

SUSTAINABLE LOGISTICS & SUPPLY CHAIN MANAGEMENT

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Sustainable Logistics & Supply Chain Management: Challenges & Future Outlook

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I. Abstract

Sustainability has increasingly become a growing concern for consumers, businesses, governments and communities. In recent years, mounting regulatory pressures, scarcity of natural resources, and increased population and urban growth have prompted companies to remain competitive and continuously deliver new products and services in today's marketplace. There have also been increased levels of waste, and growing demands from customers and stakeholders. Due to these issues, companies develop efficient and sustainable supply chain operations to gain positive results and uncover monetary benefits.

The purpose of this study is to analyze various challenges and trends affecting the global supply chain and logistics. The study recognizes several sustainable supply chain management practices and initiatives and focuses on the economic, environmental and social impacts. In addition, the study provides some key measures and recommendations for organizations to adopt a sustainable supply chain operation. The findings were developed and evaluated based on journal readings, literature review studies, textbooks and articles. The unique synergies between sustainable supply chain versus traditional logistical and supply chain practices have been instrumental by incorporating the triple-bottom line theory within the organization's logistics and supply chain operation. Companies must continually adapt to change and anticipate unforeseeable current and future challenges. Sustainability will not only support organizations to sustain their supply chain operations, but they will be able to further sustain the world's business environment for better living and economic prosperity.

II. Introduction and Statement of the Problem

Over the last few decades, the world has changed dramatically. We have experienced a tremendous change in various areas of sustainable supply chain management, such as in distribution, manufacturing, purchasing and transportation. These changes have brought about challenges in the way new products are designed, produced and distributed to customers and in the way companies and their relationships with suppliers and customers are managed (Wisner, Leong, and Tan, 2005). Companies are forced to find innovative ways to achieve sustainable supply chain performance due to a growing demand by consumers for environmentally and socially sustainable products.

Sustainability has been the new hype or buzzword for most companies, and it has been a central theme in supply chain management. The implementation of sustainability in the supply chain has become a future trend. There are significant payoffs and rewards when improving a company's sustainability. However, there are challenges encountered when implementing sustainability. One of the biggest challenges to sustainability is its rise to prominence across every aspect of business and society (Christopher, 2012). In the past, companies might have felt environmental issues were major problems for politicians and consumers (Sanders, 2012). Today, most companies are starting to realize that global supply chains are exposed to varying levels of environmental regulation and compliance issues, and the possibility of climate change through global warming (Sanders, 2012). These growing concerns have led to a focus on how human and economic activity adversely impact the long-term sustainability of the planet (Christopher, 2012).

Companies will need to change their supply chain management practices toward more efficient resource use to achieve sustainability. According to Sanders (2012), "Sustainability can be defined as meeting present needs without compromising the ability of future generations to

meet their own needs” (p. 376). The term sustainability is a broad concept with numerous applications. The concept of sustainability involves social and environmental concerns which recognize the needs of everyone, protecting the environment, and conserving the natural resources (Sanders, 2012). Showing responsibility for people and the environment is a condition for doing good business. For instance, a company that believes in sustainability must act to have a positive impact on people and limited resources of our planet to ensure long-term profitability. Taking social responsibility is an integrated part of the way a company conducts business. This means a company must take responsibility throughout the life-cycle of each product. Basically, it starts at the drawing table and only ends when a product has been responsibly taken care of at the end of its life-cycle.

The concept of sustainability has been introduced in many fields, and it has become a primary focus and concern for governments, organizations, companies, communities, as well as individuals (Rahim, Fernando, and Saad, 2016). The planet has witnessed increasing and alarming problems with the environment such as climate change through global warming, greenhouse effect, natural disasters, disappearing rainforests, overpopulation, air and water pollution and drought. All of these effects have ultimately led to greater awareness on how people, business, and economic activity could have the potential to adversely affect the long-term sustainability of the planet.

Furthermore, Al-Odeh and Smallwood (2012) assert that companies should establish and implement environmental strategies in their supply chain management activities in order to improve their business and environmental operations. A sustainable supply chain management is a vital business strategy that manages and supports the supply chain activities with regards to the social, economic, and environmental issues that will enhance the long-term economic goals of an

organization and its supply chains (Al-Odeh and Smallwood, 2012). To achieve socially and environmentally sustainable performance, companies should be fully aware of the associated costs and risks that surround their actions. If they do not, companies could face severe consequences that will more likely end up paying a high price for failing. For example, an extreme drop in stock value and negative shareholder reactions are all potentially ruinous consequences for the company itself, as well as the social and environmental impact. To avoid these negative consequences, companies must pay utmost attention to effective leadership and communication, and the responsiveness to their stakeholders such as government officials and local communities (Sanders, 2012).

Because the economic environment is continuously changing, many companies must act quickly and adapt to change (Muthukrishnan and Sullivan, 2012). Companies expanding their supply chains globally must understand the potential costs and risks associated with the future challenges of global trade, green initiatives and their supply chain responsiveness (Muthukrishnan and Sullivan, 2012). Not only should businesses find ways to reduce costs across their supply chain, they must position themselves to capture new market opportunities (Wisner, et al., 2005). Businesses and military operations must continuously be innovative and differentiate themselves from the competition and become proficient at managing social, political and geographical challenges (Muthukrishnan, et. al., 2012). In today's global market economy, companies must understand and anticipate the future challenges of managing their sustainable supply chain network. This may require a new approach to management decision making. Companies integrating environmental and sustainable practices in their supply chain management activities will allow them to achieve many advantages and rewards.

Companies have significant efforts placed on building long-term, mutually beneficial relationships with suppliers and customers, as well as sharing ideas and information, and listening carefully to customers with the goal of continually satisfying their needs (Wisner, et. al., 2005). It is crucial for companies to integrate suppliers and incorporate customers in a participative decision-making process. Companies that have successfully met their customers' needs gain the following: supply chains became formidable competitive entities, customers receive what they want and continue to return (Wisner, et. al., 2005). All of the companies along the supply chain benefitted.

Purpose of the Study and Scope

The primary purpose of this research is to explore and examine the challenges in sustainable supply management, develop sustainable supply chains activities, identify best practices to work on greening supply chains, and provide recommendations for companies to follow sustainable operations. In order for companies to implement a sustainability strategy in their supply chain operations, the logistics function must play a key role. For this reason, companies are able to determine the magnitude of the costs involved, identify and eliminate inefficiencies and reduce the carbon footprint (Dey, LaGuardia and Srinivasan, 2011). Successful companies are primarily the ones that integrate environmental strategies across their supply chain activities.

There are significant payoffs and benefits that come with improving a company's sustainability performance (Sanders, 2012). A company with a sustainability effort can receive financial payoffs that include increased revenue and sales, as well as reduced administrative costs (Sanders, 2012). Improved efficiency to any part of the supply chain produces better return

on investment. In addition, sustainability provides new business opportunities which include customer-related payoffs as market share increases (Sanders, 2012).

The process of how supply chains are managed has been increasingly seen as part of the social and environmental solution. Companies not only focus on the social and environmental impact of their products and services, but also their associated supply chains. For instance, Starbucks has made a point of encouraging foreign coffee suppliers to conform to its guidelines (Wisner, et. al., 2005). Such purchasing guidelines must follow environmental and quality standards, for example, the coffee has been grown and processed by the suppliers in a sustainable way. Sustainability must be built into a company's business model, and it should be aligned with their mission and culture (Wisner, et. al., 2005).

Companies are always seeking to improve production at minimum cost, and at the same time, producing products that are of high-quality standards. In addition, more companies are now focusing on the "go green" initiatives in their supply chains. For instance, Kodak takes back and recycles over 85 percent of their parts in their single-use cameras (Wisner, et. al., 2005). Another example, Xerox saves hundreds of millions of dollars each year by reusing and remanufacturing copy machine equipment and parts (Wisner, et. al., 2005). Ford is working towards the goal to economically design and manufacture vehicles that come close to being totally recyclable (Wisner, et. al., 2005). Moreover, companies continue to collaborate with their supply chain partners to develop environmental guidelines and innovative approaches to overcome environmental challenges (Wharton, 2012). By collaborating with their partners, companies can reduce costs, manage risk better, create new sources of revenue and improve the value of their products (Wharton, 2012).

Furthermore, consumers are becoming more aware of where the products originally come from, how they are manufactured and produced and how environmental legislation impacts the products they purchase (Wisner, et. al., 2005). Companies should develop a green supply chain strategy that involves collecting and analyzing environmental regulations and customer surveys from each of the supply chain locations (Wisner, et. al., 2005). The strategy should include relevant environmental issues within the procurement, engineering and quality departments at each firm (Wisner, et. al., 2005). As green supply chain policies are implemented, companies must communicate them to their customers and suppliers, as well as managing the program to assure compliance with the policies (Wisner, et. al., 2005).

