reduce their environmental impact. For the environmental aspect they develop policies regarding assessing the environmental impact of the operations and products. JKH has considered many aspects in implementing minimums and regulations in an organizational context, with a primary focus on reducing energy consumption, safeguarding biodiversity, and carbon footprint in the supply chain (JKH, 2010).

While on the path to sustainability they have identified challenges, opportunities and risks associated with environmental factor. The challenges identified by them were to “Balancing customer demands and company objectives to conserve energy and reduce emissions through improved design. Getting local suppliers to provide required goods and services at competitive costs while adhering to environmental and social standards. Conserving resources like water, energy, and material” (JKH, 2010), pp.23). Opportunities are presented to utilize more innovative and cleaner technology to save operating costs, generate new green goods, reduce emissions, and conserve energy and resources, investigate market possibilities, use more renewable energy sources, utilize energy management tools to assist clients in becoming more energy efficient (JKH, 2010). And the risks associated with the environmental factors are, the groups' carbon footprint can expand because of environmental damage brought on by the increased use of energy, environmental damage could result from inadequate waste recycling and emission control systems (JKH, 2010).

Environmental responsibilities are highly prioritized in the company and for this as mentioned earlier they practice environmental norms in the company by establishing practices, policies and other appropriate measures while focusing of reduction on resources use in their supply chain. In 2010 they were more focusing on introducing robust mechanism to identify the carbon footprint of the company and the initiatives that they can use to mitigate environmental impact and implementation of environmental laws while keeping the continuous focus on energy consumption and biodiversity. The company has a

strong energy management process which is encouraged throughout the organization by adopting the latest technologies and best practices in order to reach energy goals of the organization.

They have two main goals in terms of energy. The first one is minimized impact of energy related to environmental damage and the second one is to enhance the company competitiveness through energy cost savings. They are using an energy management team which is developed to carry out the responsibilities such as regulate baselines for energy consumption, identify the Key Performance Indicators (KPI), setting up energy consumption benchmarks within each industry, evaluate alternative energy and renewable energy sources etc. In the year 2018 their total energy usage was 843,931 GJ, in 2019 it was 811,426 GJ and in 2020 it was 698,154GJ which include direct energy, renewable energy and indirect energy usage. In this it can clearly identify the reduction in energy usage and exactly they were able to reduce their energy usage by 19% by using renewable and alternative energy sources such as solar power and hydropower (JKH, 2020).

The company undertook other deployment initiatives aiming to save water raising multiple awareness efforts programs with continuous monitoring measure usage from all sources, including groundwater, surface inland water, sea and tap water from National Water and Sewerage Administration source. Before being discharged, all water drawn by the company from non-dry areas, before being discharged, 30% of the water was treated using on-site sewage treatment plants at various operational locations, and 27% of the treated water was entirely recycled. Such water was used for ordinary cleaning tasks as well as gardening. The Group strives to employ recycled water and rainwater collecting whenever possible to meet a portion of its water needs while minimizing freshwater extraction in their green water usage project. Due to the nature of their operations which includes leisure activities, consumer food, retail, and real estate industry, groups consumed the most water, making for over 85% of the group's total consumption (JKH, 2021).

Total recorded waste generation mainly increased to 8,051 MT higher operational activity due to mitigation the impact of the pandemic,

especially leisure industry group. Total waste occurred and 216 MT were classified as dangerous goods waste or hazardous waste and post-recycling disposal is done by professional third-party providers. 29% of non-hazardous waste produced in the group companies recycle and reuse units from selected third party vendors. Leisure, consumer goods, retail groups accounted for more than 90% waste generated by the group. With all of this they were able to reduce 31% of their waste throughout the company. With the JKH's Social Entrepreneurship Project - 'Plastic cycle' they are aiming to create awareness, supporting responsible disposal of waste, and promoting recycling of non-hazardous and hazardous materials. And they also encourage their customers to reduce the use of single use plastic to reuse the environmental impact of food and consumer category (JKH, 2020).

