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Title in English

**The Impacts of Sustainability on the Supply Chain: A Comprehensive
Analysis Of Jubail Chemical Companies**

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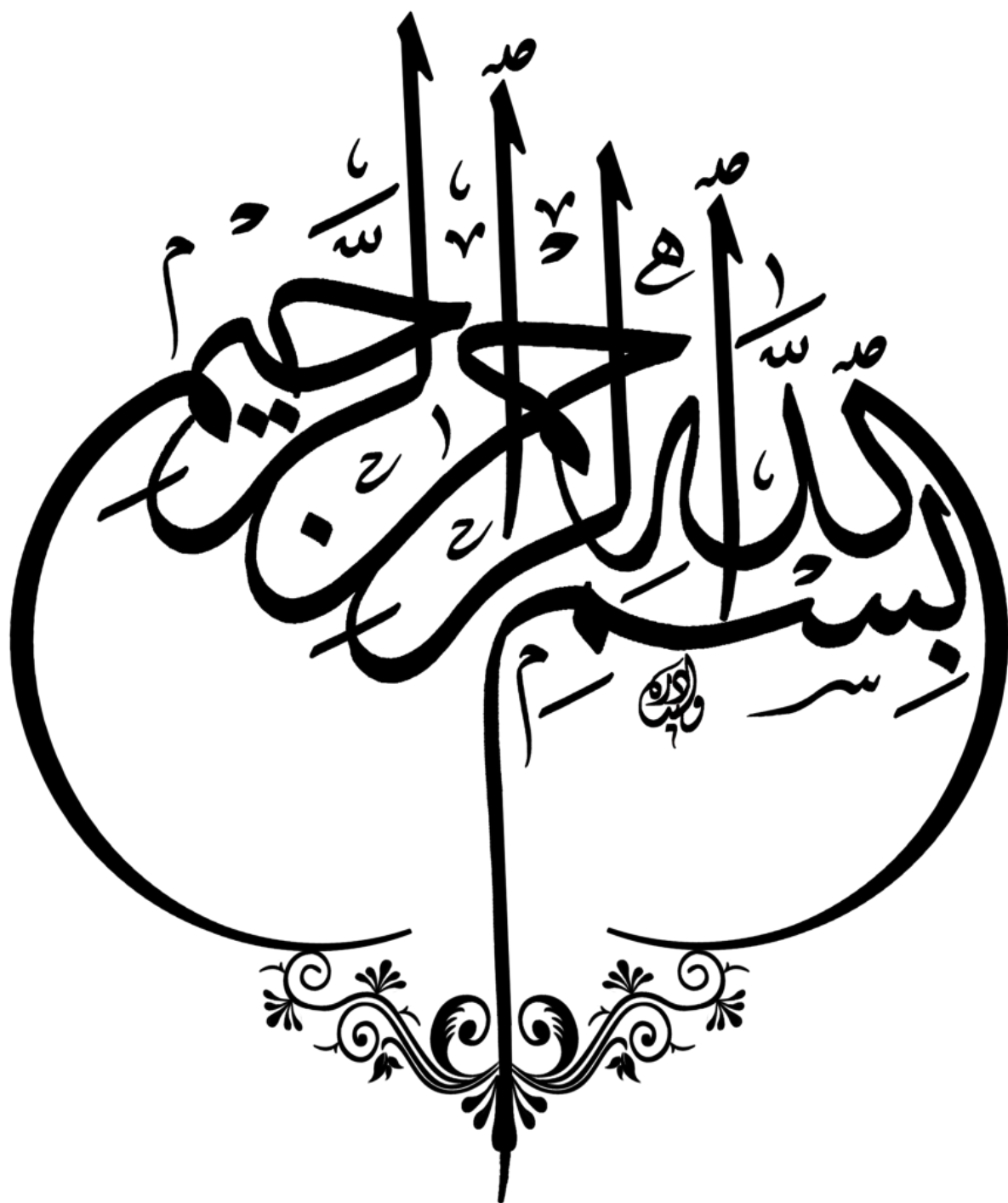
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"وَإِذْ قَالَ رَبُّكَ لِلْمَلَائِكَةِ إِنِّي جَاعِلٌ فِي الْأَرْضِ خَلِيفَةً"

البقرة:30.

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Acknowledgment

“فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَىٰ إِلَيْكَ وَحْيُهُ وَقُلْ رَبِّ زِدْنِي عِلْمًا”

Alhamdulillah, Prayers and peace be upon the best teacher Muhammad (PBUH). Praise be to Allah who made it easy for us to complete this research. May this research be useful for others to benefit from.