Companies should implement sustainability in their supply chains. According to Sanders (2012), “There are at least four reasons: 1) Legal compliance with government regulations; 2) Maintain positive community relations; 3) Increase revenue and 4) Satisfy moral obligations” (p. 382). Failure to adopt sustainability practices can lead to regulatory fines which could affect operating costs and create negative publicity or even tarnish a company’s reputation. For example, a transport company wants to take a leading role in a low carbon society and to reduce carbon emissions from all aspects of its business operations. If a company does not make any effort or progress by reducing the emissions from its own operations, then such effects of pollutions can jeopardize the integrity of ecosystems or human health (Sanders, 2012). It is crucial for supply chain managers to identify sustainability issues when analyzing their business operations and their environmental effects (Sanders, 2012). The company should examine and analyze both inputs and outputs of each stage of the supply chain. The input requires understanding all aspects of resource consumption from raw materials to human resources (Sanders, 2012). A sustainable supply chain avoids consuming so much of a resource that future

operations are compromised (Sanders, 2012). The output involves all aspects of pollutant emissions, so that the health of neighboring ecosystems or populations is not put in jeopardy (Sanders, 2012).

Significance and Organization of the Research

The primary objective of this paper is to outline the results of a literature review on the field of green and sustainable supply chain management, as well as to provide a conceptual framework related to research. Overall, the research will present the challenges and future outlook in the area of green and sustainable supply chain management. It will also examine numerous compelling issues facing the sustainable supply chain, and address research identified through previous studies. As competition among supply chain intensifies and demand for varied product and services continues, companies will need to become adept at improving the performance of their sustainable supply chain activities to maintain profitability and future growth. Moreover, the sustainable supply chain management activities will be discussed in the literature review showing how each activity is related to a sustainability. Social, economic, and environmental issues will be identified and discussed. Lastly, the future outlook and trends of sustainable supply chain management will be addressed.

III. Literature Review

The concept of sustainability is strategic and an integrated element of companies' operations and supply chain networks. Seurig and Muller (2008) define sustainability as "a development that meets the needs of the present without compromising the future generations to meet their own needs" (p. 1700). Sustainability requires a balanced commitment and approach to humanity and profitability. An important concept and central theme of this paper is sustainable supply chain management. To understand the meaning in a broader sense, Suering

and Muller (2008) defined sustainable supply chain management, “the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements” (p. 1700). Companies must be fully aware of the social and environmental criteria that must be met by its supply chain partners in order to sustain the supply chain, while they maintain competitiveness through meeting customer needs and related economic criteria (Seurig and Muller, 2008). In retrospect, companies must always keep in mind that the principle of sustainability is not just for the sake of future developments or well-being of society, but for the present purposes as well.

It can be argued that the supply chain starts on the drawing board. Essentially, this means that the decision-making process generally starts in the design of the product thus having a huge impact throughout the supply chain. In other words, companies will need to further look at sustainability across the entire product life cycle, starting from product design through the end-of-life disposal. Companies today will need to be innovative in their product design and packaging in a way that the product can be recycled or remanufactured. A sustainable product design will more likely lead up to achieving a successful recycling process (Al-Odeh and Smallwood, 2012). This activity develops sustainable design strategies that will significantly improve their social and environmental sustainability performance. Not all companies are fully aware that some of their components could be harmful or detrimental to the environment. Companies should choose their raw materials according to environmental standards and focus more attention to recycling (Al-Odeh and Smallwood, 2012). There have been more and more companies actively seeking to reduce the waste in landfills and reduce the amount of packaging

material that is being used. Many companies today are known for their green policies or sustainability measures. For instance, the zero-waste philosophy helps reduce pollution by reducing the waste that goes to landfills and incinerators. A small improvement can have significant environmental impact and cost savings, companies can gain customers' respect which can all lead to better products and services.

According to Al-Odeh and Smallwood (2012), "Sustainable transportation is another important element in developing effective sustainable supply chain management. Many factors including fuel sources, type of transport, infrastructure, and operational and management practices should be considered in developing environmentally-friendly transportation systems" (p. 86). Another initiative of achieving sustainable transportation is the term called reverse logistics. Elmas and Erdogmus (2011) define reverse logistics as "The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal" (p. 162). This process involves bringing products back normally at the end-of-life cycle, but also include bring a product returned for recall and repair. Companies will need to pay close attention to the challenges and the stringent regulations particularly on product disposal, and reuse or recycling requirements. This growing realization has been considered a top priority in many organizations today in order to avoid high costs being incurred to their business.

Al-Odeh and Smallwood (2012) believe that sustainable purchasing plays a crucial role in sustainable supply chain management. Sustainable purchasing assists organizations in reducing the source of pollution and waste by using various strategies. Such strategies include using biodegradable packaging, dumping, recycling, scrapping or sorting (Al-Odeh and Smallwood,

2012). Sustainable purchasing strategy is simply using environmental raw materials which could lead to reducing waste and hazardous materials (Al-Odeh, et. al., 2012). Companies select the right suppliers that follow sustainability practices, and also, they must find ways to monitor their compliance.

Sustainable marketing is a key component in developing and implementing a sustainable supply chain management. Al-Odeh and Smallwood (2012) encourage companies to maintain a biological balance, and pay close attention to the environmental protection to achieve a sustainable marketing (p. 86). Companies benefit from costs savings and enhanced relationships with their customers, suppliers and other partners (Al-Odeh and Smallwood, 2012). Furthermore, companies should advertise their products with the “green” features. The sustainable marketing features are generally displayed through the product labels or the product itself. For example, customers can identify the product with a symbol of recycled materials or a packaging is biodegradable. With the "green features," customers are informed about the ingredients of the product which may be harmful or detrimental to the health or environment, and ensure the product has entered into fair partnerships with international laborers (Sanders, 2012).

Challenges in Logistics and Green Initiatives in the Transportation Industry

The logistics function plays a critical role in organization’s supply chain operations. According to a research review titled *Building Sustainability in Logistics Operations: A Research Agenda*, “Billions of products are in transit every day, transportation requires a large amount of fossil fuels. The burning of these fossil fuels causes GHG emissions, such as carbon dioxide that can have a major negative impact on environment and individual health” (p. 1245). The supply chain manager must make good and sound decisions about their mode of transportation they use to transport their products (Dey, LaGuardia, and Srinivasan, 2011). To

reduce the environmental impact, companies should put more focus on clean vehicle technology through business practices by improving the efficiency of vehicles in their daily operations and switching to hybrid or alternative fuel technology sources (Dey, et. al., 2011). Since this has become an inescapable obligation, companies will need to find ways to adopt and implement a long-term sustainable transport strategy that will help reduce their carbon footprint.

The world economy and global trade will more likely continue to grow resulting in increased demand for transport and distribution. According to a journal article on sustainability, “Currently, 50% of the world’s population lives in urban and metropolitan areas, and in Europe this share reaches 70%. In 2050, the urban population worldwide is expected to have risen to 69%, while in Europe and the USA it could be 85% and 91%, respectively” (Rosso and Comi, 2016). Traffic congestion and infrastructure issues are related to the impacted population. The ports are facing challenges due to container vessels waiting to be unloaded and transported while railways are running into bottlenecks. All of these infrastructure problems will certainly contribute to the carbon emissions, as well as fueling more cost to suppliers and customers alike. It is imperative for supply chain managers to seek out and reduce as much as possible the environmental impact associated with such growth.

Another challenge faced in supply chain logistics is the practice of just-in-time (JIT). More customers will continue to demand JIT deliveries from their suppliers. The widespread adoption of JIT has led to sustainability concerns due to the increasing number of freight vehicles delivering in the residential areas. The JIT philosophy today involves smaller but quicker and more frequent movements of goods and services. According to Russo and Comi (2016), “The rapid growth of urban freight transportation due to changes that are occurring in the supply chain (e.g., just-in-time, home deliveries, and e-shopping) produces more deliveries and

more light goods vehicles in residential areas” (p. 2). Supply chain managers will need to find a solution that enables them to benefit JIT without leading to potential environmental disadvantages (Christopher, 2012). It is inevitable that these frequent movements of low-value products traveling around the world are unnecessary and not sustainable in the long term.

Environmental concerns in the maritime ports are continuously evolving. There has been alarming and growing traffic concentration at certain ports, since there are fewer existing ports to handle larger vessels. According to a maritime literature, “Shipping represents one of the largest, most difficult to regulate and control source of air and water pollution in the world” (Sislian, Jaegler, and Cariou, 2015, p 2). Sislian, et. al, (2015) conducted studies of two interrelated concepts: port sustainability and Ocean’s Carrier Network Problem (OCNP). Sislian et. al. (2015) confirmed the importance of incorporating the sustainability concept in relation to OCNP to identify the sustainability indicators to optimize the maritime operation. The OCNP is greatly impacted by environmental changes and environment protection (Sislian, et. al., 2015). Nevertheless, the relationship between port sustainability and OCNP should be taken into consideration because there are different variables of port sustainability which could affect the optimization of the OCNP (Sislian, et. al, 2015). Logistics managers will certainly need to find other possible solutions and seek efficiencies of how they transport their goods and store freight to reduce the environmental impact of their activities. In order to reduce environmental impacts, companies will need to optimize their distribution networks requiring fewer trips and lower overall delivery costs. Another option is to optimize and consolidate, if possible, the transport routes to reduce the number of loads overall. Whether or not ocean carriers are sustainable from an environmental perspective going forward is an important question to ponder on.