Nestle Lanka

Climate change is one of the greatest threats in the current world and for their company's future. They are most prominently dedicated on reducing the amount of GHG emissions produced from their activities by increasing energy efficiency and transitioning to renewable resources such as solar power which they have installed in many factories all over the country (Nestle.lk, 2021). Only 5% of Nestle's total GHG come from operations. In contrast, 95% are from supply chains activities such as agriculture and shipping. To reduce the supply chain GHG emission they are focusing on transforming manufacturing and packaging activities and working across supply chain to contribute to absolute reductions. Scaling GHG reduction projects across operations and supply chain has resulted in exceeding peak carbon emissions and reducing absolute GHG emissions by 4 million tons from peak while continuing to grow the business by using GSCP. By 2025, they want to minimize emissions throughout the value chain by 20%, by 50% by 2030, and achieve net zero by 2050. To achieve this, they are taking steps such as by 2025, using 100% renewable electricity across all sites, including factories, warehouses, logistics and offices. To make logistics networks and warehouses more efficient, they optimize routes to reduce nonrenewable fuel consumption and CO2 emissions. Product evaluation can help you reduce the ecological footprint. Making appropriate brands environmentally friendly and considering the usage of more environmentally sustainable ingredients are some examples of this. (Nestle.lk, 2021). Over the period from 2012-2020,

they were able to reduce their energy consumption by 13% in absolute terms. This equates to a reduction in GHG of nearly 840 tons per year. The previous energy sources were able to provide uninterrupted power supply systems but there are processes which reduce diesel generators which helps to save up nearly 1300 MT CO₂ annually. In year 2016, they were able to rebuild their green distribution center which is more environmentally friendly, and it utilizes electricity in a minimum level by using solar power generators natural ventilation and skylights (Nestle.lk, 2021).

With the identification of everyone everywhere has the right to clean and safe water for drinking and sanitation they were able to reduce 4.5% off their annual water usage from year 2012. They are using technologies such as ultra-heat treatment lines that have resulted in a reduction in water usage of approximately 33 million liters per year compared to the water usage in the same process previously. The wastewater produced during food preparation is handled by their own wastewater treatment facility. They repurpose this water for the factories to landscaping, toilet flushing, and water chilling processes in addition to a neighboring nursery for coconut plants. The facility recycles about 100 million liters of water each year (Nestle.lk, 2021).

By the year 2025, Nestle Lanka intends to have all of their packaging to be recyclable or reusable. Its goal is to ensure that none of its packaging, including plastic, or any other waste ends up as trash or in landfills. With the slogan 'The Good Food Good Life', company has started a variety of green initiatives as part of its "Making My Sri Lanka More Sustainable" campaign to make the country cleaner and greener. "Zero waste for disposal" at the Kurunegala factory means that nothing is disposed of in a landfill or burned without first recovering energy from the process. And furthermore, they have taken several steps to manage their waste in a more accurate manner. Starting with MILO, Ready to Drink (RTD) beverages, Nestle is the first in Sri Lankan company to offer consumers paper straws as a more environmentally friendly option. With this one step closer to being an environmentally friendly path, they will remove more than 90 million plastic straws from the environment which is a significant improvement as a company. Beginning in April 2020, they will no longer use plastic in promotional products. This will enable us to get rid of about 250 MT of

plastic each year. By weight, more than 80% of their packaging is recyclable. By the year 2025, they will complete this 100% and all their packaging will be recyclable. Also, they are aiming to cut the amount of virgin plastic packaging across their entire production process by a third (Nestle.lk, 2021).

Hayleys Global beverages

The business uses a variety of agricultural raw ingredients for manufacturing, including milk and sugar, as well as packaging materials. Due to their commitment to going green, the organization also tries to understand how the packaging process affects the environment. To ensure sustainability, corrugated packaging and PET bottles are used. Additionally, various measures were launched to the sustainable development model that Hayleys beverage (pvt) Ltd has created throughout the years is an illustration of moral, value-driven business practices. Hayles can make a positive difference in people's lives all over society and build a bright future for everyone because of their commitment to environmental protection, practices in economic, social, and good governance, which help them in their commitment to quality. These core ideas serve as the cornerstone of The Hayleys Life code, which serves as a general road map for achieving all-encompassing growth and advancement. They produce 3.6% of Sri Lanka's total tea production as the country's largest plantation. 9% revenue growth, 69% profit growth, and 22% economic growth are claimed for their plantation. Hayles Group is an established corporation that focuses on new industrial inputs. They have 50 MW of installed hydro, solar, and wind power facilities and contribute around 3% of the country's total renewable energy.

