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MEASURING THE IMPACT OF THE GREEN SUPPLY CHAIN ON SUSTAINABLE PERFORMANCE

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Abstract

The main purpose of green supply chain is to ensure that the customer's requirements and needs are met without compromising the sustainability aspect of environment and prevent the latter from getting polluted. The purpose of current study is to measure the impact of green supply chain upon sustainability so as to reduce the environmental pollution. The author(s) used questionnaire to collect the data for current study whereas field coexistence and interviews were also conducted with stakeholders. The research questions were posed at 185 workers to find a solution for the research problem. The study results arrived at a few conclusions. The results infer that some of the dimensions of green supply chain exert an influence on sustainable performance. The study found the most important treatments to overcome the weaknesses through smoothly-applicable recommendations.Keywords: green supply chain, sustainable performance.

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1. Introduction

Global warming and climate change crises have worsened significantly and rapidly in the recent years, owing to rampant spread of pollution across the globe. This is primarily due to industrial pollution, automobile exhausts, power generation utilities and unsustainable practices. Global nations have held several meetings so far, related to climate change, to find a mechanism that can preserve the environment and put an end

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to the accelerating torrent of environmental pollution with scientific development. Many conferences and studies have been conducted on sustainable performance, environmental preservation, and optimal utilization and preservation of natural resources for future generations. These initiatives opened a door for investment in the field of green economy (Rifai, 2016).

Green economy is a concept aimed at satisfying human needs without compromising environmental concerns. To face the increasing competition in the field of sustainability, industries follow a new fundamental direction, these days, for production, marketing, and consumption of its products/services through the implementation of green supply chain activities. These activities are compatible with environmental challenges that emerged in the beginning of 21st century. The environmental challenges represent prominent elements in today's business environment including sustainable performance achievement that can ensure a better and more sustainable life for current and future generations (Kaur et al. 2019); (Abbas& Khali, 2016).

The integration of two concepts such as green supply chain and sustainable performance is a vision by itself and the adoption of this blended green supply chain approach has incentivized a number of large companies as it enables the companies to preserve the environment, save energy and water, improve the healthcare of an individual and the community, and reduce pollution. Over a period of time, these ideas reflected in the company's service/product offerings to the customer. This transformation made the consumer to make their purchase decisions based on the potential negative effects of products compared to the services provided by manufacturing companies. The consumer prefers the products of companies that rely on using organic and environmental-friendly materials to achieve environmental sustainability and follow green supply chain management practices. This prompted the companies to modify their production methods so that it is accepted by the consumer.

2. Methodology

2.1 Problem Statement

The statement of the problem is that there is a lack of dependence on the application of green supply chain activities in achieving sustainable performance. This in turn negatively increases the environmental damage. When natural resources are wasted excessively and the industrial waste is let out into environment without treatment, it has a negative impact on the environment. In this background, most of the industrialized nations have started deploying green supply chain practices to reduce their country's carbon footprint on environment and achieve long-term sustainability. These rapid changes are imposed by technological developments and continuous changes that occur in consumption patterns. The results reflect the future of environment in addition to addressing many such social and economic problems faced by organizations. With this

motivation, it has become necessary to search for novel approaches to achieve sustainable performance.

2.2 Importance of studying

The application of all the environmental requirements must be considered to perform green supply chain activities and attain environmental sustainability. Further, the organization's activity can be maintained in line with sustainability practices. The current study discusses about the orientation of the organization towards modern methods in operations management, creation of green supply chain dimensions and sustainable performance, and implementation of such dimensions in the study sample.

2.3 Purpose of study

The current study is aimed at finding green supply chain activities and the role played by it in attaining sustainable performance. Further, the study also attempts to seek the extent of applying green supply chain management. The study also intends to identify the most important modern dimensions and finds which dimensions of green supply chain to be relied upon, to use them in improving the level of the organization. In addition to this, the study aims at determining the extent of green supply chain's contribution towards the achievement of sustainable performance and activities to enhance green supply chain management.

2.4 Study model

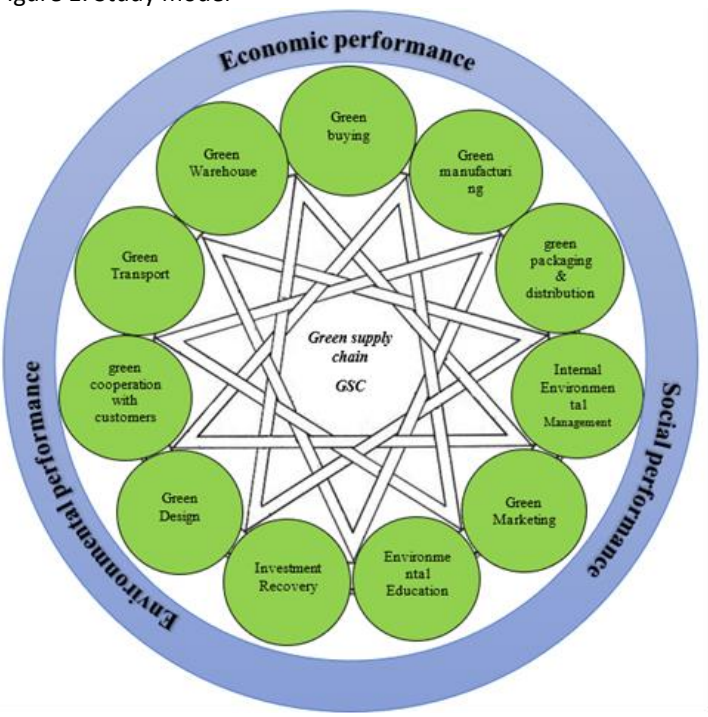
The study model is designed based on the review of literature. The authors considered green supply chain as a flaming star from which the dimensions branch out in different directions and is surrounded by sustainable performance in the form of a ring. Further, all the dimensions of green supply chain are interconnected among each other through overlapping lines. Each dimension complements the other dimension. The optimal region is the one between green supply star and the sustainable performance loop. Figure 1 shows the model developed for current study.

2.5 Sample and data collection

Al-Noura factory, located in Karbala, was chosen as the study location due to its economic importance and the possibility of collecting data from potential respondents. Between March 2020-2021, the data was collected from a random set of target audience i.e., employees working in various departments of the factory such as administration, technical operations, productivity, human resources, marketing, warehouse, and quality using a survey questionnaire. The total number of permanent employees was (344) whereas the number of daily wage workers was (97). So, the total employee size at the time of conducting the study was (441). A total of 185 complete and valid questionnaires was obtained for further processing. Statistical analysis was conducted with the representative data i.e., 42.1% of the total population. Invalid, incomplete and partially-filled questionnaires were not considered for further

proceedings and rejected. Employees were given 50 days to complete the survey. The size of the error in sample size (3%) was determined based on Saunders et al, (2019).

Figure 1. Study model



Source: Prepared by researchers

2.6 Scales used in the study

Green Supply Chain: The authors developed a new metric based on the review of studies conducted earlier. As per the literature (Younis, 2016), (Obiso, 2011), (Yang et al. 2013), (Vijayvargy et al. 2017), (Besbes et al. 2013), (Çankaya & Sezen, 2019), the scale including 11 sub-dimensions such as internal environmental management, investment recovery, green marketing, green buying, green packaging and distribution, green manufacturing, Environmental Education, Green Design, green cooperation with customers, Green Transport, Green Warehouse was developed.

Sustainable performance: Many scales were relied upon to develop a highly accurate and clear questionnaire. The studies conducted earlier such as (Emara, 2019), (Saeed & Kersten, 2017), (Sebhatu, 2008), (Abbas, 2019), (Caiado et al. 2018) were referred. The created scale includes three sub-dimensions such as economic performance, social performance, and environmental performance. The questionnaire is given in the appendix in which Likert scale was used.

3. The theoretical side

3.1 Green supply chain

Green supply chain is aimed at reducing the ecological impact of commodity distribution through a set of measures within vein chain management and corporate strategy that focus on waste management, material handling, transportation, and storage. This concept includes multiple dimensions with regards to product, materials management, and physical distribution. This phenomenon opened the door for a group of applications that represent environmental-friendly strategies (Rifai, 2016). Green supply chain not only takes into account the ecosystem, but also considers the industrial system too. Industrial establishments are able to reap maximum benefits by adopting green supply chain approach. This is possible since they can develop a new strategy through which profit can be gained and market share can be increased. This can be achieved when the policy is implemented successfully and the results are attained in the form of advantages such as reducing waste by rationalizing the consumption of non-renewable resources; attention to the human element whether through psychological factor or public health factor in which the employee feels that he or she has a value to add, plays an important role in preserving the environment and contributes solutions for environmental problems. This ultimately reflects in high productivity (Al-Ghamdi, 2021), (Mohamed Ali et al, 2019).

In addition to this, the organization's brand can be projected as it is associated with environmental-friendly practices. If this becomes a social moment, many organizations start paying attention to the environment through their activities and act with social responsibility towards the environment (Kamel, 2020). This sort of social policy increases the production efficiency and benefits the organizations (alZazou, 2015) since the waste gets reduced as a result of optimal utilization of organizational resources. Further, the organizations also get a reputation in society for achieving environmental-friendly performance (Handhal & Hachim, 2016).