The literature review presented recent developments in environmental sustainability issues in the logistics service industry (Evangelista, Santoro and Thomas, 2018). The environmental concerns have been stringent in the logistics service sector (Evangelista, et. al., 2018). Transport and logistics activities have been major contributors to Greenhouse Gas (GHG) emissions (Evangelista, et. al., 2018). The demand for moving goods will continue to grow, and global warming will continue to rise. The need to reduce the negative effect on the environment has become a main priority for companies operating in supply chains (Evangelista, et. al., 2018). In order to reduce environmental impact, companies will need to coordinate supplier shipments. Doing so will additionally allow them to consolidate freight costs and have a better negotiation position for better rates.

Socio-Economic and Environmental Implications

The triple bottom line philosophy encompasses a broad idea. Sustainability essentially deals with the long-term viability and continuity of the business, in addition to the contribution for the future well-being of society (Christopher, 2011). Supply chain strategies that benefit a wider environment are more likely to involve their business in cost-savings in the long run as a result of a better use of their resources (Christopher, 2011). For instance, an organization that applies green supply chain strategy will utilize transport capacity more efficiently through better scheduling and routing. As the environmental impact of transport has been reduced, so has the cost.

According to Dey, LaGuardia and Srinivasan (2016), “Firms have a great social responsibility mainly with respect to use of non-renewable sources of energy and materials, and also with respect to how their products are used and handled once they reach the end of their life cycles” (p. 1237). Supply chain managers will need to follow sustainable practices in their

overall and logistics operations. Sanders (2012) has identified two types of sustainable practices: social sustainability and environmental sustainability (p. 377). Sanders (2012) points out the two concepts are interconnected; environmental sustainability is “the preservation of diverse biological systems that remain productive over time, while social sustainability involves maintaining societies’ long-term well-being” (p. 377). The primary differences between the two concepts are environmental sustainability involves with either pollution or resource depletion issues, whereas social sustainability deals with either economic or population issues (Sanders, 2012).

Over the years, companies have faced public scrutiny and pressure from the government to adopt an environmental sustainability strategy in their supply chain. Nevertheless, companies that do employ environmental sustainability in their supply chain tend to reap greater benefits such as an increased market share, improved reputation, improved innovative capacity, and better compliance with legislation (Jugend and Figueiredo, 2017).

IV. Challenges and Trends of Sustainability

There is an increased presence and growing evidence of organizations taking a practical approach to integrate sustainability within their daily supply chain operations. Companies that take the initiatives in developing innovative supply chain strategies and integrating sustainability within their operations are more likely to stay ahead on supply chain performance over a long period of time (Sroufe and Melnyk, 2017). Adopting principles of sustainability throughout the supply chain operations are no simple task and do not happen over-night. Therefore, supply chain managers must carefully decide on how to implement sustainability in their products and services, and promote environmental practices.

Internal and External Pressures from Stakeholders

Companies have faced numerous barriers and limitations to their sustainable initiatives resulting in some challenges for proper integration of a sustainable supply chain solutions (Alzawawi, 2014). There are various drivers that are causing some roadblocks to the implementation of specific sustainable practices. Saeed, Waseek and Kersten (2017) identified regulatory pressures and market pressures as the most commonly cited drivers. Drivers of sustainable supply chain management are known as influencers or motivators that encourage organizations towards achieving sustainability in their operations (Saeed, et. al., 2017). These drivers are considered internal pressures that happen within the organization or external pressures which include aspects outside of the organization, but have a great influence on the organization's internal activities (Alzawawi, 2014). Furthermore, Alzawawi introduced several external drivers, such as government regulations, customers, competitors, suppliers and society. These external drivers have greatly influenced organizations to include social and environmental practices into their daily supply chain operations. According to Alzawawi (2014), "Organizations are obliged to adopt transparency after all those pressures to respond to investors and stakeholders' expectations and to satisfy the legislative and regulatory compliance." Many organizations are now seeing external drivers as a requirement to assure all of their products and services are environmentally sustainable.

The external drivers play an important element in the integration of sustainability into the supply chain processes. For example, governments have been influential through policy and regulations which enforced tax cuts or reductions for organizations that employ green initiatives in their supply chain operations. Alzawawi addressed that it is critical for companies to be on board and respond to the government pressures and regulations due to the growing and recent trend towards achieving sustainability in the United States and Europe. Failure to comply with

governmental environmental regulation may result to high penalties and fines. Organizations that are not in compliance can potentially lead to lost productivity, bad publicity and even plant closure. As a result, this could have some environmental and human health consequences.

Not only do customers play an important aspect in any businesses, but they are becoming increasingly aware of the environmental impact of purchasing goods that are sourced over long distances. Customers are considered external drivers that primarily give existence to organizations. Companies must consistently serve and provide customers good quality product to stay in operation. Alzawawi (2014) has confirmed that companies tend to give much attention to achieving what their customers' demand to ensure customer satisfaction. Her statement proves relevant because customer demands have a positive influence on the environment and market trends. To attain competitive advantage and increase market share, it is important for companies to integrate sustainability into their supply chain management activities (Alzawawi, 2014).

External drivers arise from a broad range of stakeholders, including competitors and suppliers. According to Alzawawi (2014), "To become more alert to customers' needs, companies must achieve competitive advantages for themselves. The integration of sustainability in supply chain activities was formed mainly to improve competitiveness among rivals." A sustainable supply chain can enhance competitive advantage for a company by offering a collaboration of social and environmental awareness. Furthermore, collaboration with suppliers is another driving force for the integration of sustainability into the supply chain processes (Alzawawi, 2014). The integration with suppliers generally deals with barriers including organizational culture, information systems compatibility, and lack of top management commitment (Kim and Chai, 2017). Suppliers have played a critical role when it comes to

integration of sustainable solutions because they provide valuable insights and ideas employed in implementing environmental projects (Alzawawi, 2014).

Moreover, people and society are considered external pressures due to their growing demands and concerns when it comes to their usage of environmentally products (Alzawawi, 2014). Pressures from society have been high, and companies have been advised to adopt green supply chain practices to show that they have a sense of social and environmental responsibility. Companies should also consider the welfare of society and the impact organizations have on the local communities because all people should at least have a desire to fulfill their moral obligation and motivate sustainability.

Obstacles for Sustainable Supply Chain

Aside from the internal and external pressures, companies have also faced obstacles to integrate sustainability within their daily supply chain operations. Internal obstacles are considered resource costs, lack of knowledge, lack of training, lack of integration of information technology (IT) systems, and poor organizational structure (Alzawawi, 2014). Today, consumers are endlessly seeking lower prices; however, the resource costs incurred to integrate sustainability into the supply chain processes are generally expensive and not reasonable enough to offer low selling price to their customers. According to Alzawawi (2014), “An investigation of green purchasing practices in US firms revealed that resource cost concerns are the most serious obstacle for taking environmental factors into account in the purchasing process.” Lack of knowledge is another obstacle for integrating a sustainable supply chain approach. Alzawawi (2014) indicated that employees should be well informed and aware of the benefits concerning the importance of integrating sustainability into the supply chain management. In addition, lack of training of employees can be another major hindrance (Alzawawi, 2014). In order to achieve

a green supply chain approach to their businesses, employees should be highly motivated and well trained prior to being introduced to a whole new concept to adopt. Furthermore, Alzawawi (2014) stated that the integration of information technology (IT) system into the green supply chain approach is a major requirement for the concept to be adopted successfully.

The lack of integration of IT systems is another obstacle for organizations when incorporating sustainability practices. Companies need to combine programs and sustainability actions to work, and run smoother and easier by creating an effective supply chain planning implementation (Alzawawi, 2014). Lastly, the lack of supportive corporate structures or lack of top management commitment has been considered an internal barrier for establishing a sustainable supply chain approach. Top management commitment is vital to a company's success for green initiatives or any sustainability project in supply chain. Managers need to clearly and effectively communicate to employees that sustainability is a critical element of the core value of the company. Tay, Rahman, Aziz and Sidek (2015) also addressed that top management is critical, and should be fully committed to service excellence or any quality improvement efforts would be doomed to failure from the start.

On the other hand, external obstacles involve aspects outside the organization but have an influence on the organizations' internal activities (Alzawawi, 2014). These external obstacles include regulations, poor supplier commitment, competition and uncertainty, customers' unawareness of sustainable green products, and lack of green practitioners (Alzawawi, 2014). All of these obstacles have served as major limitations or drawbacks for implementing a sustainable supply chain. Failure to adopt sustainable practices could result in fines and penalties, which could negatively impact the firm's financial bottom line by affecting their operating costs (Sanders, 2012). This failure would not only make companies noncompliant, but

they could be more prone to environmental or human health damages, and as a result could tarnish the company's reputation.