Hayles' environmental goal is to lessen their environmental impact while looking for ways to help create a more sustainable future. They used 5.06 GJ million in total energy in 2021, and they cut their overall carbon footprint (GHG emissions) by 12.49% more than they did in 2021. Hayles Company placed a strategic emphasis on value creation and employee involvement, sustainable regenerative agriculture techniques, product innovation, and new market penetration in value-added tea. Importantly, they control their environmental impact by lowering their dependency on fossil fuels by 83%, their use of renewable energy by 4%, their use of water by 17%, and their emission

levels by 18%. Additionally, they improved staff by investing Rs. 0.42 million in research and development projects, value was created by promoting productivity-linked compensation, increasing sustainable and regenerative agricultural methods, and enhancing new product developments and market expansions in value-added tea exports. The company is now well-known as a supplier of a wide range of value-added tea products, including tea bags, green tea, flavored tea, herbal tea, and many more.

In conclusion, as a summary of the above analysis, authors identified that the selected companies did not pay much attention to practices such as GP and GT due to lack of knowledge and technological advancement in the country. But in practices such as GM, GW and RL, they have invested their time and effort in adapting those practices in reducing environmental pollution.

Discussion

The literature review was developed based on five independent variables namely GP, GM, GT, GW, RL, and the dependable variable environmental sustainability. The narrative analysis was conducted for five well reputed Sri Lankan manufacturing companies.

There are many past literatures that have been developed based on GSCP which discuss different green initiatives which was developed with the intention of achieving the first research objective to identify the GSCP use in international companies. Although there was lack of studies done for all selected variables at once there are separate literature for different GSCM practices which provide detailed information on variables.

For GP, a study conducted by Wisner, Tan and Leong, (2012), provided information on how organizations can initiate GP, what are the benefits that they can achieve through this. When it is considered the past literature of GM, the measures that they have taken as a country to encourage the implementation of GM and the processes that can follow to achieve green initiatives in manufacturing have been highlighted. For studies that have developed based on GT by the authors such as Todorovic and Simic, (2019) and many others, mostly focus on emission reduction and use of alternative energy sources in

transportation. GW is another variable that is looked at under the literature review of this study. In this, authors such as Luu, (2016); Chen et al., (2016) have explained how to reduce the energy usage of warehouses and improve efficiency by adopting green initiatives in an organizational context. Ultimately by analyzing the past studies such as above mentioned, the first study objective is achieved.

The second study objective was to identify the GSCP that Sri Lankan organizations have implemented. Nestle, John Keells Holdings, Dilmah Ceylon Tea, Ceylon Cold Stores and Hayles are well reputed companies in Sri Lanka. By using narrative analysis method this study has analyzed various GSCP that companies have implemented to ensure environmental sustainability. All the companies are launching their own kind of green initiative project all around the country, maybe not for all supply chain practices but at least for two or more which also can make the significant impact on the environment. All the companies are focusing on use of alternative energy in supply chain phases such as manufacturing and warehousing, use of treated/ recycled water in their operations, reduction of emissions and waste management. With the analysis conducted on these Sri Lankan manufacturing companies, the second objective was achieved.

In conclusion, according to the sample selected it identified most of the Sri Lankan manufacturing companies are lagging adapting practices such as GP and GT even though the studies that referred in literature highlighted, in international context most of the companies have already implemented GP and GT in their organizations and gaining benefits out of them. And, other practices such as GM, GW and RL are adapted to some extent it is not fully implemented like in international context. But they are gaining benefits out of that to ensure environmental sustainability.

Conclusion

Green supply chains will play a significant role in businesses in the future. In this globalized business landscape, it is inevitable that organizations will work with dispersed suppliers around the world (Youn, Yang and Roh, 2012). The broader and complicated the supply chain becomes, the more challenging the supplier relationship management and acquiring sustainability driven supply chain will be

there. It is a must for the organizations to retain and improve the quality of supplier and reduce non-renewable material throughout the supply chain process. Environmental problems such as global warming, environmental pollution, and decreasing biological diversity have caused familiar in ecological balance. Business activities can be a significant threat to the environment in terms of wastages, emissions and many other things. The concept GSC can be identified various issues that encourage companies to establish environmental- friendly management practices in the supply chain process. According to Srivastava, (2007) GSCP has generated the idea of incorporation of environmental sustainability in SCM. GSCP try to reduce or terminate wastages including hazardous chemical, emissions of GHG, product design wastages etc. This concept requires thoroughly changing the idea of “treating after pollution” to reduction of pollution at the source, prevention before pollution and treatment second.