Green supply chain practice refers to all the stages of production in an industry that can be modified within the scope of environment to reduce the damage caused to environment. Environment gets damaged, as a result of different stages of production process. Green supply chain includes various activities such as recycling, reuse, and replacement of raw materials. It also includes different processes such as product design, raw materials supply, selection, dispatching the end product to consumers, and end of the product's life cycle to preserve the environment (Agha, 2012). The supply chain also covers the delivery of products and services from suppliers and manufacturers to the consumer through the flow of materials and information in addition to cash flow within the context of environment (Abd, 2019). Green or Sustainable Supply Chain Management (GSCM) approach combines together two concepts such as environmental thinking and supply chain activities. It attempts to mitigate the negative environmental impact of supply chain which in turn add value to the organizations. This green supply chain process reduces the overall environmental

impact. There are various practices followed in green supply chain such as environmental management, green purchasing, green design and production, and reverse logistics. Reverse logistics in a concept in which reusable and recycling products are recovered including recyclable waste. This is consistent with the concept and principles of green economy (Al-Sabbagh, 2018), (Weeratunge & Herath, 2017).

Green supply chain management focuses on creating high-quality environmental technology whereas production chain managers support these ideas to overcome the economic problems (Ali & Mohsen, 2019). The environmental management practices must be integrated with whole supply chain process to attain green supply chain, enhance the market share of firms and maintain competitive advantage (Abd & Abd Nour, 2020).

For this reason, some researchers had a conclusion that there exists a close relationship between green supply chain and environmental protection. It was also found that the industrial facilities must move towards this direction, especially after a significant increase in pollution levels in the past few decades and deteriorating natural environment as a result of some human actions such as industrial waste generation, letting untreated waste into environment etc., (Al-Tai et al. 2012). This scenario resulted in the reduction of green spaces which eventually affected the public health of humans and the environment. Due to the increasing demand, the governments started enacting laws and brought legislation to protect the environment. This legal frameworks made organizations realize the importance of environmental dimension in their business activities from which the concept of green supply chain gained momentum (Allaoui & Goncalves, 2013).

Hussein & shahatha, (2020); Al-Saegh & Balssem, (2019); Al-Sabbagh, (2018); and Indrasiri & Rathnayake, (2015) indicated the importance of green supply chain through several points:

1. The application of green supply chain leads to reduction in the volume of gases emitted in during transportation, storage, and manufacturing processes, represented by carbon gas.
2. Green supply chain leads to an increase in the volume of profits achieved by enterprises as a result of manufacturing products that are environment-friendly.
3. This scenario results in increasing awareness among and within organizations about how important the concept of environment preservation is and how far the employees' suggestion must be taken into account in terms of supply chain performance development, so that it reflects on the environment.
4. Reducing the costs incurred upon packaging operations through optimal utilization of packages and wrappers which results in reduction of volume of waste generated.
5. Green supply chain occupies an important role in building and maximizing economic-environmental performance at various levels of business organizations.
6. The implementation of supply chain management results in economic benefits, increased environmental performance, and reduced waste generation.

7. Implementation of green supply chain is a way for organizations to achieve competitive edge over their competitors and improve profit rates.
8. It plays a significant role in encouraging efficiency and synergy among the allies.
9. Cost savings results in high profits and increased market share for business organizations.
10. The effective implementation of green supply chain plays a role in increasing competitiveness and economic performance of organizations. Further, it also develops the capacity of organizations in terms of environmental performance as well as other such performance dimensions namely cost and green supply chain.
11. Leads and assists in influencing the internal and external behavior of organizations to ensure sustainable performance.
12. Increase the firm's efficiency by enhancing productivity and increasing product quality.
13. It helps the organizations to adapt and maintain environmental changes through waste reduction and efficient utilization of energy and raw materials.
14. It helps the community by opening new factories based on renewable energy sources which in turn contributes to new job opportunities.
15. Save money by saving energy.
16. Waste reduction through process improvements such as raw material selection, proper fuel blend selection, and automation.

3.2 Green supply chain activities

In terms of green supply chain activities, based on the review of literature, the authors reached a comprehensive measure which is tabulated herewith. Though there is a clear discrepancy in the opinions of researchers about numbers, it can be noticed through the review of studies that after each period, new activities appear. So, in current research work, the authors tried to limit the largest possible number as shown in the table (1) (Hussein & shahatha, 2020), (Younis, 2016), (Obiso, 2011), (Yang et al. 2013), (Vijayvargy et al. 2017), (Irani et al. 2017), (Choi & Hwang, 2015).

Table 1. Green supply chain activities

Activity	Details
Green buy	Purchasing raw materials that are less harmful or create no harm to the environment, through their production, use or after the use process. The purpose of this green purchase is to preserve the environment throughout the life cycle of product development and manufacturing, right starting from the first step in production until it turns into waste and waste. This method of purchasing distinguishes the companies from its competitors
Green manufacturing	A productive method that aims to achieve the optimal usage of available resources (raw materials and energy) at all the stages of production process. The aim is to reduce the volume of pollution and emissions of gases on one hand while reducing costs incurred upon workers' injuries as a result of that

	pollution, on the other hand.
Green packaging and distribution	Reuse and recycle packaging are economically viable for the companies to sustain. The primary goal is to utilize minimum packaging so as to keep a threshold on costs spent upon. In recent years, these processes took momentum, thanks to social movements, regulatory practices and consumer pressure. This sort of processes include packaging, distribution and logistics.
Internal Environmental Management	It can be achieved through cooperation among all the sections of an organization and the development of indicators and commitments within standards and their implementation to protect the environment
Green Marketing	It can be defined as any marketing activity, which is specific to a particular organization, aimed at creating a positive impact or removing the negative impact of a particular product on the environment. This includes a wide range of activities in which the locations and segmentation of consumers are based on environmental dimensions. The strategies and solutions are developed in such a way that would meet the needs and desires of consumers with the least negative impact possible on ground.
Environmental Education	This activity refers to organized efforts taken such as introduction of green supply chain in education about how natural environments function, in particular how humans can manage their behavior and ecosystem to live sustainably.
Investment Recovery	Selling surplus inventory to avoid spoilage and the ability to recycle the used products sourced from customers and selling excess capital equipment that consumes energy during its operation.
Green Design	It is a constructive approach that can reduce the destructive impact on environment and human health. A 'green' engineer or designer attempts at conserving air, water and land by choosing environment- friendly building materials and building practices
Green cooperation with customers	Achieving common environmental goals with customers, working to develop a mutual understanding of environmental risks, setting standards to measure risks, and cooperating with other companies to mitigate potential risks.
Green Transport	Any means of transportation that has a low impact on the environment and makes a positive contribution to achieving economic, social and environmental sustainability. These activities must support the communities whereas the primary aim is to enhance the number of products transported with least damage to the environment
Green	A suite of technological and organizational solutions is designed to achieve

Warehouse	efficiency in warehouse operations by maintaining the highest social standards and minimizing the impact on nature in terms of financial efficiency.

4. Sustainable performance

Sustainable performance is approached from the perspective of management in terms of business strategy development and business model creation so that the strategies and business models are constantly integrated together with engineering activities. This is done so, in order to meet the dynamic market environment whereas sustainability concepts can be applied only in the presence of awareness about the organization's engineering capabilities. The concept of sustainable performance includes economic, environmental and social perspectives (Tao&Yu,2018,26); (Rosak-Szyrocka& Abbase,2020). Sustainable performance models can also be adapted to face financial crises in which a sustainable value is measured based as return-cost ratio, the difference between return and opportunity cost. Sustainable performance can be measured only by considering environmental, social and economic resources and the optimal utilization of resources. Further, some of the measures to determine sustainable performance are as follows; the amount of return achieved by the company, creation of value for the shareholders and the company, achievement of sustainable prosperity, the ability to overcome financial crises and achieve sustainable growth in revenues with a commitment to social responsibility. Sustainable performance links the human being and their consumption during a period and ensure the current needs are satisfied without any compromise for future generation's needs (Stankevicience & Nikonorova, 2014, 1198), (Blasim & Al Jawhar, 2021). There is a way to remodel the sustainability concept as a business opportunity and translate the public health, social and environmental risks into enables of innovation so that the companies can gain a novel and unprecedented source of competitive advantage. This concept further helps in building a collaborative approach in decision-making to maximize the potential for change across the organization (Laszlo & Cooperrider, 2010, 32), (Al-Masoudi & Al-Masoudi, b 2018).

Sustainable performance approach was selected as an evaluation approach based on the sole value of performance in terms of sustainability performance. Sustainable value brings a combination of economic returns and leveraging of environmental, economic and social disadvantages. So, it is linked with economic growth challenges. Sustainable value depends on the assumption that a value can be created out of more efficient resources than the use of alternatives. In other words, opportunity cost of capital is translated from the perspectives of financial economy to a sustainability perspective as a whole with increased growth. Economic, environmental and social stewardship are credited with sustainable performance (Manzhynski et al, 2015, 637-639); (Żywiołek& Abbas, 2021). Sustainable performance is an important key to improve social justice and avoid both risks and environmental scarcity. It is understood as a phenomenon to detail

and utilize the regeneration system while at the same time, the current needs should also be met without any compromise for future generation needs. Therefore, in long term perspective, new forms of social learning must be promoted to obtain better-trained citizens whereas a strong focus should be given upon nurturing knowledge, tools, and training required to achieve sustainable performance (Muschard & Seliger, 2015, 70-71). The importance of sustainable performance in today's society is highlighted through its role in finding solutions at technological level, thinking about environmental, social, and ecological aspects within the product, developing the process, and reducing the carbon footprint (Peukert et al, 2015, 519).