The Impact of Congestion

One of the major concerns when implementing a sustainable supply chain solution has been traffic congestion and the related infrastructure issues. Whether the country is developed or not, the current logistics infrastructure has not kept up with the pace with the level of economic activity. The production of goods has dramatically risen which has led to billions of products in transit every day. Transportation of goods are essential and require a large amount of fossil fuel to be used. The burning of fossil fuels cause GHG (greenhouse gas) emissions, such as carbon dioxide which leads to a negative impact on our environment and individual health (Dey, et. al., 2011). Nevertheless, the geographical length of supply chains has increased immensely, along with the environmental issues of fuel use and emissions (Grant, Trautrim and Wong, 2017). A lack of prior investment and funding has resulted in an alarming shortage of capacity on roads, ports and railways. This problem also has created traffic gridlock on motorways and caused container vessels to wait before being unloaded at ports. Moreover, bottlenecks on the railways have been a common problem in many countries, as well as increased carbon emissions. As the rise of economic growth and development continues, traffic congestion is more likely to affect the logistics and supply chain management for many years to come.

Increased Global Trade

The forces of globalization and expanding world markets are prevalent in today's competitive and globalized economy. According to Aziz, Jaafar and Tajuddin (2015), "In a globalized world, rapid development of industry has contributed towards the economic growth." Economic growth and improved wealth of nations comes with the emergence of new markets

and greater flow of transporting products across borders which expands access to markets worldwide. Economic growth and development in transport are closely related because as economies grow, more transport is needed to move the freight that economic growth inevitably generates (Blanchard, 2010). Supply chain managers must find ways to expand the global infrastructure to reduce the congestion affecting transport networks.

Offshore manufacturing has increased exponentially, further adding to congestion. The trend to low-cost country manufacturing has meant that supply chains are extended and products travel much further (Christopher, 2011). The growth of offshore manufacturing has resulted in increased security measures particularly for containers, which have added delays at both the points of origin and destination (Christopher, 2011).

Food Waste as a Global Issue

Another challenge to creating a more sustainable supply chain is the massive amount of food waste around the world. According to the Food and Agriculture Organization (FAO), “We waste approximately one-third of the food produced for human consumption which amounts to over 1.3 billion ton a year globally (Derqui, Fayos and Fernandez, 2016).” The food industry must find the best solutions to minimize the environmental impact by reducing food waste. The environmental effects contribute to the use of natural resources such as land, water and energy across the food supply chain. The excessive use of all these resources could have negative environmental impacts (Derqui, et. al., 2016). Supply chain managers must take the proactive approach on the social and environmental issues because “food waste arises as a problem that must be tackled appropriately to guarantee sustainable growth on our planet (Derqui, et. al., 2016).”

The Rise of E-Commerce

The growth of e-commerce has risen rapidly around the world. According to Grant, Trautrim and Wong (2017), “The retail e-commerce sales for the United States have increased more than five-fold between 2002 and 2014.” This increase of e-commerce sales has significant relevance for the logistics and supply chain management sector (Grant, et. al., 2017). It has imposed enormous amount of pressure and challenges for supply chain managers to ensure every parcel delivery is expedited and punctual. In addition, the development of omnichannel retailing, consumer’s entire online shopping experience linked to sales and fulfillment, must be seamlessly integrated across all channels of interactions (Grant, et. al., 2017). All of these challenges have an impact on sustainability which contributes to the reduction of natural resources such as oil, and contributes to increasing emissions (Grabara, 2013).

The Widespread Adoption of Just-In-Time Practices

The lean approach of just-in-time (JIT) practices have made a significant impact in a company’s supply chain management strategy (Grant, et. al., 2017). With a consequent impact on the carbon footprint, the JIT philosophy resulted in smaller and more frequent movements of products and materials. JIT has contributed to increased shipments and movements in short time-frames. As more customers demand JIT deliveries from their suppliers, it is likely that shipment sizes are reduced while delivery frequencies increase. Companies must think hard to find alternative strategies to reduce the supply chain’s carbon footprint. In addition, supply chain managers must find a feasible solution that enables the benefits of JIT to be gained without jeopardizing the environment (Christopher, 2011). This has been a major challenge because companies practicing JIT philosophy in their supply chain have been more energy intensive than ever before.

Outsourced Logistics

Evangelista, Santoro and Thomas (2018) argued that there have been relatively few literature reviews in the area of environmental sustainability in third-party logistics service providers (3PL). Most research studies on logistics and sustainable supply chain have focused primarily on the manufacturing sector, rather than the environmental sustainability in the logistics service providers (Evangelista, et. al., 2018). Despite the growing environmental problems of government regulators' pressures, scarcity of energy resources and the increase of greenhouse gas emissions (GHG), companies will need to find solutions and adopt measures to reduce the negative environmental impact of their own logistics activities (Evangelista, et. al., 2018). It has become a top priority for most companies to find ways to reduce the negative environmental impact on the environment. In order to protect the company's brand reputation, supply chain managers will need to seek the best tool to monitor their supplier or service providers' performances. For example, Mattel Corporation, a toy manufacturing company, failed to monitor the quality of their suppliers' materials (Dey, et. al., 2011). As a result, Mattel suffered massive financial loss, recalled over 14 million of toys and was forced to pay \$2.3 million in civil penalties (Dey, et., al., 2011). Unfortunately, Mattel discovered that their suppliers were using excessive levels of lead in their toy surface paints without Mattel's agreement (Dey, et. al., 2011). This example shows what companies face in managing their global supply chains and their needing to take full responsibility of their supplier's negligence. It is imperative for Mattel not only to keep pace with the strict regulation but also be more proactive on social and environmental issues. They must develop sustainable operations and work closely with their suppliers to develop eco-friendly raw materials and find the most efficient ways to reduce waste.

Logistics and Supply Chain Risks

Aside from the social, ethical and environmental pressures, companies have faced greater challenges, as well as various types of risks associated in their global supply chain. One major risk facing logistics and supply chain functions is supply disruption risk. Kim and Chai (2017) define “supply disruption as unknown events that hinder the flow of materials in the supply chain, thereby leading to various negative effects on the supply chain.” Essentially, it is an unforeseen event that interferes with the normal flow of goods and materials within the supply chain (Grant, et. al., 2017). To help mitigate supply disruption risk, companies must identify, assess and employ continuous improvement process within their global supply chains (Kim, et. al., 2017). Failure to mitigate disruption in logistics and supply chain operations, will not only cause loss of productivity and revenue, but, potentially, loss of human lives. According to Grant, et. al., (2017), “173 people were killed in the Tianjin explosion in 2015.” The explosion additionally destroyed hundreds of homes and businesses in the area. A significant amount of goods stored at and around the port were destroyed in the nearby port as well (Mortimer, 2016). The massive explosion at a Tianjin factory in Hebei province, China, is thought to have been caused by the illegal storage of over 11,000 tons of hazardous and combustible chemicals (Mortimer, 2016). While supply chain disruptions often incur additional cost, the true monetary cost can be difficult to assess (Grant, et. al., 2017). It is significant for supply chain managers to identify the risks and their monetary impact because any disruptions in the global supply chain could affect their operational, financial and supply chain performances. Analyzing the risks will allow companies to make well informed decisions with respect to the environment, human health and safety and most of all, their company’s financial bottom line.

As companies adopt sustainability initiatives in their global supply chains, they will continue to face greater challenges from several risk factors. Global sourcing is an effective way

to expand market access to cheaper materials and labour. However, operating a global distribution channel is more likely to increase the level of supply chain risks (Mand, Singh and Singh, 2013). Such risks associated from outside parties of a supply chain are supply risks which are caused by natural disaster, and cyber breach or attack (Grant., et. al., 2017). Supply risks involve disruption of supply inventory and schedules which can lead to the inability to supply customers according to promised delivery dates. In contrast to supply risks, demand risks involve disruption of the physical distribution of finished goods (Grant, et. al., 2017). For example, truck drivers on strike can lead to such disturbance or a major fire incident in the warehouse could disrupt the timely outbound logistics delivery (Mand, et. al., 2013). A variation in demand can mean a higher cost of inventory. Furthermore, security risks involve information systems security, freight breaches and vandalism (Mand, et. al., 2013). For example, this could lead to the loss of sensitive data and disruption production. All of these risks cannot be avoided and supply chain managers must carefully assess which risk factors have the most impact in their supply chain operations, and plan a risk mitigation strategy to prevent any negative effects on the global supply chain. The supply chain manager must understand the bigger scope and know how their actions can impact the risk to the overall global supply chain activities.

V. Sustainability in Practice

Most organizations require a sustainable business practice to assess the major negative consequences from the current and future economic trends (Klumpp, 2018). After evaluating the challenges in implementing the discourse of sustainable practices, companies need to further understand the foundation that underlie the concept of sustainability. A sustainable supply chain operation can provide a useful framework for exploring greater business opportunities to

improve sustainability while meeting the needs of the present generation without compromising the future ones (Abdala, Oliveira and Cezarino, 2018).

The Triple-Bottom Line Approach

Companies implementing sustainability practices throughout their supply chain operations will need to be aligned with the triple-bottom line (3BL) philosophy. The triple-bottom line (3BL) concept encompasses a wider notion that institutes the environmental, economic, and social goals which must be met simultaneously while delivering value and financial gains (Alhaddi, 2015). This essentially means that sustainability ensures the long-term viability and continuity of the business while taking proactive measures and responsibility for current and future living conditions (Abubakar, 2014).