The study aimed to identify and investigate the green supply chain practices that can be implemented/ has implemented by the two selected manufacturing categories including manufacturing and beverages companies located in Sri Lankan context. By conducting this research, the researchers tried to identify the positive impact for the environment by implementing GSCP in Sri Lanka.

Most previous studies on this topic has identified the positive relationship between the two constraints which are GSCP and environmental sustainability. But the research barely found the studies on this topic considering Sri Lankan context. Most of the findings shows how organizations can implement GSCP in their supply chain and different limitations of GSCP implementation. The research investigated how these practices contributed to the Sri Lankan firms after implementing GSCP to achieve environmental sustainability. So, this research examined the GSCP that can be implemented to eliminate or decrease the environmental damages such as degradation of biodiversity, depletion of Ozone layer due to GHG emission and many more, caused by traditional supply chain practices and to achieve environmental sustainability. The main limitations of carrying out the research were filtering relevant literature, limited time and selecting the companies which have reliable documented information.

The authors recommend future researchers to give priority on barriers of implementing GSCP and recommend solutions to overcome those problems which will be beneficial for developing countries who are lagging implementing GSCP.

References

- Ai, T., Malik, N.F.I., Tat, H.H. and Sulaiman, Z. (2020) Green Purchasing Practices and Environmental Performance. *International Journal of Supply Chain Management*, V.9 (1), pp 292-927. Available at: <http://excelingtech.co.uk/>. [Accessed: 5th October 2022].
- Ali, Y., Zeb, K., Babar, A.H. and Awan, M.A. (2021) Identification of critical factors for the implementation of reverse logistics in the manufacturing industry of Pakistan. *Journal of Defense Analytics and Logistics*, V.5 (1), pp. 95-112. Available at: <https://doi.org/10.1108/jdal-07-2020-0013>. [Accessed: 5th October 2022].
- Allcock, A. (2010) Green supply chains. *Machinery*, V. 168(4180), pp. 18-20. doi:10.5848/amacom.978-0-814414-47-7_15.
- Bai, C. and Sarkis, J. (2013) Flexibility in reverse logistics: A framework and evaluation approach. *Journal of Cleaner Production*, V. 47, pp. 306-318. Available at: <https://doi.org/10.1016/j.jclepro.2013.01.005>. [Accessed: 15th September 2022].
- Banihashemi, T.A., Fei, J. and Chen, P.S.-L. (2019) Exploring the relationship between reverse logistics and sustainability performance. *Modern Supply Chain Research and Applications*, V. 1(1), pp. 2-27. Available at: <https://doi.org/10.1108/mscra-03-2019-0009>.
- Belve.com (2020) What is Narrative Analysis? [online] Available at: <https://delvetool.com/blog/narrativeanalysis> [Accessed: 18th November 2022].
- Buil, R. and Piera, M.A. (2008) Warehouse redesign to satisfy tight supply chain management constraints. *WSEAS Transactions on Information Science and Applications*, V.5 (3), pp. 286-291. Available at: https://www.amazon.com/dp/B01M70WZFT/ref=sr_1_1?ie=UTF8&qid=1477381724&sr=8-.