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Abstract:

This research paper examines the impact of sustainability on supply chain management. Sustainability has become a critical issue in recent times, and companies are under pressure to minimize their impact on the environment while ensuring their business operations are profitable. The study explores the various ways in which sustainability affects supply chain management, including the need for companies to adopt sustainable practices, the role of stakeholders in promoting sustainability, and the benefits of sustainable supply chain management. The paper also evaluates the challenges that companies face in implementing sustainable supply chain management practices and offers recommendations for addressing these challenges. Finally, the study concludes that sustainable supply chain management is not only necessary for protecting the environment but also for achieving long-term business success and creating value for stakeholders.

Keywords: sustainability, supply chain, environmental impact, social impact, challenges and opportunities.

Chapter One: 1. Introduction

In recent years, sustainability has gained significant attention in the context of supply chain management. Traditionally, supply chain operations focused primarily on efficiency, cost reduction, and timely delivery. However, with growing concerns about climate change, resource scarcity, and social inequality, there is an increasing realization that the long-term success and survival of organizations depend on integrating sustainability principles into their supply chain practices (Yu Xia and Thomas Li-Ping Tang, 2011).

Sustainability in the supply chain refers to the adoption of environmentally and socially responsible practices that minimize negative impacts on the planet and society. This approach recognizes the need to balance economic growth with environmental protection and social well-being.

The importance of sustainability in the supply chain stems from several key factors. First, consumers and stakeholders are becoming more conscious of sustainability issues and are actively seeking products and services from ethically and environmentally responsible companies. Sustainability practices can enhance brand image, attract loyal customers, and contribute to increased market share.

Second, integrating sustainability into the supply chain can result in significant cost savings and operational efficiencies in the long run. For example, by reducing energy consumption and waste generation, organizations can save on resource expenses and mitigate regulatory risks. Sustainable practices also promote collaboration and transparency among supply chain partners, leading to improved risk management and better decision-making.

Third, sustainability in the supply chain mitigates environmental impacts such as pollution, deforestation, and greenhouse gas emissions. It prioritizes the preservation of natural resources,

biodiversity, and ecosystems. By implementing sustainable sourcing, production, and distribution practices, organizations can contribute to the global effort to combat climate change and preserve a healthy environment for future generations.

Moreover, sustainability in the supply chain has social implications. It supports fair labor practices, safe working conditions, and the well-being of communities affected by supply chain activities. By promoting responsible sourcing and ethical business conduct, organizations can contribute to the development and empowerment of local communities. (Steven Seuring, 2012).

Recently and since 2016, Sustainability has become the heart of everything in the Saudi 2030 Vision given its essential role internationally in the energy market and driving the global economic growth and development. This Paper will explore A Comprehensive analysis of Jubail Industrial City's Chemical Companies through the two of the Key Variables of the Vision 2030, Sustainability and Supply Chain. Moving Forward in this Paper the following points will be discussed. Firstly, A Literature Review for which the sustainability in the context of the supply chain will be defined, Theoretical frameworks and models for assessing sustainability impacts and Key challenges and barriers in implementing sustainable practices. Subsequently In Chapter Two, the Sustainability and its impacts Environmentally, Socially, Economically and Technologically on the supply chain will be shown. Then In chapter Three, the results of the conducted Survey on the selected sample will be represented and discussed. Finally, the Recommendations and the Conclusion will be provided.

Research objectives and Research Questions:

1) Research objectives:

- a) To examine the impact of sustainability initiatives on supply chain performance.
- b) To identify the key drivers and barriers of implementing sustainable practices in the supply chain.
- c) To investigate the role of stakeholders (e.g., suppliers, customers, regulators) in promoting sustainability in the supply chain.

2) Research Questions:

- a) - What are the key sustainability practices that can be implemented in the supply chain?
- b) - How do sustainability practices affect supply chain performance in terms of cost, quality, and delivery?
- c) - What are the challenges and barriers to implementing sustainable practices in the supply chain?

- d) - How do stakeholders perceive the importance of sustainability in the supply chain and what actions do they take to promote it?
- e) - What is the relationship between sustainable supply chain practices and corporate social responsibility?
- f) - How can companies measure and evaluate the sustainability of their supply chain?

2. Literature Review

a. Defining sustainability in the context of the supply chain:

Sustainability in the context of the supply chain refers to the integration of environmentally and socially responsible practices and principles throughout all stages of the supply chain, from sourcing raw materials to delivering the final product or service to customers. It involves considering the long-term impacts of supply chain operations on the environment, society, and the economy. Sustainable supply chain management aims to minimize negative environmental effects such as pollution, waste generation, and carbon emissions. It also seeks to uphold ethical labor practices, support local communities, and promote fair trade. Ultimately, the goal of sustainable supply chain management is to create a balance between economic growth, environmental stewardship, and social well-being, ensuring that the needs of current and future generations are met (Manuela D' Eusanio, Alessandra Zamagbi, Luigia Petti ,2019).