Organizations cannot be accused for all the global problems and so, it is a fact that they lack resources to overcome the problems. So, it becomes important for the governments and citizens to a part of finding the correct solution. For example, social entrepreneurial organizations can achieve two goals at the same time: achieving profits and sustainable performance. They have the ability to meet basic human needs by reducing the environmental impact and inequality, thus becomes highly suitable for life and achieve heavy social expectations (Pirson, 2010, 273). There is a need exists for an integrated theory based on social sciences of change, economic, social, and organizational stability, and social leadership to restructure and integrate power and interests. This sort of policy is required to achieve sustainable performance because a policy that destroys important future sources of growth exists today and it allows the consumption of unaccounted environmental wealth (Pitelis, 2013, 402). The policy development and implemented can be achieved via social capital and human capital via non-formal education, lifelong learning methods, and instilling the concepts of sustainable manufacturing, and the fact that sustainable performance must start from family (Premarathn et al, 2017, 579). Therefore, sustainable performance efforts should be defined and input-oriented with robust actions and focus on outputs that provide value to multiple stakeholders, especially who are in need of it. Real value creation occurs not only with the help of organizational executives, but also by external stakeholders and how they perceive about the impact exerted upon the industry. He added that clean technology is at the base of the pyramid to achieve sustainable performance (Perez-Pineda et al, 2017, 1637), (Kumar, 2013). It contributes towards the increment of social responsibility of individuals and investments in applied technology to preserve the environment. It further enhances the values and institutional behavior of organizations (Stankeviciene & Cepulyte, 2014, 883). Sustainable performance helps in developing the company’s products using resources in the most economically-viable form and reducing its impact on the environment, which is a benefit to both organizations and its customers. Further it also enhances the performance of the product throughout its life cycle. The life cycle of a sustainable product can be defined as the cycle in which the consumption of energy and raw materials gets reduced whereas the amount of waste getting generated and environmental mission mitigate from a full life-cycle point of view. On the other hand, it also fulfils the functional, quality, cost, and profit requirements (Tao&Yu,2018,299). (Surie & Ashley, 2008, 235) and (Evans et al, 2017, 213) believe that entrepreneurial leadership has an important

role in creating sustainable performance. (Dheur, 2015, 1-5) (Al-Masoudi & Al-Masoudi, a2018) indicated that sustainable performance concept can be utilized to detail an ideal situation or a goal in which the sustainability aspects are taken into account in all the perspectives of business management. The sustainable performance can be achieved through a combination three standalone phenomena such as participation, sustainability and value creation. So, it represents the basic principle in generating the highest possible level of operational added value, achievement of regular profits and enhancing the company's values. Sustainable performance, can possible be implemented, in this form in most of the companies that operate for profit. A combination of philanthropy and business development is part of an organization's sustainable performance strategy. The company has the control over the development of performance and its influence (Kantimm, 2015, 142). Acceptance of responsibility is considered as a primary step towards the organization's sustainable development and it remains the basic step to achieve success. It is directly proportional to social responsibility and is considered as a real opportunity for cooperation among politics, business, and civil society (Zastrau, 2015, 165). To achieve sustainable performance, the organization must redirect its efforts to provide greater imagination and scientific expertise that contribute towards solution finding and shifting to a more creative model. This model should transcend traditional thought, hone skills and must be able to create dynamic organizational structures, identify the needs of consumer and produce creative ideas (Dodds, 2015,340). It also contributes in the optimal utilization of resources in a creative way that ensures minimal damage and improve the profit level (Nayak, 2017, 239-240). (Manda et al, 2015, 131) pointed out the sustainable performance role in improving the social and environmental performance of companies and it has a positive influence upon the financial performance on the company since the costs get reduced, revenues increase, avoids risks, improves the utilization of raw materials, and reduces waste treatment and disposal costs, while at the same time, reduces the environmental footprint.

4.1 Sustainable performance dimensions

Sawadi (2020), Anis (2020), Emara (2019) mentioned the dimensions of sustainable performance as shown herewith.

4.1.1 Economic performance:

Economic performance is measured as the surplus amount achieved by the organization as a result of maximizing its outputs, while simultaneously reducing the level of usage of its resources. This performance is represented through five main areas (such as reliability, responsiveness and meeting customer needs, flexibility, financing and quality). Through economic performance, the organization satisfies the desires of shareholders, customers, and suppliers and gains their confidence. This performance is measured based on the reports and financial statements issued by the organization. Through this measure, the organization works at recovering appropriate returns from the money invested and achieving a competitive advantage that enables it withstand

competition in the market, ensure survival, raise productivity and respond to the aspirations of customers.

4.1.2 Social performance

Social performance includes the success of an organization in achieving its objective and predetermined social goals that contribute towards the improvement of important aspects of society or relations with other societies. Therefore, organizations build principles and strategic foundations through which they integrate their social, environmental, and volunteer goals with their business operations. Social performance is divided into two models such as internal performance, which is related to owners and employees, and external performance, which is related to customers, local community, and the government. Social performance measures the practices of an organization followed by its employees. This measure focuses on the ability of an organization to make sure its human resources are active parties. The organization works through this dimension to achieve economic and social well-being, bring social justice, and provide equal opportunities to people from all the segments of society.

4.1.3 Environmental performance

Environmental performance is the product of groups that seek to rationalize the consumption of raw materials, energy, and various facilities. It does cover the reduction of risks associated with environment such as emission of toxic gases and water pollution, good waste control through recycling process. There are two axes present in this measure; the first axis being the organization's usage of natural resources and the second axis being the impact of an organization's activities on ecological nature. The practices and efforts made to present the ecological environment are important components of an organizations' environmental performance.

5. STATISTICAL ANALYSIS

This section discusses the data analysis conducted for the study. The research analyses was conducted using SPSS (V. 26) for basic descriptive statistics, and (SmartPLS 3.2.7) for SEM-PLS modeling. In the first section, the data pre-preparation procedures are discussed. The model proposed in the study and the instructions were validated for its reliability and validity in section two. Section three details about various descriptive statistics and bivariate correlations. Finally, section four discusses the structural model to test the hypotheses for the proposed objectives.

5.1 Data Examination

The collected data must be inspected for issues such as missing data, outliers, normality, and Common Method Bias (CMB) (Hair et al., 2017). Therefore, primary data issues were examined using SPSS. Primary issues such as missing data and outliers were inspected and found that no problems were found. CMB can be detected through Harman's single-

factor test and is commonly used by researchers. The percentage of the factor's explained variance determines whether the bias is present or not. If the total variance of the factor is less than 50%, then the common method bias does not affect the data. The analysis infer that the first factor explained only 16.96% of the total variance. As the value was below 50%, it can be concluded that the issue of CMB had not been detected. In addition, VIF values were less than 3.3 which confirmed the absence of this problem (Kock, 2015). Normality statistics results show that the values of Skewness and kurtosis, for all the constructs of the model, were within the range of ±2. So, the variables were normally distributed (Trochim & Donnelly, 2006; Gravetter & Wallnau, 2014), see table (4).

5.2 Measurement model Assessment

Figure 2 shows the assessment method for the measurement along with some descriptive statistics for each item. The measurement model assessment requires the validated of internal consistency reliability, convergent validity, and discriminant validity. In table 2, internal reliability and convergent validity results were shown with the help of item loadings, Composite Reliability (CR), and Average Variance Extracted (AVE).

Table 2 Reliability and validity analysis

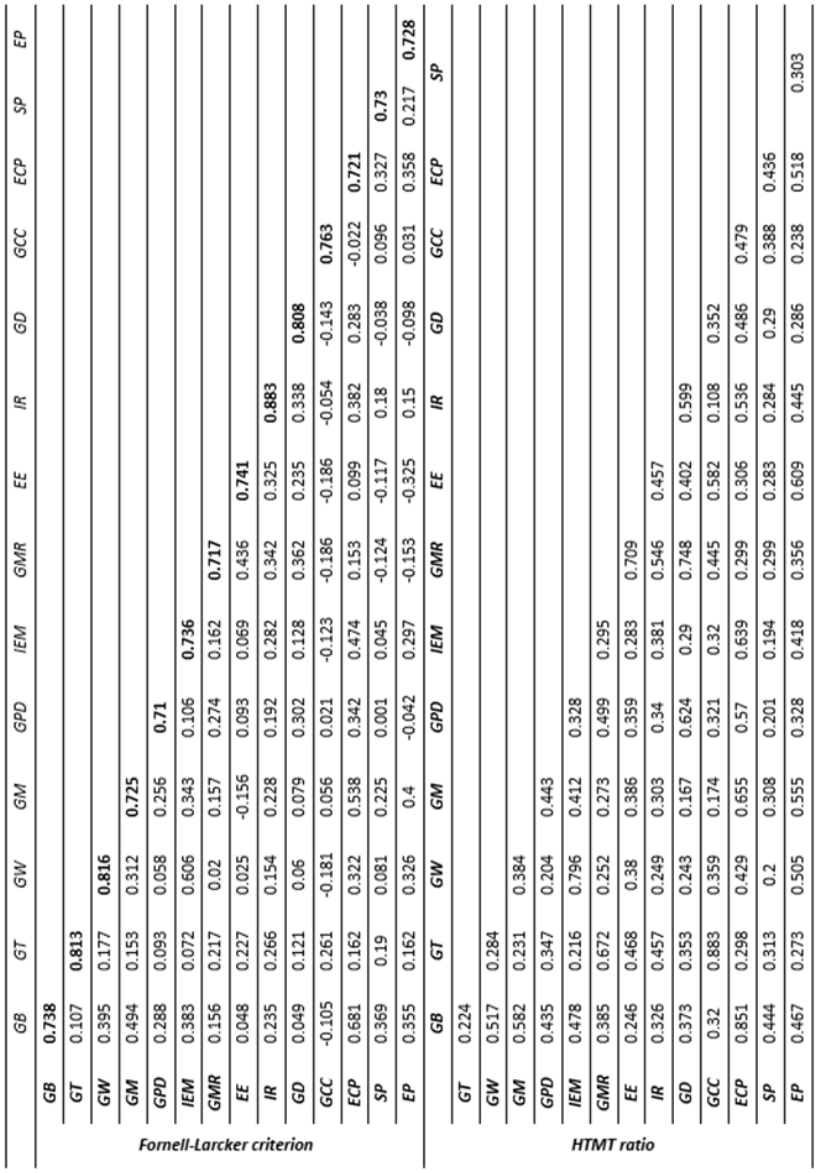
	Construct	***Item***	***Mean***	***SD***	***Loadings > 0.4***	***CR > 0.7***	***AVE > 0.5***
Green Supply Chain (GSC)	*Green Buying (GB)*	GB1	3.86	1.077	0.61	0.854	0.545
		GB2	4.05	1.257	0.863		
		GB3	4.08	1.304	0.673		
		GB4	3.84	1.1	0.629		
		GB5	4.01	1.264	0.871		
	Green Manufacturing (GM)	GM1	4.01	1.355	0.753	0.847	0.526
		GM2	3.78	1.281	0.654		
		GM3	4.02	1.078	Deleted		
		GM4	3.59	1.153	0.743		
		GM5	4.01	1.349	0.74		
		GM6	3.56	1.169	0.732		
	Green Packaging and Distribution (GPD)	GPD1	3.82	1.127	0.666	0.749	0.504
		GPD2	3.94	1.194	0.838		
		GPD3	3.95	1.252	0.606		
	Internal Environmental Management (IEM)	IEM1	3.83	1.359	0.482	0.868	0.542
		IEM2	3.49	1.084	0.508		
		IEM3	4.21	0.98	0.532		
		IEM4	3.69	1.047	0.902		