The objective of a sustainable supply chain enables a company to meet and satisfy the triple-bottom line (3BL) approach. This can impact business strategies and operations (Abdala, et.al., 2018). Each three key areas or dimensions (i.e. environment, economy and society) represent a wider impact on sustainability, and a company's ability to remain viable and profitable (Abdala, et. al., 2018). Abdala, et. al., (2018) pointed out that dimensions are directly related and interconnected to sustainable development. For instance, from an economic point of view, the economy has an effect on people's livelihoods and financial security. In the social perspective organizations are concerned about the social welfare, health and community safety, occupational health and safety of employees, as well as improvement of working and living conditions, proper wages, better prepared workplace and leisure time between shifts (Abdala, et. al., 2018). From an environmental aspect, the organizations need to adopt an environmentally responsible attitude due to the growing problem of pollution, climate change and the depletion of scarce resources in the world (Abdala, et. al., 2018). The triple-bottom (3BL) approach related

to the economic, social and environmental objectives has been a significant factor in achieving a sustainable supply chain. The activities of sustainable supply chain have been recognized as a coordinated and integrated network of operations. Implementing sustainable business practices and initiatives must achieve all three dimensions (i.e. social, economic and environmental goals) which stem from the customer and stakeholder requirements (Abdala, et. al., 2018).

Traditional Practices

The interest of sustainable supply chain management has evolved rapidly, and companies must adapt to the best sustainable supply chain solutions (Mejias and Pardo, 2013). However, this is not enough to just incorporate sustainable practices in their operations. Companies must also find the most feasible and cost-effective solutions to meet sustainability requirements. To understand the framework, Mejias, et. al., (2013) identify the best practices from the traditional approach of efficiency in the supply chain management to the current context of sustainability. Mejias, et. al., (2013) provide a comprehensive literature review that examines the traditional and sustainable best practices from a holistic point of view, integrating the triple-bottom line (3BL) throughout the supply chain logistic activities.

Sustainable Practices

From an economic efficiency perspective, traditional practices include quality and environmental systems implementation, and coordination between buying and supplying in organizations (Mejias, et. al., 2013). On the other hand, sustainable practices include reporting on different standards, such as policies and codes of conduct of an organization, and the collaborative behaviors with customers and suppliers (Mejias, et. al., 2013). Sustainable practices are more collaborative and long-term with value-added benefits for companies. By following a collaborative supply chain management, Mohsen and Sharmin Attaran (2007)

analyze “companies can dramatically improve supply chain effectiveness with demand planning, synchronized production scheduling, logistic planning and new product design” (p. 3). In addition, sustainable business practices enable suppliers to innovate, and build better customer and supplier relationships. This is a valuable approach to gain positive results because companies today have the ability to stay ahead and look forward by employing real-time systems to determine order profitability (Attaran, et. al., 2007). For example, to comply with customer demands for green products, companies now require their suppliers to perform according to the guidelines set by environmental and social standards (Seurig, et. al., 2008). The future of sustainable supply chain development involves a significant level of collaborative decision-making with all the activities along the supply chain, particularly in the areas of production, purchasing, reverse logistics, transportation and warehousing (Mejias, et. al., 2013).

Sustainable Transport and Logistics

Furthermore, companies play a vital role to reduce the environmental impact of the global supply chain, especially in the area of transport and logistics. The role creates major changes on the company’s distribution activities supporting more on-line sales with accompanying light goods vehicles in residential areas (Russo and Comi, 2016). As international trade continues to grow, more transport is needed to support the global economic growth. Consequently, the growth of transportation and more home deliveries are inevitable and will increase the emissions further. This increase is commonly known as “transport intensity” of the supply chain which deals with the energy consumption relative to transport movement and economic activity (Banister and Stead, 2002).

Moreover, the rise of e-commerce shopping, just-in-time and home deliveries of light goods have grown tremendously. Higher customer expectations in developing markets and the

trend of home delivery will substantially continue to grow in the global market. According to Aziz, Jaafar and Tajuddin (2015), “In a globalized world, rapid development of industry has contributed towards the economic growth (p. 121).” Russo, et. al. (2016) recognize that the rapid growth of urban freight transportation and supply chain activities have contributed to a threat to the environment and economy (i.e. air pollution, congestion, etc.) resulting in increased logistic costs and prices of the products. On the positive note, the sustainable development in logistics has offered tremendous product availability throughout the world, and has allowed better market accessibility that enables transport to make our modern lifestyles possible.

Kadlubek (2015) describes “sustainable transport and logistics are the effect of the process of sustainability in the sector of transport and logistics, which possess the properties of environmental awareness, economic optimality, social justification and political responsibility (p. 496).” There is a greater public awareness of the impact on human activities and the environment especially as a result of social, economic and environmental costs (Grabara, 2013). Companies need to pay close attention to public and government initiatives which may serve to increase the cost of greenhouse gas emissions. To minimize the negative impact on the ecosystems of logistics flow, companies must utilize their resources in the most efficient and environmentally friendly way to support the need to take care of the global environment (Grabara, 2013). A primary goal for supply chain sustainability should be to move toward a more sustainable future in transportation; however, companies will more likely face some challenges and encounter environmental issues in other aspects of sustainability. As the world economy continues to grow, transport and logistic services are greatly needed to support global trade and economic opportunities in the next decade.

Sustainable Warehousing

A sustainable warehouse plays a major operational role of supporting a company's supply chain strategy. To reduce the reliance on GHG-producing sources, companies must integrate energy conservation strategies in the warehouse. The layout of the warehouse and design of its operational processes connected with sustainability initiatives creates environment-friendly value supply chains. Most warehouses generally have massive structures, and their massive layout and design can consume an enormous amount of energy. To minimize the environmental effect, warehouse environmental footprints can be reduced, such as more efficient lighting, usage of low-voltage lighting, and installation of motion sensors or timers on all of their lighting systems. Additionally, warehouse managers need to set targets for reducing energy consumption, and conduct annual audits to ensure progress for a consistent and sustainable business operation.

Another green effort undertaken in the warehouse is the utilization of solar panels. Solar panels can be installed throughout the entire warehouse facility to help reduce energy consumption. For proactive measures, warehouse managers should conduct regular facility inspections and identify opportunities to upgrade doors and windows. They also should identify possible threats and repair, as necessary, any leaks from water pipes and irrigation systems within the warehouse structure. In supply chain logistics efficiency is not only restricted in the area of transportation but also in the area of warehousing. Driving out inefficiency from operational processes creates significant energy savings and monetary benefits. For example, setting up meetings with the use of video conferencing in the warehouse facility can reduce energy consumption and emissions associated with travel (Hasan, 2013). This could eventually lead to reductions in energy consumption, travel costs and travel time. Moreover, building a sustainable warehouse to optimize the distribution networks would require less trips and lower overall delivery costs. The area of green warehouse design has become a business requirement

in today's supply chain operation. The design leads to greater energy efficiency and environmentally responsible processes by reducing companies' dependence on fossil fuels (Nidumolu, Prahalad and Rangaswami, 2009).

Sustainable Product and Packaging

More companies are now shifting their business operations towards a more sustainable and environmentally friendly product (Alzawawi, 2014). To design a sustainable and eco-friendly product, companies must gain better understanding of the consumer's concerns and conduct life cycle analysis (LCA) on their products' offerings. Life cycle analysis simply documents the entire supply chain life cycle of a product (Nidumolu, et. al., 2009). The cycle starts from the raw material, then continues through production to manufacturing, distribution, transportation, use and disposal (Nidumolu, et. al., 2009). Essentially, it includes how the product will be used, serviced and disposed throughout the stages of the product's life cycle. If a product design or packaging is deemed to have negative environmental effects in the future, then it is not worth the risks to move forward with the business prospect. Companies will need to be innovative with their product design and differentiate themselves from their competitors. The main goal for developing a sustainable product is to satisfy customers and gain a competitive advantage in the global market (Seurig, et. al, 2008). Therefore, companies will have an incentive to market and sell their products as long as consumers prefer sustainable and eco-friendly products.

Hasan (2013) states that "environmentally conscious product and process design may purposely incorporate a number of concepts such as environmentally friendly raw material, design for reduced consumption of material and energy, use of cleaner technology processes to reduce solid and liquid waste and use of reverse logistics." A sustainable product generally

comes with innovative product design made of environmentally conscious raw material that can significantly improve the environmental and social sustainability performance of an organization. To implement eco-friendly product design, companies invest in an integrated environmental management system; thereby, enabling environmental improvement efforts to the supply chain (Nidumolu, et.al, 2009). Companies can improve their own business operations to ensure that the goods provided from their suppliers will increase efficiency and competitiveness. To do so, companies work collaboratively and effectively with their customers. The distribution and sales team can also design a product, reducing packaging and increasing the recyclable content in the product. Hasan (2013) confirms that there is a great benefit working with suppliers and customers. The benefit by collaborating with customers is an improved design.