- Ceylon Cold Stores (2021) Ceylon Cold Stores annual report. Sri Lanka: Ceylon Cold Stores.
- Chen, X., Wang, X., Kumar, V. and Kumar, N. (2016) Low carbon warehouse management under cap-and-trade policy. *Journal of Cleaner Production*. [First published online 18th August 2016]. V.139, pp.894-904. DOI: 10.1016/j.jclepro.2016.08.089. [Accessed: 20th August 2022].
- Clean Air in Sri Lanka (2008) Summary of progress on improving air quality. Sri Lanka: Country Network Sri Lanka.
- Dilmah Ceylon Tea (2018) Dilmah Ceylon Tea company annual report. Sri Lanka: Dilmah Ceylon Tea PLC.
- Deif, A.M. (2011) A system model for green manufacturing. *Journal of Cleaner Production*, V. 19(14), pp. 1553–1559. DOI:10.1016/j.jclepro.2011.05.022.[Accessed: 5th October 2022].
- Diaz, N., Choi, S., Helu, M., Chen, Y., Jayatathan, S., Yasui, Y., Kong, D., Pavanskar, S. and Dornfeld, D. (2010) Green Manufacturing and Sustainable Manufacturing Machine Tool Design and Operation Strategies for Green Manufacturing. Proceedings of 4th CIRP International Conference on High Performance Cutting, 2010, Gifu, Japan, Gifu, Japan, 24th -26th October. Available at: https://www.researchgate.net/publication/284081696_Machine_tool_design_and_operation_strategies_for_green_manufacturing[Accessed: 3rd September 2022].
- Digalwar, A.K., Tagalpallewar, A.R. and Sunnapwar, V.K. (2013) Green manufacturing performance measures: An empirical investigation from Indian manufacturing industries. *Measuring Business Excellence*, V. 17(4), pp. 59–75. DOI: 10.1108/MBE-09-2012-0046.
- Foo, M.Y., Suhaiza, Z., Kangi, K., Shaharudin, M.R. (2019) Green purchasing capabilities, practices and institutional pressure, *Management of Environmental Quality: An International Journal*, V.30(5), pp. 1171–1189. DOI:10.1108/MEQ-07-2018-0133.[Accessed: 14th August 2022].
- Hazen, B.T., Cegielski, C. and Hanna, J.B. (2011) Diffusion of green supply chain management: Examining perceived quality of green reverse logistics. *International Journal of Logistics Management*, V. 22(3), pp. 373–389. DOI: 10.1108/09574091111181372.

-
- [Accessed: 13th September 2022].
- HirawatyKamarulzaman, N., Hussin, H. and Mahir Abdullah, A. (2012) Green warehousing initiatives towards environmental sustainability: adoption and performance in the Malaysian food-based industry. Identity, Credential, and Access Management. Jember, Indonesia, June 25-26
Available at: <http://psasir.upm.edu.my/id/eprint/67071/>
[Accessed: 4th September 2022].
- Ibrahim, N., Razak, R.C., Wahab, M.H.A.A., Osman, A.A. and Rahman, S.M.(2021) Supply Chain Risks and Roles of the Strategy of Green Supply Chain Management Practices. International Journal of Academic Research in Business and Social Sciences, V.11(7), pp. 752-771. DOI:10.6007/ijarbss/v11-i7/10322. [Accessed: 1st October 2022].
- Iea.org (2022) Improving the sustainability of passenger and freight transport [online] Available at: <https://www.iea.org/topics/transport> [Accessed: 18th November 2022].
- John Keells Holdings. (2010) John Keells Holdings Plc Sustainability Report. Sri Lanka: John Keells Holdings.
- John Keells Holdings. (2020) Resilience in investing. Sri Lanka: John Keells Holdings.
- JKH. (2021) Fundamentals. Sri Lanka: John Keells Holdings.
- Karuppiah, K., Sankaranarayanan, B. and Ali, S.M. (2020) An integrated approach to modeling the barriers in implementing green manufacturing practices in SMEs. Journal of Cleaner Production, V.265, pp. 121737. DOI:10.1016/j.jclepro.2020.121737.[Accessed: 5th September 2022].
- Lin, C., Choy, K.L., Ho, G.T.S. and Ng, T.W. (2014) A Genetic Algorithm-based optimization model for supporting green transportation operations. Expert Systems with Applications, V. 41(7), pp. 3284–3296. DOI:10.1016/j.eswa.2013.11.032.
- Luu, M. (2016) Developing the implementation of green warehousing at IKEA Finland. pp1- 66. Available at: https://publications.theseus.fi/bitstream/handle/10024/108649/Luu_Minh.pdf?sequence=1.
- Min, H. and Galle, W.P. (2001) Green purchasing practices of US firms. International Journal of Operations & Production Management.