		IEM5	3.65	1.098	0.907		
		IEM6	3.63	1.121	0.918		
	Green Marketing (GMR)	GMR1	3.61	1.138	0.627	0.758	0.514
		GMR2	3.87	1.05	0.81		
		GMR3	3.51	1.216	0.702		
	Environmental Education (EE)	EE1	3.83	0.99	0.843	0.781	0.549
		EE2	4.03	0.98	0.774		
		EE3	3.75	1.19	0.581		
	Investment Recovery (IR)	IR1	3.6	0.99	0.896	0.876	0.779
		IR2	3.87	1.034	0.869		
	Green Design (GD)	GD1	3.85	1.056	0.738	0.789	0.653
		GD2	2.94	1.279	0.873		
	Green Cooperation with Customers (GCC)	GCC1	2.56	1.409	0.633	0.731	0.582
		GCC2	2.69	1.228	0.873		
	Green Transport (GT)	GT1	2.9	1.385	0.899	0.794	0.662
		GT2	3.09	1.334	0.717		
	Green Warehouse (GW)	GW1	3.36	1.19	0.885	0.855	0.666
		GW2	4.2	0.993	0.673		
		GW3	3.43	1.141	0.874		
Sustainable Performance (SSP)	*Economic Performance (ECP)*	ECP1	4.05	1.305	0.719	0.812	0.52
		ECP2	3.69	1.326	0.791		
		ECP3	3.98	1.142	0.637		
		ECP4	3.49	1.348	0.728		
		ECP5	2.97	1.071	Deleted		
	Social Performance (SP)	SP1	2.35	1.021	0.726	0.847	0.532
		SP2	2.25	1.181	0.836		
		SP3	1.94	1.145	0.723		
		SP4	2.64	1.512	0.822		
		SP5	2.23	1.27	0.486		
	Environmental Performance (EP)	EP1	2.34	1.201	Deleted	0.767	0.53
		EP2	3.75	1.357	0.783		
		EP3	3.43	1.33	0.828		
		EP4	2.84	1.196	0.541		

Composite reliability measures the internal consistency on the basis of a note that every indicator possesses different outer loading values. All CR values were found to be more than 0.7 threshold (Hair et al., 2017). The convergent validity of reflective measurement models was established since the values of outer loadings were found to be above 0.4

(three items were removed) whereas the AVE values were above 0.5 (Hair et al., 2017). Discriminant validity examines how much a construct differs from other constructs. It is generally determined through the validation of Fornell-Larcker criterion or with the deployment of heterotrait-monotrait ratio (HTMT) of the correlations. Fornell-Larcker criterion results and the square root of each construct's AVE were reported on the main diagonal of the table. However, rest of the values were found to be the inter-correlations between the constructs. The idea behind this test is that the AVE value of every construct and its square root must be higher than the highest correlation of any other construct. HTMT approach can be defined as "the ratio of the between-trait correlations to the within-traits correlations". The results of HTMT values are reported in table (3) which should be lesser than 0.90 (Henseler et al., 2015). In line with the Fornell-Larcker criterion guidelines and HTMT values, discriminant validity is established.

Table 3 Discriminant validity



Fornell-Larcker criterion

	GB	GT	GW	GM	GPD	IEM	GMR	EE	IR	GD	GCC	ECP	SP	EP
GB	**0.738**													
GT	0.107	**0.813**												
GW	0.395	0.177	**0.816**											
GM	0.494	0.153	0.312	**0.725**										
GPD	0.288	0.093	0.058	0.256	**0.71**									
IEM	0.383	0.072	0.606	0.343	0.106	**0.736**								
GMR	0.156	0.217	0.02	0.157	0.274	0.162	**0.717**							
EE	0.048	0.227	0.025	-0.156	0.093	0.069	0.436	**0.741**						
IR	0.235	0.266	0.154	0.228	0.192	0.282	0.342	0.325	**0.883**					
GD	0.049	0.121	0.06	0.079	0.302	0.128	0.362	0.235	0.338	**0.808**				
GCC	-0.105	0.261	-0.181	0.056	0.021	-0.123	-0.186	-0.186	-0.054	-0.143	**0.763**			
ECP	0.681	0.162	0.322	0.538	0.342	0.474	0.153	0.099	0.382	0.283	-0.022	**0.721**		
SP	0.369	0.19	0.081	0.225	0.001	0.045	-0.124	-0.117	0.18	-0.038	0.096	0.327	**0.73**	
EP	0.355	0.162	0.326	0.4	-0.042	0.297	-0.153	-0.325	0.15	-0.098	0.031	0.358	0.217	**0.728**

HTMT ratio

	GB	GT	GW	GM	GPD	IEM	GMR	EE	IR	GD	GCC	ECP	SP
GT	0.224												
GW	0.517	0.284											
GM	0.582	0.231	0.384										
GPD	0.435	0.347	0.204	0.443									
IEM	0.478	0.216	0.796	0.412	0.328								
GMR	0.385	0.672	0.252	0.273	0.499	0.295							
EE	0.246	0.468	0.38	0.386	0.359	0.283	0.709						
IR	0.326	0.457	0.249	0.303	0.34	0.381	0.546	0.457					
GD	0.373	0.353	0.243	0.167	0.624	0.29	0.748	0.402	0.599				
GCC	0.32	0.883	0.359	0.174	0.321	0.32	0.445	0.582	0.108	0.352			
ECP	0.851	0.298	0.429	0.655	0.57	0.639	0.299	0.306	0.536	0.486	0.479		
SP	0.444	0.313	0.2	0.308	0.201	0.194	0.299	0.283	0.284	0.29	0.388	0.436	
EP	0.467	0.273	0.505	0.555	0.328	0.418	0.356	0.609	0.445	0.286	0.238	0.518	0.303

Source: Prepared by researchers based on the results of the outputs from the program SPSS (V. 26) and (SmartPLS 3.2.7) for SEM-PLS modeling.

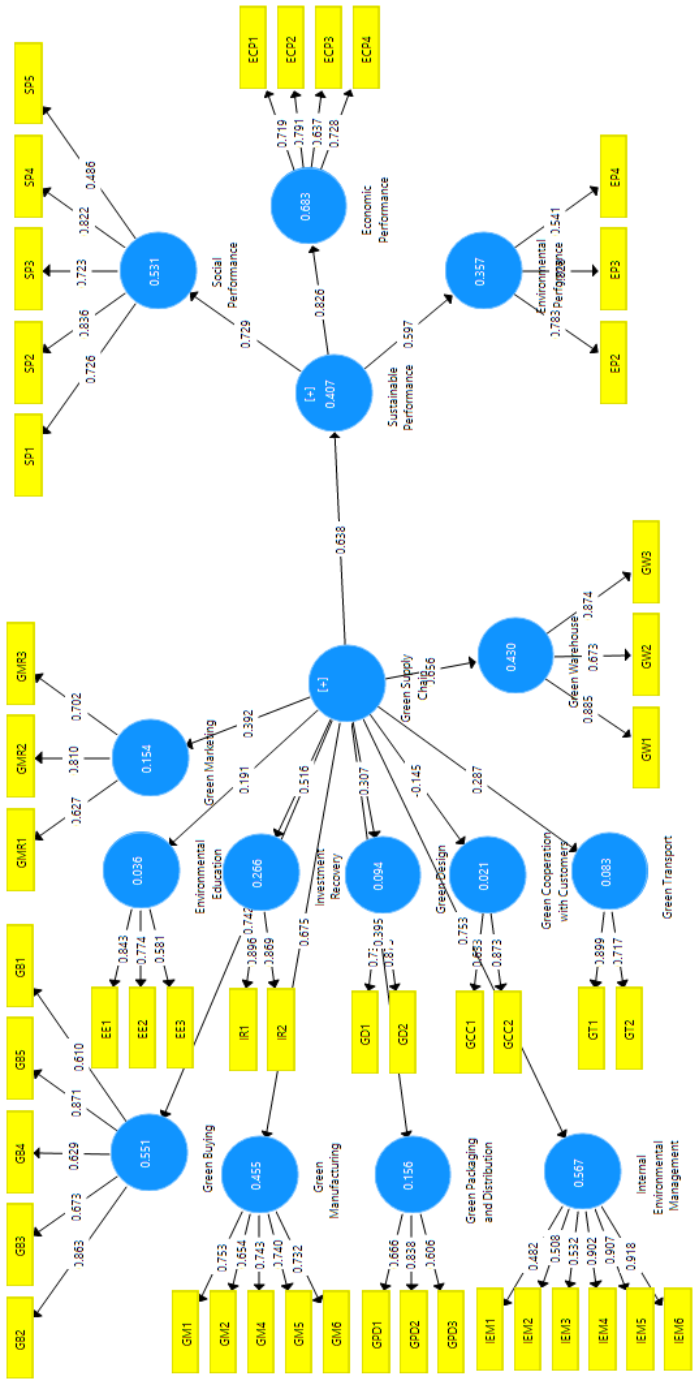
Table 4 Descriptive statistics and multiple correlations