Companies not only need to produce quality product that fulfill customer requirements and demands, but they also need to make significant changes in their product design and packaging to maintain compliance with health, safety and environmental legislation. Often companies are not fully aware that some of their product components can be harmful and detrimental to the environment or human health. In the past, there was less attention from companies about the amount of natural resources used and the amount of pollution being discharged during the production and usage of a product. Companies collaborated with their customers and suppliers to address the environmental impact of packaging. The companies developed programs to reduce the amount of packaging that enters the waste stream (Hasan, 2013). Product design and packaging are a major contributor to a sustainable global supply chain which has considerable effect on the environment; however, it can also open up new revenue opportunities that can benefit the company from being the first mover in a market (Hasan, 2013).

Sustainable Purchasing and Procurement

Sustainable purchasing and procurement play a crucial role to a company's sustainability efforts. Procurement activities generally occur on the supply-side practices. Companies consider sustainability issues in their purchasing decisions since much of the environmental and social impact can resonate from earlier stages in the supply chain (Grant, et. al., 2017). To support sustainability improvements in the supply chain, companies must effectively select suppliers based on their competency, as well as their technical and eco-design capability, environmental performance, and their ability to develop eco-friendly goods, but also the ability to support local company's environmental objectives (Rahim, et. al., 2013). Companies must choose the right suppliers that will commit to sustainability practices. In addition, companies should monitor and ensure their suppliers are in compliance with regulation. Suppliers must comply with the company's ethical standards, which cover employment and work place conditions, and adherence to local country laws. Abdala, et. al., (2018) suggest that the customer and supplier relationship should be collaborative with respect to continuous monitoring to adapt measures to changes involving the market and society.

Home Depot, the largest home improvement store in the United States, has been recognized as one of the world's largest suppliers of certified wood products (V. Crittenden, W. Crittenden, L. Ferrell and O. Ferrell, 2011). Unfortunately, Home Depot encountered reputational problems in the past. Environmental groups organized protests against the company because Home Depot failed to ensure that their wood did not come from endangered forests (Platts, 2004). In response, Home Depot publicly announced that their wood supplies no longer come from endangered forests, and ensured that their products sales come from responsibly managed forests or sustainable forestry. In addition, Home Depot even took the affirmative steps

to collaborate with environmental groups to protect the environment, as well as worked with their vendors to develop alternative products to reduce pressures on the world's forest resources (Platts, 2004). Home Depot's motive for implementing sustainability principles stems from the sense of moral obligation to preserve the environment, as well as reversing the loss of environmental resources (Vurro, Russo, and Constanzo, 2014). Home Depot is committed to support sustainable forestry by assuring that harvested trees will be replenished since the company depends on tree farms for supply. According to the Emerging Issues in Management, "The more companies collaborate through a strong sustainability orientation, the higher the impact on supply-chain related performance, with companies adopting a proactive attitude to sustainable supply chain management being able to benefit the most from it (Vurro, et. al., 2014)."

Reverse Logistics

The growing concern with the environment, in particular a company's utilization of resource consumption, has led to an enormous amount of waste, as well as depletion of natural resources. According to Alzawawi (2014), "Climate and environmental changes around the world have led to initiation of several environmental rules and regulations, as well as to growing consumer pressure requiring initialization and implementation of environmentally benign practices in industry (p. 1)." This effect on the business environment can cause significant public health and environmental problems around the world. Environmental-related legislation has forced companies to be responsible for their waste management. Also, waste disposal cost has increased rapidly. This is a complicated issue because manufacturers must comply with government policy and legislation on how to recover and dispose of used product while reducing the economic and environmental impact. However, companies can effectively take care of waste

in a responsible and sustainable manner through the concept of reverse logistics. Reverse logistics primarily concerns the reverse flow from consumer to manufacturer (Hansen, Larsen, Nielsen, Groth, Gregersen and Ghosh, 2018). Reverse logistics is defined as “a process by which a manufacturing company governs the return of its products, parts and materials from the consumption sites, in order to reuse them, recover their residual value, or to dispose of them (Gandolfo and Sbrana, p. 31-32).” Essentially, this means recovering the product or the return flow of process of bringing the product back mainly at the end-of-life, whether to repair, remanufacture or recycle the product.

Companies will need to understand recovery options for each type of recovered product. There are several ways to prevent waste and minimize the environmental costs of business activities through reverse logistics. The recovery options in reverse logistics include repair, remanufacturing and recycling. The option to repair is to return used products to working condition. If possible, the option to remanufacture is to bring used products up to quality standards that are comparable as those for new products. The option to recycle is to reuse the materials from used products or components. Recycling involves a process of collecting used products, separating them into categories of similar materials, and then processing them into recycled materials. Reverse logistics’ practices not only reduce waste and its effect on the environment; recovery options can lead to reduced costs, improved operational efficiency, improved customer service level and profitability, and the public image of these companies (Hansen, et. al., 2018). To gain competitive advantage and lessen the environmental impact, companies will need to further understand the management of return flows as part of their strategic and integrated business operations (Hansen, et. al., 2018).

VI. Outcome of the Study

Over the past few decades, today's society and business community have gained an increasing awareness of sustainability issues due to the negative effects of climate change, increased carbon emissions, depletion of natural resources, stricter governmental and environmental regulations. The rapid growth of environmental and social problems encouraged many consumers to be more aware of their purchasing decisions. The demand for sustainability will continue to grow, especially in economically developed and emerging countries. As the economy continues to grow, consumer spending will continue to be on the rise and influential in the global marketplace. There are more consumers today that are basing their purchasing behavior on ethical and environmental criteria. More and more businesses are shifting towards producing a sustainable and environmentally-friendly product. To embrace green practices, companies must clearly assess their sustainability objectives when analyzing their supply chain operations. In addition, companies must re-align their supply chain to become more collaborative, more cost efficient, more energy efficient and more customer-oriented focused.

Social media today plays a contributing role and influence on a consumer's health and well-being, as well as contributing to the social communities that contribute significantly to sustainable practice. For instance, social media has focused their attention on encouraging customers to support businesses with green initiatives. This pressured organizations to integrate sustainability practices into their product design and supply chain processes. The concept of sustainability associated with logistics and supply chain management activity has a major effect on every aspect of our daily lives, both today and into the future.

Millennials have become more influential in the global marketplace because they have a significant impact with their purchase decisions. According to the Journal of Business Logistics,

“Millennials are value-driven consumers, expecting good corporate citizenship from the companies with whom they interact (Castillo, Mollenkopf, Bell and Bozdogan, 2018).” The millennial generation is the largest in history, and this group continues to grow substantially worldwide (Castillo, et. al., 2018). The value-based consumption attitudes and behaviors of millennials have become commonly widespread and are taken into consideration when improving a company’s sustainable supply chain.

On the other hand, organizations face greater challenges and public scrutiny in all dimensional aspects of sustainability (i.e. economic, social and environmental). These elements are a great challenge to every business entity and management area since the ultimate objective of an organization is to generate profit (Kadlubek, 2015). Companies should recognize sustainability as an opportunity for improvement rather than a threat to the business. Furthermore, companies must maintain a society’s well-being or social sustainability to uphold the values of human life, health and safety, and the quality of life in our communities. This aspect focuses attention primarily on people and all stakeholder groups (i.e. customers, investors, suppliers and workers). Due to an alarming rate of natural resources being depleted, stakeholder groups recognize a higher need and awareness to preserve the future of our environment.

According to the Journal of Operations Management, “Managers are being challenged by multiple (and diverse) stakeholders, which have a variety of expectations and informational needs about their firms supply chains (p. 1).” Transport developers, supply chain coordinators, logistics analysts, inventory and procurement personnel, sustainability managers and executives must consider the needs and growing demands of each stakeholder when implementing sustainability practices throughout their supply chain. There are numerous reports by the media on oppressive businesses and their suppliers intended mistakes, whether the supplier’s knowingly

or unknowingly made the error (Sroufe, et. al., 2017). For example, a retail company has initiated a massive recall, and the product is made from a supplier in India. Consequently, the company discovered that the product is unsafe to use. Another example, a company's sourcing practices originated from scarce resources or deteriorating environment. The diverse demands from a wide variety of stakeholder groups must be examined prudently due to their changing and diverse issues (Gualandris, Klassen, Vachon and Kalchschmidt, 2015).

These considerations are all critical and relevant to an organization's sustainability performance. To evaluate the sustainability efforts and implement social and environmental issues in the supply chains, every stakeholder's motivation must be taken into account, and the company must fully commit to a strong environmental, health and safety record. Kadlubek (2015) reports to strengthen the existing strategy, "sustainable development amounts to the fulfillment of the expectations of the whole of stakeholders by increasingly effective production of socially desirable goods and services with simultaneous reduction in the use of natural resources and respect for the policy of the environmental protection (p. 495)." In addition, companies must carefully assess and understand each stakeholder's responsibilities throughout the supply chain process and their implications to the businesses, environment and community.

Supply chains are shifting practices due to enhanced government legislation and policy, including the collection, recovery and disposal of used products. This regulatory pressure has forced many companies to take back their products after use and search for a viable sustainable solution. Most companies today adopt sustainability initiatives to comply with government regulations and customer mandates, and promote the recovery processes of unavoidable waste materials. Because there are business challenges and roadblocks, organizations must take an

important step to clearly understand and evaluate the key issues in applying sustainable supply chain management as best practice.