- V 21 (9), pp. 1222- 1238. Available at: <http://www.emerald-library.com/ft>. [Accessed: 10th September 2022].
- Nestle.lk (2021) Good for My Planet [online]
Available at: <https://www.nestle.lk/csv/planet/climate-change> [Accessed: 1st September 2022].
- Nestle.lk (2021) Good for My Planet [online]
Available at: <https://www.nestle.lk/csv/planet/tackling-plastic-pollution> [Accessed: 1st September 2022].
- Nestle.lk (2021) Good for My Planet [online]
Available at: <https://www.nestle.lk/csv/planet/caring-for-water> [Accessed: 1st September 2022].
- Nestle.lk (2021) Good for My Planet [online]
Available at: <https://www.nestle.lk/media/pressreleases/allpressreleases/recycle-reusable2025> [Accessed: 1st September 2022].
- Nestle.lk (2021) Good for My Planet [online]
Available at: <https://www.nestle.lk/planet> [Accessed: 1st September 2022]
- Panday, A. and Bansal, H.O. (2014) Green transportation: Need, technology and challenges, *International Journal of Global Energy Issues*, V. 37(5-6), pp. 304-318. DOI:10.1504/ijgei.2014.067663. [Accessed: 6th August 2022].
- Paul, I.D., Bhole, G.P. and Chaudhari, J.R. (2014) A Review on Green Manufacturing: It's Important, Methodology and its Application, *Procedia Materials Science*, V. 6, pp.1644-1649. DOI:10.1016/j.mspro.2014.07.149.
- Pamoshika Jayarathna, C. and Lanka, S. (2016) The Level of Green Supply Chain Practices Adoption in Sri Lankan Manufacturing Companies, *International Journal of Supply Chain Management*, V. 5 (4), pp. 12-17.
Available at: <https://www.researchgate.net/publication/312159765> [Accessed: 10th August 2022].
- Pinto, L. (2020) Green supply chain practices and company performance in Portuguese manufacturing sector. *Business Strategy and the Environment*, V. 29(5), pp. 1832-1849. DOI:10.1002/bse.2471.
- Ranaraja, C.D.M.O., Arachchige, U.S.P.R. and Rasenthiran, K. (2019) Environmental Pollution and Its Challenges in Sri Lanka.

-
- International journal of scientific and technology research, V. 8, pp. 7. Available at: www.ijstr.org [Accessed: 16th July 2022].
- Rüdiger, D., Schön, A. and Dobers, K. (2016) Managing Greenhouse Gas Emissions from Warehousing and Transshipment with Environmental Performance Indicators. *Transportation Research Procedia*. V.14, pp. 886–895. DOI:10.1016/j.trpro.2016.05.083.
- Rusinko, C.A. (2007) Green manufacturing: An evaluation of environmentally sustainable manufacturing practices and their impact on competitive outcomes. *IEEE Transactions on Engineering Management*, V. 54(3), pp. 445–454. DOI:10.1109/TEM.2007.900806. [Accessed: 8th September 2022].
- Salimifard, K., Shahbandarzadeh, H. and Raeesi, R. (2012) Green Transportation and the Role of Operation Research. International conference on traffic and transportation engineering (ICTTE) [online], Hong Kong, China, 17th -18th February. Available at: <https://www.semanticscholar.org/paper/Green-transportation-and-the-role-of-operations-Salimifard-Shahbandarzadeh/dfd1c31f2a40f02e7dd465315233886b8eb848f5>. [Accessed: 25th July 2022].
- Srivastava, S.K. (2007) Green supply chain management: A state-of-the-art literature review. *International Journal of Management Reviews*, V.9 (1), pp. 53–80. DOI:10.1111/j.1468-2370.2007.00202.x. [Accessed: 15th July 2022].
- Todorovic, M. and Simic, M. (2019) Feasibility study on green transportation. 2nd international conference on energy and power [online], Sydney, Australia, 13th - 15th December v.160, pp.534-541. Available at: <https://doi.org/10.1016/j.egypro.2019.02.203> [Accessed: 10th July 2022].
- Wisner, J.D., Tan, K. Choon. and Leong, G. Keong. (2012) Principles of supply chain management: a balanced approach. In: Jack, W.K., Charles, M., Noguera, D. and Heink, N. (eds.) *Principles of supply chain management: a balanced approach*. USA: pp 1-555.

- World Economic Forum (2004), *Shaping the Global Agenda*. Switzerland: World Economic Forum. Available at: www.weforum.org.
- Youn, S., Yang, M.G. and Roh, J.J. (2012) Extending the efficient and responsive supply chains framework to the green context. *Benchmarking*, V. 19(4), pp. 463–480. DOI: 10.1108/14635771211257954.
- Yazdi, S.K. and Shakouri, B. (2012) The Sustainable Environment, *Journal of advances in Environmental Biology*, V. 6 (1) , pp. 468–474. Available at: <https://go.gale.com/ps/i.do?id=GALE%7CA283593098&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=19950756&p=AONE&sw=w&userGroupName=anon%7E88384e5c> [Accessed: 13th August 2022].