	GB	*GM*	*GPD*	*IEM*	*GMR*	*EE*	*IR*	*GD*	*GCC*	*GT*	*GW*	*GSC*	*SSP*
GB	1	.468***	.286***	.378***	0.113	-0.052	.218**	0.021	-0.102	0.093	.393***	.559***	.621***
GM		1	.231**	.322***	0.123	0.137	.219**	0.066	0.044	0.137	.294***	.612***	.474***
GPD			1	0.139	.231**	-0.082	.166*	.301***	0.007	0.054	0.058	.473***	0.118
IEM				1	.170*	-0.034	.292***	.157*	-0.116	0.076	.586***	.577***	.386***
GMR					1	-.396**	.340***	.371***	-.160*	.257***	-0.009	.411***	-0.082
EE						1	-.294**	-.208**	.201**	-0.133	0.057	0.022	.215**
IR							1	.343***	-0.048	.273***	0.128	.542***	.275***
GD								1	-0.120	0.126	0.032	.428***	0.054
GCC									1	.333***	-.163*	.219**	-0.008
GT										1	.166*	.538***	.232**
GW											1	.505***	.332***
GSC												1	.527***
SSP													1
Mean	3.969	3.7881	3.9027	3.7505	3.6613	2.1315	3.7351	3.3946	2.627	2.9946	3.6631	3.4197	3.1413
SD	0.885	0.91727	0.84565	0.78715	0.82274	0.79255	0.89389	0.94895	1.01287	1.11315	0.91088	0.40327	0.65819
CV	22.3%	24.21%	21.67%	20.99%	22.47%	37.18%	23.93%	27.95%	38.56%	37.17%	24.87%	11.79%	20.95%
Skewness	-0.739	-0.796	-0.562	-0.467	-0.016	0.601	-0.473	0.066	0.366	0.059	-0.291	0.042	-0.322
Kurtosis	0.119	0.169	-0.499	-0.53	-0.662	0.042	-0.591	-0.957	-0.355	-0.736	-0.696	-0.663	-0.721

$^{*}P < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

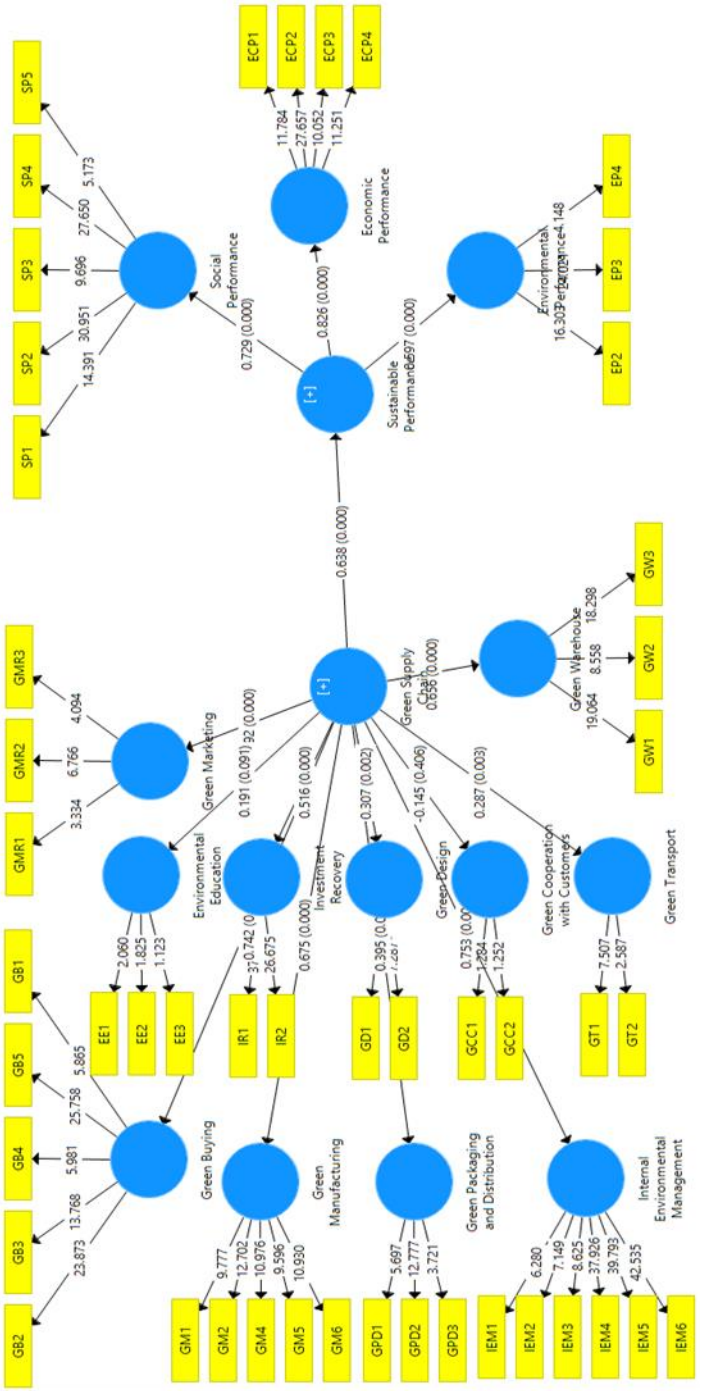
Source: Prepared by researchers based on the results of the outputs from the program SPSS (V. 26) and (SmartPLS 3.2.7) for SEM-PLS modeling.

Figure 2 Measurement model assessment (factor loadings)



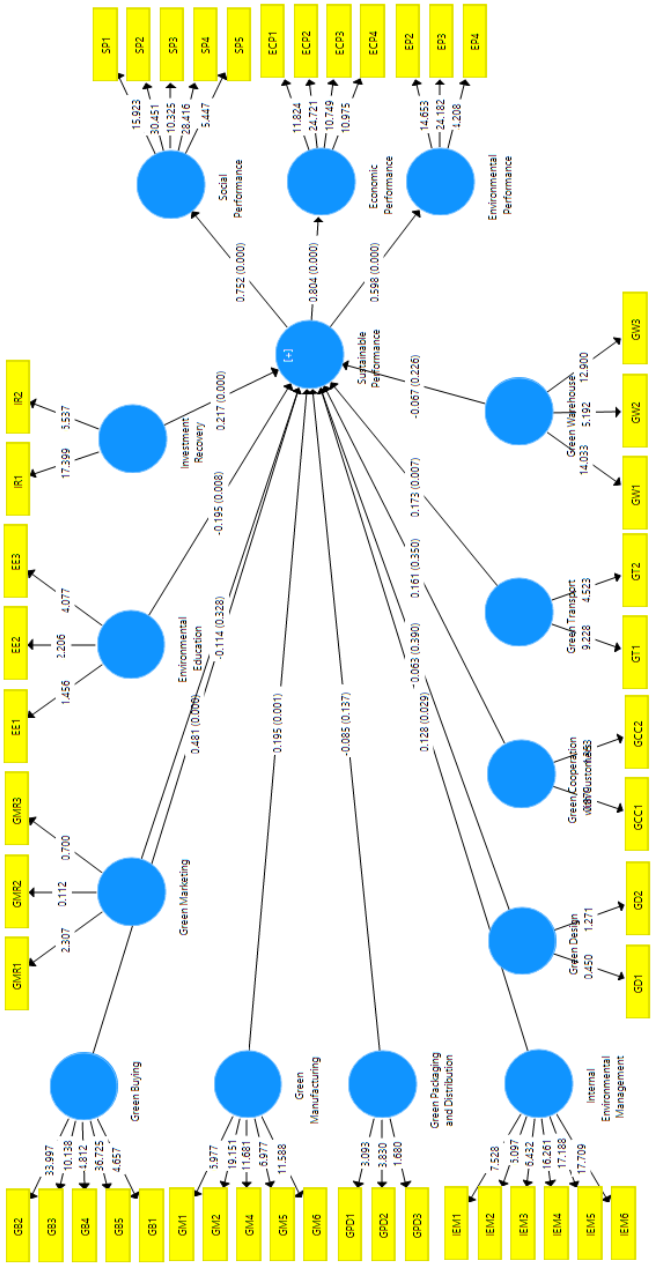
Source: Prepared by researchers based on the results of the outputs from the program (SmartPLS 3.2.7) for SEM-PLS modeling.