Organizations can pay a high price if they do not adopt a sustainability strategy. Without a sustainability strategy, severe consequences for both the organization and the environment may result. However, the negative consequences can be prevented by effective strong leadership and communication, responsiveness to all stakeholders, and a clear policy of reducing the social and environmental risks. Organizations must also maximize their long-term profitability for the company while protecting the environment and human welfare.

Organizations have realized the significant cost-savings from energy-efficiency programs. To a lesser degree, a sustainable product has a negative impact on the natural environment. For example, a Municipal Transport Company in Poland has designed an electric-powered bus; the ride is quiet and very efficient in fuel consumption. A fascinating aspect of it being a sustainable product is the operation of the engine (Kadlubek, 2015). Kadlubek (2015) describes the operation, “When in motion and stationary, the engine does not cause any vibrations or noise, only the noise of tires and the heater blower of the interior of the bus can be heard (p. 497).” The vehicle provides comfort and easy access for passengers when getting on and off the bus, and the rollaway ramps service to the need for the disabled (Kadlubek, 2015). The electric-powered bus was exclusively designed and manufactured with a view to protect the environment and conserve energy use (Kadlubek, 2015). Yet, it is less expensive to maintain and operate than a traditional vehicle.

The movement of freight transportation is not solely responsible for the world’s environmental problem. Freight transport activities contribute significantly to the global greenhouse gas emissions (Grant, et. al., 2017). In other areas such as manufacturing and

wholesale retail companies, customers played a prominent and influential role for sustainable development. According to *Emerging Issues in Management* (2014), “A remarkable interest has been addressed to the identification of the sustainability challenges faced by firms in managing their upstream and downstream supply chain relationships (Vurro, et. al., 2015).” Companies must extend the sustainable behavior, practices and processes, along their supply chain operation toward long-term profitability to protect consumers, employees and the environment.

Sustainability has a considerable influence over the carbon footprint of the supply chain operations. Grant, et. al., (2017) confirm that “globalization has increased tremendously since the 1970s, primarily due to the development and widespread adoption of the standard shipping container, international trade liberalization, the expansion of international transport infrastructure such as ports, roadways and railroads, and production and logistics cost differentials between develop and developing countries. However, the geographical length of supply chains has increased along with the attendant environmental issues of fuel use and emissions (p. 13).” These trends assisted logistics and supply chain management activities, however, they have been detrimental from a sustainability perspective (Grant, et. al., 2017). Depletion of energy and scarcity of natural resources hindered the quality of human existence (Grant, et. al., 2017). People are now becoming more aware and concerned about the future generations and the lack of natural resources in the environment. Sustainability promotes everyone to be socially and environmentally responsible and cognizant of the depletion of our own natural resources.

Additionally, sustainability can affect various aspects of business performance and its competitive advantage. Companies tend to see regulations as a roadblock and costly to the business. Companies are convinced that they will incur additional costs rather than delivering immediate financial benefits (Nidumolu, 2009). Grant, et. al., (2017) stated, “Most managers

still see damage to the environment due to their supply chain activities as a reputational risk which could eventually reduce profitability rather than seeing that such damages will eventually make the supply chain or business unsustainable (p. 247).” Government regulations and social pressures can hold the company back from making operational and business decisions; however, it makes them a good citizen or socially responsible thus representing their corporate value (Grant, et. al., 2017). Many companies argue that the more sustainable a company becomes the more the effort it will take away their competitiveness (Nidumolu, 2009).

Sustainability can open up new revenue opportunities as it transforms the competitive business landscape with positive benefits and results. According to the Journal of Industrial and Business Management, “Other benefits achieved by companies are increased efficiency, reduced cost, improved risk management, improved service, increased sales and market share, revenue growth and reputation (Hasan, 2013).” Moreover, sustainability will motivate many more companies to rethink their products, services and business models. Improved revenue streams will enable companies to differentiate their product and improve brand image (Sroufe, 2017). Companies will be able to identify business opportunities such as expanding their customer base in the marketplace (Sroufe, 2017).

Research was conducted at Dachser, a European logistics company, to understand the relationships in the supply chain in areas of eco-friendly activities and logistics infrastructure (Lichocik and Sadowski, 2014). Dachser had utilized their natural resources, energy savings, and improved their operational efficiency throughout their terminals (Lichocik, et. al., 2014). The terminals had temperature-controlled environments that prevented the loss of cold air. The lighting systems had energy light sources that were controlled inside and outside of the facilities and offices (Lichocik, et., al., 2014). To reduce the number of vehicles used for making

deliveries, Dachser consolidated their goods for shipment in cross-docking facilities (Lichocik, et. al., 2014). Furthermore, Dachser supported their local communities and people in need by partnering in various projects (Lichocik, et. al., 2014). Dachser's performance on eco-friendly activities led to reduced input and overhead costs. A strong eco-friendly policy has actually improved Dachser's public image by emphasizing corporate social responsibility through their participation in the education system (Lichocik, et. al., 2014).

When sustainability is implemented properly, the company can attract and retain better quality and experienced employees. Improved employee relations are crucial for the business success to retain the best talent employees. As a result, this can help increase employee's productivity and morale while lessening absenteeism or turnover. According to Lichocik, et. al., (2014), "Dachser believes that its main asset is human resources and so it takes special efforts to create a sense of community and to take care of the well-being of all employees (p. 114)." Corporate social responsibility has been built into Dachser's business model as part of their daily agenda and social development.

VII. Key Developments, Recommendations and Conclusion

Key Developments

The major challenges and trends of sustainable logistics and supply chain activities have been examined over the past few decades. The current and future challenges address the significance of social and environmental sustainability issues that require immediate attention. Supply chain and logistics also have a major impact on the natural environment. With the rise of today's cognizant consumers, companies have established numerous sustainability initiatives to improve their supply chain operations. Increasingly more consumers prefer eco-friendly products that are free of toxins or have no harmful chemicals with minimum environmental

impact. A consumer's purchasing decision is not based only on price or quality, but also on the "greenness" of the product. To meet customer's expectations, companies have heavily invested time and money pursuing sustainability standards and certifications that will make their supply chains sustainable. Sroufe, et. al., (2017) states that "sustainability standards are developed to address the issues of social equity, environmental quality and economic prosperity of global production and trade practices (p. 157)." Standards are common business practice, and they can be advantageous in the form of advertising in today's business environment.

Companies can choose a set of rules or guidelines that provide metrics for assessing performance. Companies can also choose a standard that offers means for certification; a formal recognition that the organization has set certain minimum requirements (Sroufe, 2017). With top management support, standards can be used to achieve a number of significant outcomes; however, they can be leveraged for alignment with a given business model. Organizations that have successfully met sustainability standards and requirements through industry-initiated certification programs can often be viewed as more credible or trustworthy in the marketplace (Sroufe, 2017). Hence, these sustainability programs and initiatives are voluntary regulations, and they appeal primarily to the preferences of environmentally conscious consumers.

Leadership and talent are critical for developing more sustainable and high performing supply chains which will dominate the markets of tomorrow. The most effective leadership comes from a clear commitment of top management to ensure sustainability issues are addressed from the top down. As top management's vision is translated into actual performance, the organization will develop innovative solutions by adopting green initiatives and environmentally-friendly products that will reduce their overhead costs. Ultimately, the organization will end up lowering the inputs which they normally use. This process generates

additional revenues from the improvements made from the new product design and packaging. The product eventually becomes sustainable and improves social and environmental quality.

Coca Cola Company heavily invested in their sustainability goals in the area of energy conservation, sustainable packaging/recycling and water stewardship (Hasan, 2013). Their Corporate Responsibility and Sustainability (CRS) goals are to reduce their overall carbon footprint by 15% by 2020 and establish a water-sustainable operation with minimal water use (Hasan, 2013). The company has already established a water-sustainable operation in which water use will be minimized and will have less impact on the local communities in which they operate (Hasan, 2013). Contributing to the efforts of reducing packaging and the overall carbon footprint, Coca Cola Company launched its first zero-calorie sport drinks and naturally sweetened low-calorie beverage (Hasan, 2013). The company developed a sustainable operation by analyzing each link in their value chain to reduce their overhead costs and to create new products as well. Furthermore, the public perception of Coca Cola has benefited and earned Coca Cola a good reputation and public image by embracing cultural diversity. Every employee is respected regardless of race or ethnic background, and the company's workforce is a reflection of the communities in which they operate (Hasan, 2013).

Recommendations

The first and foremost recommendation, it is imperative for organizations to comply and stay ahead of international standards and government regulations (Dey, LaGuardia and Srinivasan, 2011). Logistics and supply chain managers must be proactive as opposed to reacting to government regulations when implementing sustainability initiatives throughout their global supply chain. They must fully understand the legislation framework related to product design, production and packaging (Grant, et. al., 2017). One example, the Kyoto Protocol, an

international agreement with 37 industrialized countries and the European Union for reducing the GHG emissions (Dey, et. al., 2011). Countries must meet their goals by means of reduction and also the ability to meet their targets through emissions trading. This is, also known as the cap and trade approach, a central governmental body setting a limit on the amount of pollutant (Dey, et. al., 2011).