Figure 3 Structural model for the effect of GSC on SSP including Path Coefficients with the Corresponding P-values



Source: Prepared by researchers based on the results of the outputs from the program (SmartPLS 3.2.7) for SEM-PLS modeling.

Figure 4 Structural model for the effect of GSC dimensions on SSP including Path Coefficients with the Corresponding P-values



Source: Prepared by researchers based on the results of the outputs from the program (SmartPLS 3.2.7) for SEM-PLS modeling.

5.3 Descriptive Statistics and Multiple Correlations

Table (4) shows the descriptive statistics and correlations between the main variables. The results infer that *Green Buying* has a mean (*M*), standard deviation (*SD*), and coefficient of variation (*CV*) of $(M = 3.969, SD = 0.885, CV = 22.29\%)$ with a significant positive medium correlation with *Sustainable Performance* since $(r(185) = .621, P < 0.001)$. Sustainable Performance also has a significant positive medium correlation with *Green Manufacturing* $(r(185) = .474, P < 0.001)$, *Internal Environmental Management* $(r(185) = .386, P < 0.001)$, and *Green Warehouse* $(r(185) = .332, P < 0.001)$. Sustainable performance has a significant positive week correlation with *Environmental Education* $(r(185) = .215, P < 0.01)$, *Investment Recovery* $(r(185) = .275, P < 0.001)$, and *Green Transport* $(r(185) = .232, P < 0.01)$. The rest of *Green Supply Chain* dimensions including (*Green Packaging and Distribution*, *Green Marketing*, *Green Design*, and *Green Cooperation with Customers*) exhibits no relationship with *Sustainable Performance*. Finally, *Green Supply Chain* has a significant positive medium correlation with *Sustainable Performance* since $(r(185) = .527, P < 0.001)$.

5.4 Structural model Assessment

The structural model can be assessed through different parameters such as goodness of fit criteria, path coefficients, and coefficient of determination (R^2), predictive relevance (Q^2), effect size (f^2), and collinearity diagnostics. Figures (3) show the research model with the estimated path coefficients along with corresponding p-values. The structural analysis of the current study showed that *Green Buying* has a significant positive effect on sustainable performance since $(\beta = 0.481, t = 8.073, P < 0.001, 95\%\ CI \text{ for } \beta = [0.375, 0.602])$. So, the first hypothesis is supported. *Green Manufacturing* has a significant positive effect on sustainable performance since $(\beta = 0.195, t = 3.402, P < 0.001, 95\%\ CI \text{ for } \beta = [0.056, 0.289])$. So, the second hypothesis is supported. *Internal Environmental Management* has a significant positive effect on sustainable performance since $(\beta = 0.128, t = 2.193, P < 0.05, 95\%\ CI \text{ for } \beta = [0.024, 0.25])$. So, the fourth hypothesis is supported.

Table 5 Hypothesis testing

Path	β	t-value	P-value	95% CI for β		Remark
				LL	UL	
H1: Green Buying -> Sustainable Performance	0.481	8.073	0.000***	0.375	0.602	Supported
H2: Green Manufacturing -> Sustainable Performance	0.195	3.402	0.001***	0.056	0.289	Supported
H3: Green Packaging and Distribution -> Sustainable Performance	-0.085	1.487	0.137	-0.206	-0.002	Not Supported
H4: Internal Environmental Management -> Sustainable Performance	0.128	2.193	0.029*	0.024	0.25	Supported

H5: Green Marketing -> Sustainable Performance	-0.114	0.978	0.328	-0.314	0.136	Not Supported
H6: Environmental Education -> Sustainable Performance	-0.195	2.662	0.008**	-0.341	-0.085	Supported
H7: Investment Recovery -> Sustainable Performance	0.217	3.646	0.000***	0.1	0.328	Supported
H8: Green Design -> Sustainable Performance	0.063	0.86	0.39	-0.046	0.185	Not Supported
H9: Green Cooperation with Customers -> Sustainable Performance	0.161	0.935	0.35	-0.205	0.313	Not Supported
H10: Green Transport -> Sustainable Performance	0.173	2.697	0.007**	0.069	0.333	Supported
H11: Green Warehouse -> Sustainable Performance	-0.067	1.211	0.226	-0.173	0.045	Not Supported
H12: Green Supply Chain -> Sustainable Performance	0.638	11.125	0.000***	0.485	0.726	Supported

***P < 0.05, **P < 0.01, ***P < 0.001.**

Source: Prepared by researchers based on the results of the outputs from the program SPSS (V. 26) and (SmartPLS 3.2.7) for SEM-PLS modeling.

The results of hypothesis testing also infer that there is a significant effect of *Environmental Education* upon sustainable performance since $(\beta = -0.195, t = 2.662, P < 0.01, 95\%\ CI \text{ for } \beta = [-0.341, -0.085])$. So, the sixth hypothesis is supported. *Investment Recovery* has a significant positive effect on Sustainable Performance since $(\beta = 0.217, t = 3.646, P < 0.001, 95\%\ CI \text{ for } \beta = [0.1, 0.328])$. So, the seventh hypothesis is supported. *Green Transport* has a significant positive effect on Sustainable Performance since $(\beta = 0.173, t = 2.697, P < 0.01, 95\%\ CI \text{ for } \beta = [0.069, 0.333])$, so, the tenth hypothesis is supported. Finally, *Green Supply Chain* has a significant positive effect on Sustainable Performance since $(\beta = 0.638, t = 11.125, P < 0.01, 95\%\ CI \text{ for } \beta = [0.485, 0.726])$, so, the twelfth hypothesis is supported. The results in table (6) indicate that 66% of the variations in *Sustainable Performance* is explained by the variations in independent variables with Cohen's effect size for each as follows; high for *Green Buying* (f^2 =0.423), small for *Green Manufacturing* (f^2 =0.07), for *Internal Environmental Management* (f^2 =0.029), for *Green Marketing* (f^2 =0.029), for *Environmental Education* (f^2 =0.094), for *Green Cooperation with Customers* (f^2 =0.067), for *Green Transport* (f^2 =0.065), and finally high for *Green Supply Chain* (f^2 =0.688).

Table 6 Structural model assessment

Items	f square	VIF
Green Buying	0.423 (High)	1.593
Green Manufacturing	0.07 (Small)	1.583
Green Packaging and Distribution	0.018 (No Effect)	1.183

Internal Environmental Management	0.029 (Small)	1.659
Green Marketing	0.029 (Small)	1.281
Environmental Education	0.094 (Small)	1.179
Investment Recovery	0.1 (No Effect)	1.371
Green Design	0.01 (No Effect)	1.15
Green Cooperation with Customers	0.067 (Small)	1.127
Green Transport	0.065 (Small)	1.327
Green Warehouse	0.008 (No Effect)	1.643
Green Supply Chain	0.688 (High)	1
R Square	0.656	
R Square Adjusted	0.634	
Q^2	0.148	
GoF	0.595	

Source: Prepared by researchers based on the results of the outputs from the program SPSS (V. 26) and (SmartPLS 3.2.7) for SEM-PLS modeling.

All the values of Variance Inflation Factor (VIF) were below 5 which indicates the absence of collinearity problem. The current study evaluated predictive relevance by assessing Stone-Geisser's Q^2 Blindfolding, a sample reuse technique that can be used to calculate Q^2 values for latent variables. The authors executed the blindfolding procedure and calculated the Q^2 values for *Sustainable Performance* (Q^2 =0.148) which is greater than zero. This indicates the predictive relevance for endogenous latent variable in present study PLS path model (Hair et al. 2017). According to Tenenhaus et al. (2005), Goodness of Fit (GoF) is an excellent fit indicator. There exists a criteria of GoF to decide whether the GoF values are unacceptable, small, moderate, or high to be regarded as a globally appropriate PLS model. GOF value (0.595) is greater than 0.36 in current study which indicates a high fit. So, the GoF model can be projected as a significantly-valid global PLS model. Figure (4) shows the relationships of influence for each dimension of green supply chain upon sustainable performance. It can be seen to what extent some positive relationships have been achieved and some relationships were weak or inverse, which requires the organization to conduct a study and find out the causes and treat them to reach an integrated green supply chain in the future.

6. Conclusion

The implementation of green supply chain activities results in the achievement of sustainable competitive advantage, and the possibility of driving the lowest cost. The organization seeks to develop a long-term strategy so as to mitigate the negative impact it exerts upon the environment and also reduce the consumption of primary resources. Supply chain management is concerned with managing the flow of information, materials, services, and funds across all the functions of an organization to maximize the effectiveness of processes, activities, materials, and people involved in the production of final product that meet the customer's requirements and achieve sustainability. The application of sustainability to supply chain is an integrated environmental thinking

process for vein chain management to achieve sustainable performance. This remains a key factor for the required development process and contribute to the achievement of economic, social, and environmental requirements. So, the flow of information through supply chain must be properly managed and it works to define the concept of sustainability, its applications, and benefits.

6.1 Recommendations

1. Organizations must be motivated to implement green supply strategy by holding introduction and implementation training workshops for its employees.
2. The organization must enter into contract with suppliers who adhere to the principles of sustainability and do not violate environmental standards.
3. The organizations must work to develop values and trends related to green supply chain among employees and make them believe in themselves. They should nurture the employees to have a sense of loyalty towards the development of an organization through the implementation of environmental standards.
4. The organization must determine the dimensions, related to green supply chain that can be fully implemented as soon as possible. It should also identify the shortcomings in other dimensions, and seek the assistance of experts in the field of sustainability so as to find the best ways for the implementation of large number of green supply chain activities to achieve sustainable performance.
5. The organization must work on new designs in production process that do not pollute the environment and do not consume high energy.
6. The organizations must work on using renewable sources of energy, even if they are minimal. For example, the organization must establish a solar power plant to provide some of its departments with renewable source of energy or use them to light the premises. Solar panels can be placed on their roof or if they have empty spaces that can be exploited.
7. Re-use the packaging materials for more than one time or recycle them, and find packaging materials that are not harmful to the environment and degrade quickly.
8. The organization must conduct studies with specialists on how to recycle waste, as well as reduce pollution and gas emissions, and allocate a budget to implement these plans on an ongoing basis.

References

Abbas, A. A. H., & Khali, H. H. (2016). Effect of the empowerment leadership's on job involvement reinforcement through a mediator role for strategic thinking skills. *International Journal of Academic Research in Business and Social Sciences*, *6*(6), 2222-6990.

Abbas, Ali Abdulhassan (2019). The Intermediary effect of Social Entrepreneurship through Inclusive Leadership to sustainable value creation, *Second International Conference of Engineering and Science*, (1), Appendix1 / Turkey / Antalya / 28-30 March/ 2019. 27-47.

Abd, Iftikhar Jabbar (2019). The extent to which the sustainable performance of industrial companies can be measured using the balanced scorecard, *Al-Muthanna Journal for Administrative and Economic Sciences*, 9 (12), 251-265.

Abd, Safaa Jawad, Abd Nour, Nour Maytham Kamel (2020). The effect of the green supply chain on achieving environmental sustainability An exploratory study in Kufa Cement Factory, *The Administration & Economic College Journal For Economics & Administration & Financial Studies*, 12(3), 27-55.

Agha, Ahmed A. (2012). The Possibility of Establishing the Green Supply Chain Management Requirements: An Analytical Study in the Company of the Northern Cement in Nineveh Governorate, *Rafidain Development Journal*, 34(110), 261-284.

Al-Ghamdi, Ahmed Misfer (2021). Green Supply Chains, obtained on 30/11/2021, available at: https://maaal.com

Ali, Suzan Abdel-Ghani, Mohsen, Iyad Fadel (2019). The extent of adopting a number of green processing chain management activities in industrial companies an analytical study behind a sample of workers in Kirkuk Cement Factory, *Journal of Economics and Administrative Sciences*, 25 (115), 220-233.

Allaoui, H., & Goncalves, G. (2013, January). Green Supply Chain: challenges and opportunities. In *Supply Chain Forum: An International Journal* (Vol. 14, No. 2, pp. 2-3). Taylor & Francis.

Al-Masoudi, Haider Ali Jarrad, Al-Masoudi, Heba Nabil Hamid (a2018) Measuring the sustainable balanced strategic performance of industrial companies, *Journal of Administration and Economics*, 7 (25), 208-234.

Al-Masoudi, Haider Ali Jarrad, Al-Masoudi, Heba Nabil Hamid (b2018). Application of the TBL model to disclose sustainable performance in economic units, *Iraqi Journal of Administrative Sciences*, 14 (55), 57-81.

Al-Sabbagh, Azzam Abdel-Wahhab Abdel-Karim (2018). Importance of green manufacturing and its impact on the shift to green supply chain: General company for manufacturing batteries/Iraq, *Journal of Baghdad College of Economic Sciences*, 55, 69-100.

Al-Saegh, Nagham Ali, Ismail, Bassem Saad (2019). Determine the application level to manage the green Supply chain, *Journal of Administration and Economics*, 42 (122), 199-214.

Al-Tai, Bassam Munib Ali, Al-Sabawi, Israa Waad Allah Qassem, Al-Afandi, Ahmed Talal Ahmed (2012). Contributions of some green supply chain activities in promoting the establishment of environmental management system requirements, *The magazine of Economics & Administration*, 35 (93), 265-280.

AlZazou, Omar Khattab (2015). *Obstacles of Implementing Sustainable Development on Supply Chain Management in Building Projects in SYRIA*, Master's thesis, Damascus University, Faculty of Engineering/ Department of Engineering and Construction Management, 1-159.

Anis, Kashat (2020). The sustainable performance of business organizations: a study in the measurement and disclosure model, *Journal of Finance, Investment and Sustainable Development*, 5(2), 145-166.

Besbes, K., Allaoui, H., Goncalves, G., & Loukil, T. (2013, January). A green supply chain design with product life cycle considerations. In *Supply Chain Forum: An International Journal* (Vol. 14, No. 2, pp. 18-25). Taylor & Francis.

Blasim, Sabreen Karim, Al Jawhar, Karima Ali (2021). Governance and its role in improving the sustainable performance of economic units - an analytical study, *Journal of Al-Kut University College for Human Sciences*, 2(1), 1-19.

Caiado, R. G. G., Quelhas, O. L. G., Nascimento, D. L. M., Anholon, R., & Leal Filho, W. (2018). Measurement of sustainability performance in Brazilian organizations. *International Journal of Sustainable Development & World Ecology*, *25*(4), 312-326.

Çankaya, S. Y., & Sezen, B. (2019). Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management*.

Choi, D., & Hwang, T. (2015). The impact of green supply chain management practices on firm performance: the role of collaborative capability. *Operations Management Research*, *8*(3), 69-83.

D'heur, M. (2015). shared. value. chain: Profitable Growth Through Sustainable Value Creation. In *Sustainable Value Chain Management* (pp. 1-107). Springer, Cham.

Dodds, B. (2015). Teaching Elephants to Dance! Building Sustainable Systems for Value Creation. In *Proceedings of the 2008 Academy of Marketing Science (AMS) Annual Conference* (pp. 340-340). Springer, Cham.

Emara, Mona (2019). *Measuring and evaluating sustainable performance in the service organization according to the Global Reporting Initiative (GRI)*, Master's thesis, Université Mohamed Boudiaf - M'SILA/ Faculté des Sciences Économiques Commerciales et des Sciences de Gestion/Département Sciences de Gestion, 1-112.

Evans, S., Fernando, L., & Yang, M. (2017). Sustainable Value Creation—From Concept Towards Implementation. In *Sustainable Manufacturing* (pp. 203-220). Springer, Cham.

Gravetter, F., & Wallnau, L. (2014). Essentials of statistics for the behavioral sciences (8th ed.). Belmont, CA: Wadsworth.

Hair, J. F., Hult, G. T., Ringle, C. M., & Sarstedt, M. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd Ed.). Los Angeles, CA: SAGE.

Handhal, Qassim Ahmed, Hachim, Yasir Mawlood (2016). The role of Reflections of Green Supply Chain Management in Fiaicial Performance Exploratory Study in the factory of Cement Industry in Kirkuk, *Kirkuk University Journal of Administrative and Economic Sciences*, 6(2), 78-97.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135.

Hussein, Khawla, shahatha, Noor Fadhil (2020). The Role of Green Supply Chain Activities in Managing Environmental Quality Costs Applied Research in The Gas Filling Company, *City of Science College Journal*, 12(1), 64-78.

Indrasiri, R. D. C. P., & Rathnayake, W. L. (2015). Analysis of green warehouse practices in Sri Lanka. *Proceedings of 8th International Research Conference, KDU, Published November 2015*

Irani, Z., Kamal, M. M., Sharif, A., & Love, P. E. (2017). Enabling sustainable energy futures: factors influencing green supply chain collaboration. *Production Planning & Control*, *28*(6-8), 684-705.

Kamel, Wissam Hashem (2020). The possibility of adopting green supply chain management depending on its activities, *Al-Dinar Journal*, 19, 353-376.

Kantimm, H. (2015). SAP AG & StarShea Limited (Ghana): Sustainable Value Creation Through Collaboration with Companies, NGOs, and Intermediaries. In *Sustainable Value Chain Management* (pp. 141-155). Springer, Cham.

Kaur, J., Sidhu, R., Awasthi, A., & Srivastava, S. K. (2019). A Pareto investigation on critical barriers in green supply chain management. *International Journal of Management Science and Engineering Management*, *14*(2), 113-123.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration, 11*(4), 1–10. https://doi.org/10.4018/ijec.2015100101.

Kumar, K. (2013). *Sustainability performance measurement: an investigation into corporate best practices* (Doctoral dissertation, PhD Thesis). National Institute of Development Administration).

Laszlo, C., & Cooperrider, D. L. (2010). Creating sustainable value: A strength-based whole system approach. In *Positive Design and Appreciative Construction: From Sustainable Development to Sustainable Value* (pp. 17-33). Emerald Group Publishing Limited.

Manda, B. K., Bosch, H., & Worrell, E. (2015). Sustainable Value Creation with Life Cycle Management. In *Life Cycle Management* (pp. 129-146). Springer, Dordrecht.

Manzhynski, S., Figge, F., & Hassel, L. (2015). Sustainable Value creation of nine countries of the Baltic region. Value, changes and drivers. *Journal of cleaner production*, *108*, 637-646.

Mohamed Ali, Saad Bayoumi Mohamed, El-Sayed, Salah El-Sayed Mohamed, Bayoumi, Sabri Shehata El-Sayed (2019). Contributions of Green Vein Chain Management (GSCM) and its Role in Enhancing an Organization's Competitiveness, *Journal of Environmental Studies and Researches*, 9(1), 84-91.

Nayak, A. K. (2017). Optimal Institutional Architecture of Farmer Producer Organizations for Sustainable Value Creation for Small and Marginal Farmers. In *Financing Agriculture Value Chains in India* (pp. 239-250). Springer, Singapore.