Organizations must understand and measure exactly what is involved in the manufacturing, transportation and distribution of their products. By measuring the environmental aspects and potential impacts associated with a product or process, companies can adopt a full lifecycle assessment (Grant, et. al., 2017). Lifecycle assessment (LCA) is the most common and comprehensive approach that assesses the entire life cycle of the product and determines whether a product or service is sustainable (Sarkar, 2012). The LCA evaluates all stages of a product's lifecycle in a holistic view, encompassing from the extraction and processing of raw materials leading up to production through consumption (Grant, et. al., 2017). The LCA ends when all materials are recovered or reused/recycled; the process of bringing products back (Grant, et. al., 2017).

Because supply chain decisions generally have a much wider impact on utilizing a company's resources, organizations will need to minimize their supply chain's carbon footprint. By doing so, every stakeholder must recognize the effect of economic activity on the use of scarce resources across the value chain as a whole (Nidumolu, 2009). Every stage in a company's value chain can have significant implications for resource requirements (Nidumolu, 2009). During the product design phase, designers and engineers will need to improve or reduce product packaging. According to Kim and Chai (2017), "Material reduction practices are associated with improving the quality of the products in order to protect the environment in a

way that the operational process does not emit waste (p. 4).” Such practices can contribute to operational cost reductions. Choosing the right materials for the product design can be a challenging task. However, companies must focus on opportunities for possible reuse and recycling that mainly rely on biodegradable and recyclable materials (Beamon, 2005).

Furthermore, supply chain managers should take into consideration the facility location of suppliers which can impact differentially on a resource footprint (Terouhid, Ries and Fard, 2012). The major differences in resource consumption depend on the location and how the products are sourced and made. Also, the total material and personnel travel distances to and from the facility location should be minimized, as well as the air pollution effects on the community (Beamon, 2005).

During the manufacturing process, operations management will have an opportunity to find ways to reduce waste, rework and scrap, and also reduce pollution emissions (Al-Odeh, et. al., 2012). Logistics managers need to evaluate the nature of the delivery network, optimize network configuration and reconsider the transport mode that will affect the carbon footprint of a supply chain (Eskandarpour, Dejax, Miemczyk and Peton, 2015). To make sustainable transport decisions, logistics managers should select transportation modes wisely, consolidate shipments, source locally, strategically locate warehouses, and reduce the number of shipments (Beamon, 2005).

During the product’s end of lifecycle, companies should develop a “closed-loop” supply chain to achieve a sustainable end-of-life product recovery (Sarkar, 2012). Closing the loop involves recovering the materials for either remanufacture or recycling. Due to the challenges and high costs being incurred, companies should put more focus on reverse logistics’ capabilities, and allocate time and energy to product end-of-life whether to return the product

back for recall or repair, or dispose the product for reuse or recycle (Dey, et. al, 2011).

According to Nidumolu et. al., (2009), “When they create environment-friendly value chains, companies uncover the monetary benefits that energy efficiency and waste reduction can deliver (p. 10).”

Top management must be sufficiently knowledgeable and committed to integrate sustainability strategies within the entire organization. Essentially, they must be fully committed to their vision to translate it into actual performance. Top management must devote their time and resources toward developing a sustainable supply chain which is critical to the company’s future and triple bottom line. In addition, sustainability requires top management support and collaboration through all the layers of the organization. According to Fish (2015), “Top management must strategically align the organization and its associated supply chain toward delivering sustainable products and services (p. 89).” With a shared vision and strategy, top management needs to articulate that sustainability is everybody’s responsibility and not only restricted to one department (Dey, et. al., 2011). Furthermore, top management should search for opportunities associated with sustainability and foster a sustainable corporate culture throughout the entire organization.

To track and monitor sustainability performances, Fish (2015) requires that “Top management needs clear, relevant metrics to track implementation progress, benchmark against other companies and to report their progress to the world (p. 103).” Companies can voluntarily decide whether or not to pursue International Standards Organization (ISO) 14001. The ISO 14001 sets standards for companies to engage in a continuous improvement process for their environmental management (Grant, et. al., 2017). ISO 14001 has been subject to criticism;

however, it should be leveraged carefully and aligned with the relevant business model (Sroufe, 2018).

Companies should mitigate and assess their logistics and supply chain risks.

Certifications for standards may be too costly for some; however, companies can adopt their own sustainability process frameworks (Grant, et. al., 2017). Companies should adopt an effective risk mitigation strategy to determine when or what actions or precautionary steps are necessary to manage supply chain risks. According to Kim and Chai, (2017), "Activities such as supply risk identification, supply risk assessment and continuous improvement processes also help to mitigate supply disruption risk (p. 2)." Supply disruption has negative effects on the supply chain. Nevertheless, it is imperative for companies to conduct a holistic assessment of all foreseeable costs and benefits. Supply chain risks must be identified, and their environmental and monetary impacts should be assessed. Risk mitigation planning will substantially help an organization to develop a mature decision-making process when unforeseeable disruption happens in the supply chain operation (Mand, et. al., 2013).

Companies should reduce the transport-intensity of their global supply chain, and improve their transport intense mode of supply chains. For instance, companies can review product design, sourcing strategy and transport options (Christopher, 2011). Another example, companies can improve transport utilization and implement postponement strategies (Christopher, 2011). Product developers and engineers should review the product design from a sustainability point of view. The physical characteristics of the product and the choice of materials, as well as the packaging materials should be decided carefully (Christopher, 2011). Sourcing decisions are taken into consideration on distances, locations and the carbon footprint. This is why logistics and supply chain managers carefully review the sourcing strategy and

transport options together. The various transport modes can have different impacts on carbon and emissions (Christopher, 2011).

Another way to improve the transport-intensity is to improve transport utilization. Logistics and supply chain managers should utilize shared distribution, scheduling, better loading and routing (Christopher, 2011). By implementing shared distribution, companies can improve transport capacity utilization (Christopher, 2011). They can also utilize their truck capacity by sharing transport arrangements with other organizations since many trucks generally return empty to their point of origin after making a delivery (Christopher, 2011). Another way of reducing the overall transport-intensity is to utilize postponement strategy. By using this strategy, product can be shipped in bulk from their point of origin. The product can then be assembled, customized, or configured for local requirements nearest to the point of use (Christopher, 2011).

Moreover, it is highly recommended for organizations to develop an approach towards a greener and more environmentally friendly solution in transportation. Green transportation provides fuel/energy efficiency and lower-carbon transportation energy sources. According to Panday and Bansal (2015), “Hybrid vehicles have the potential to change the existing state of transportation and market face with lower petroleum consumption and toxic emission (p. 316).” For example, FedEx Courier company has used hybrid vehicles that are 42% more fuel efficient than conventional trucks (Nidumolu, 2009). The company replaced a quarter of its fleet with smaller and more fuel-efficient vehicles (Nidumolu, 2009). To reduce the global energy use, FedEx uses hybrid vehicles in their operations and drastically reduced their energy consumption and gas emission.

Conclusion

As we enter the 21st century, sustainable logistics and supply chain management have played a vital role on the global economy as well as our everyday lives. The challenges and trends of increased internal and external pressures from key stakeholders, increased global trade and the spread of economic wealth, the widespread adoption of just-in-time (JIT) capabilities, and increased global sourcing as products and services travel much longer distances, have assisted the logistics and global supply chain activities, however, they also been disadvantageous from a sustainability point of view. Changing consumer demands, increased government regulatory pressures, increased population and urban growth, supply chain disruption, emissions of greenhouse gases, scarcity of natural resources, increased levels of waste from packaging, and other forms of pollution are some dominant examples that are detrimental to the sustainable maintenance of the natural environment, economic growth and development.

Organizations need to recognize the triple-bottom line approach. Sustainability must also be integrated into the organization's logistics and supply chain strategies for the right social and environmental reasons. Sustainable logistics and supply chain management are becoming more crucial in the business environment, government and society. At the same time, organizations are faced with greater pressures and challenges in integrating sustainability in their areas of interest. When examining the operations and their effects, logistics and supply chain managers must focus on both inputs and outputs in each stage of the supply chain to identify and carefully assess social, economic and environmental issues. To meet the challenges and to contribute to the efforts of the firm, sustainable practices and measures are employed in the following areas: 1). transport and logistics; 2). warehousing, product and packaging; 3). purchasing and procurement; and 4). reverse logistics. Stakeholders should recognize and reap significant

benefits and savings for incorporating sustainability initiatives in their logistics and supply chain operations. Implementing sustainability strategies throughout the value chain is not simple but is an arduous task that can be achieved. There is no best pragmatic way to implement sustainability principles in the value chain.

Organizations must continually learn how to survive and grow in a sustainable and environmentally friendly manner without adverse impact on current and future generations. Sustainability must be embraced, carefully understood and analyzed in a much broader perspective. The triple-bottom line thinking with respect to integrating profit, people and planet into our culture, strategy and operations of companies, is an important approach to support sustainability goals. Sustainability is not only one person's job. Sustainability is for everyone to be socially and environmentally responsible in today's global economy. It is also every stakeholder's job to take full responsibility because organizations cannot survive without top management support and commitment with their journey of achieving an effective sustainable supply chain strategy.

VIII. Reference

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