Obiso, E. I. (2011). *A Survey Of Green Supply Chain Management Practices In The Petroleum Marketing Firms In Kenya* (Doctoral dissertation, University of Nairobi).

Pérez-Pineda, F., Alcaraz, J. M., & Colón, C. (2017). Creating sustainable value in the hospitality industry: a (critical) multi-stakeholder study in the Dominican Republic. *Journal of Sustainable Tourism*, *25*(11), 1633-1649.

Peukert, B., Benecke, S., Clavell, J., Neugebauer, S., Nissen, N. F., Uhlmann, E., & Finkbeiner, M. (2015). Addressing sustainability and flexibility in manufacturing via smart modular machine tool frames to support sustainable value creation. *Procedia CIRP*, *29*, 514-519.

Pirson, M. (2010). Social entrepreneurship: A model for sustainable value creation. In *Positive design and appreciative construction: From sustainable development to sustainable value* (pp. 259-274). Emerald Group Publishing Limited.

Pitelis, C. N. (2013). The public− private nexus in organizational economics and the challenge of sustainable value creation. *Journal of Change Management*, *13*(4), 387-406.

Premarathne, H. D. P., Kulatunga, A. K., Ekanayake, S. B., & Miyanadeniya, D. M. W. S. B. (2017). Value Creation towards Sustainable Manufacturing using Non-Formal and Lifelong Learning Methods. *Procedia Manufacturing*, *8*, 579-586.

Rifai, Mamdouh Abdel Aziz (2016) Supply Chain Management / Environmental Introduction, Ain Shams University Press.

Rosak-Szyrocka, J., & Abbase, A. A. (2020). Quality management and safety of food in HACCP system aspect. *Production Engineering Archives*, *26*.

Saeed, M. A., & Kersten, W. (2017). Supply chain sustainability performance indicators: A content analysis based on published standards and guidelines. *Logistics research*, *10*(12), 1-19.

Sawadi, Amal Farhan (2020). The effect of knowledge sharing on sustainable performance, *Journal of Economic Sciences*, 15(57), 145-162.

Sebhatu, S. P. (2008, December). Sustainability Performance Measurement for sustainable organizations: beyond compliance and reporting. In *11th QMOD Conference. Quality Management and Organizational Development Attaining Sustainability From Organizational Excellence to SustainAble Excellence; 20-22 August; 2008 in Helsingborg; Sweden* (No. 033, pp. 75-87). Linköping University Electronic Press.

Stankevičienė, J., & Čepulytė, J. (2014). Sustainable value creation: coherence of corporate social responsibility and performance of socially responsible investment funds. *Economic research-Ekonomska istraživanja*, *27*(1), 882-898.

Stankeviciene, J., & Nikonorova, M. (2014). Sustainable value creation in commercial banks during financial crisis. *Procedia-Social and Behavioral Sciences*, *110*, 1197-1208.

Surie, G., & Ashley, A. (2008). Integrating pragmatism and ethics in entrepreneurial leadership for sustainable value creation. *Journal of Business Ethics*, *81*(1), 235-246.

Tao, J., & Yu, S. (2018). Product Life Cycle Design for Sustainable Value Creation. In *Value Creation through Engineering Excellence* (pp. 297-326). Palgrave Macmillan, Cham.

Tao, J., & Yu, S. (2018). Product Life Cycle Design for Sustainable Value Creation: Methods of Sustainable Product Development in the Context of High Value Engineering. *Procedia CIRP*, *69*, 25-30.

Tao, J., & Yu, S. (2018). Product Life Cycle Design for Sustainable Value Creation. In *Value Creation through Engineering Excellence* (pp. 297-326). Palgrave Macmillan, Cham.

Tenenhaus, M., Esposito Vinzi, V., Chatelinc, Y.-M. & Lauro, C. (2005) PLS Path Modelling, *Computational Statistics & Data Analysis,* 48 (1), 159-205.

Trochim, W. M., & Donnelly, J. P. (2006). The research methods knowledge base (3rd ed.). Cincinnati, OH:Atomic Dog.

Vijayvargy, L., Thakkar, J., & Agarwal, G. (2017). Green supply chain management practices and performance: the role of firm-size for emerging economies. *Journal of Manufacturing Technology Management*. 28 *(3)*, 1-46.

Weeratunge, R. D., & Herath, R. (2017). The dimensions of green supply chain management practices. In *Proceedings of the 3rd World Conference on Supply Chain Management* (Vol. 2, pp. 123-132).

Yang, C. S., Lu, C. S., Haider, J. J., & Marlow, P. B. (2013). The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, *55*, 55-73.

Younis, Hassan (2016). *The impact of the dimensions of green supply chain management practices on corporate performance*, this thesis is submitted in partial fulfillment of the requirements for the Degree of Doctorate of Business Administration University of Wollongong, 1-215.

Zastrau, R. (2015). Nanogate AG: Sustainable Value Creation in Technology Companies. In *Sustainable Value Chain Management* (pp. 157-165). Springer, Cham.

Żywiołek, J., & Abbas, A. A. (2021). Information security in information systems among employees of industrial enterprises as societies 5.0. *System Safety: Human-Technical Facility-Environment*, *3*(1).

Annex: Index

No.	**green supply chain**
	The first dimension: green buying
GB1	Demand from suppliers to provide raw materials within specifications that do not negatively affect the environment
GB2	Collaborate with suppliers to achieve environmental goals
GB3	Our organization deals with suppliers who have a certificate
GB4	Collaboration with suppliers who use clean production
GB5	Collaborate with suppliers who use eco-design
	second dimension: green manufacturing

GM1	Our organization applies a manufacturing process that reduces noise pollution to a minimum
GM2	Our organization replaces contaminated and hazardous materials and parts
GM3	Our organization uses modern filters and control devices to reduce emissions to a minimum
GM4	Our organization's production planning focuses on precise control and control on reducing waste and improving material utilization
GM5	Process design focuses on reducing the consumption of energy and natural resources in production processes
GM6	Collaborate with suppliers who use less green energy in the manufacturing process of their products
	third dimension: green packaging and distribution
GPD1	Use of environmentally friendly materials in packaging
GPD2	Use recyclable or reusable containers or containers
GPD3	Choosing clean ways to transport materials that do not affect the environment
	Fourth Dimension: Internal Environmental Management
IEM1	Cooperation between the various functional levels in the organization to apply environmental standards at work
IEM2	Setting indicators and committing to their implementation to protect the environment, recycling, reducing gas emissions and conserving energy
IEM3	The existence of a system and department specialized in environmental management in the organization
IEM4	There is support for environmental practices from senior executives and mid-level managers
IEM5	Our organization has implemented many environmental standards and achieved success.
IEM6	Choosing suppliers that comply with environmental standards
	Fifth Dimension: Green Marketing
GMR1	Sponsorship of environmental events, environmental seminars, and cooperation with environmental organizations
GMR2	Periodic updating of the organization's website on environmental issues and announcing the most important environmental achievements made by the organization
GMR3	Use of packaging to market the organization's products to the retailer that can be retrieved and used again
	Sixth Dimension: Environmental Education
EE1	Holding awareness seminars for executives on environmental issues
EE2	Develop training programs related to the complete application of environmental standards
EE3	Explain to workers the serious and long-term effects of air, water, and soil pollution on the lives of current and future people
	Seventh Dimension: Investment Recovery
IR1	Our organization has a system for recycling defective and used products
IR2	Our organization sells capital equipment that is redundant or that consumes energy
	Eighth Dimension: Green Design
GD1	Designing products so that they can be reused, recycled, and recovered materials and parts

GD2	Designing products in a modern way to avoid or reduce the use of materials hazardous to the environment
	ninth dimension: green cooperation with customers
GCC1	My organization achieves common environmental goals collectively with clients
GCC2	My organization is developing a mutual understanding of environmental risks and social responsibilities with customers
	Tenth Dimension: Green Transport
GT1	The organization constantly seeks to find means of transportation that achieve sustainable development
GT2	The organization owns the means of transportation that preserve the transported goods from damage or damage during the transportation process
	Eleventh Dimension Green Warehouse
GW1	Environmentally friendly materials were used in the construction of the green warehouses of our organization
GW2	The lighting used in the warehouses of our organization consumes little energy
GW3	The cranes used to transport containers and cans within the warehouse run on clean energy
	Sustainable performance
	First dimension: economic performance
ECP1	There is a close relationship with customers
ECP2	Taxes are paid regularly
ECP3	Employees are motivated to excel in performance
ECP4	The organization has a good market share
ECP5	Our organization provides grants and financial aid to small and medium organizations
	Second dimension: social performance
SP1	Several training and development programs are available for employees
SP2	The organization encourages the recruitment of women into its ranks
SP3	Conditions for material and moral well-being of workers are provided
SP4	There are few work accidents
SP5	The organization provides social insurance for employees
	Third dimension: environmental performance
EP1	The organization generates revenue as a result of the sale of waste
EP2	The organization undertakes a continuous environmental assessment of suppliers
EP3	The organization is reducing its use of fuel
EP4	Some recycled materials are used in production processes

Source: Green Supply Chain: (Younis, 2016), (Obiso, 2011), (Yang et al. 2013), (Vijayvargy et al. 2017), (Besbes et al. 2013), (Çankaya & Sezen, 2019); Sustainable performance: (Emara, 2019), (Saeed & Kersten, 2017), (Sebhatu, 2008), (Abbas, 2019), (Caiado et al. 2018)