In the world of business, especially in the supply chain sector, sustainability issues are becoming increasingly important. Companies have made it a point to integrate sustainable practices within their supply chain operations over the last few years. As such, it has implications for every aspect of the supply chain, from sourcing raw materials, Manufacturing to delivering finished products to customers (Ricardo Chalmeta, Jose Eduardo Barqueros Monoz, 2021). In this literature review, we will explore the impact of sustainability on the supply chain and within its main Stages, drawing on a range of academic and industry sources.

Sourcing:

One key area where sustainability has an impact on the supply chain is in the sourcing of raw materials. Many companies are now seeking to source materials from suppliers who meet certain sustainability criteria, such as using renewable energy or minimizing waste. This can help to reduce the environmental impact of the supply chain and ensure that resources are used in a responsible and efficient manner (Singh et al., 2020). In addition, sustainable sourcing can also help to mitigate risks associated with climate change and other environmental factors, such as water scarcity (Verma et al., 2021).

Manufacturing:

Sustainability also has implications for the manufacturing stage of the supply chain. Companies are increasingly adopting sustainable manufacturing practices, such as using renewable energy sources or reducing waste and emissions. These practices can help to reduce the environmental impact of manufacturing processes, as well as improve efficiency and reduce costs (Ko et al., 2020). In addition, sustainable manufacturing can also help to enhance the reputation of a company and improve its relationships with stakeholders, including customers and investors (Sarkis et al., 2020).

Distribution:

The distribution stage of the supply chain is another area where sustainability can have an impact. Companies are now exploring ways to optimize their logistics and transportation networks to reduce emissions and minimize waste. This includes using alternative modes of transportation, such as electric vehicles or rail transport, as well as adopting more efficient packaging and delivery methods (Sarkis et al., 2020). Sustainable distribution can help to reduce costs and enhance the reputation of a company, while also contributing to broader environmental goals, such as reducing greenhouse gas emissions (Ghani et al., 2021).

b. Theoretical frameworks and models for assessing sustainability impacts

There are several theoretical frameworks and models that can be used to assess sustainability impacts in the supply chain. Here are a few examples:

1. Triple Bottom Line (TBL): The TBL framework considers three main dimensions of sustainability: economic, social, and environmental. It aims to assess the impacts on these three dimensions throughout the supply chain to achieve a balance between economic growth, social well-being, and environmental protection. (Rasa Dainienė and Lina Dagilienė . 2015)
2. Life Cycle Assessment (LCA): LCA is a widely used model to evaluate the environmental impact of a product or service throughout its entire life cycle, from raw material extraction to disposal. It helps identify areas within the supply chain where improvements can be made to minimize environmental harm. (Ya Hong Dong, S. Thomas Ng, 2015)
3. Carbon Foot printing: This model measures the total amount of greenhouse gas emissions associated with a product or organization. It provides insights into the carbon impact of the supply chain activities and helps identify opportunities for carbon reduction strategies, such as energy efficiency and renewable energy adoption. (JA Cooper, Brian P McCullough Journal of Cleaner Production 318, 128475, 2021)

4. **Social Impact Assessment:** This model focuses on evaluating the social implications of supply chain operations. It considers factors such as labor conditions, human rights, community development, and stakeholder engagement to assess the social sustainability of the supply chain. (João Fontes, Peter Tarne, Marzia Traverso & Paula Bernstein, 2018)
5. **Sustainable Supply Chain Scorecards:** These scorecards provide a systematic approach to evaluate various sustainability indicators in the supply chain, such as energy consumption, waste generation, water usage, ethical sourcing, and supplier performance. They typically use a set of metrics and key performance indicators (KPIs) to assess and benchmark sustainability performance. (Fahimeh Aliakbari Nouri, Mohsen Shafiei Nikabadi, Laya Olfat, 2018)

c. **Key challenges and barriers in implementing sustainable practices:**

Implementing sustainable practices is essential for creating a more environmentally, socially, and economically sustainable world. However, there are significant challenges and barriers that organizations and individuals face when attempting to adopt and implement sustainable practices. These challenges may include resistance to change, lack of awareness or understanding of sustainable practices, inadequate financial resources, regulatory barriers, and a lack of collaboration and coordination among stakeholders. (Rasheda Akter. 2021). Overcoming these challenges requires a concerted effort from all stakeholders, including governments, businesses, non-governmental organizations, and individuals, to create a more sustainable future.

3. Methodology

To gain more an in Depth understanding and to draw a conclusion with providing recommendation for improving Sustainability within the Supply chain world This research adopts a descriptive methodology to investigate the impact of the supply chain on sustainability by collecting and analyzing data through observation, surveys, and utilizing deferent related performance indicators.

Chapter Two:

4. Sustainability Impacts on the Supply Chain

a. Environmental impacts

The environmental impacts on the supply chain are the various ways in which the operations and activities within the supply chain can affect the natural environment. These impacts can occur

throughout the entire lifecycle of a product, from the extraction of raw materials to the disposal of waste and beyond.

Some common environmental impacts in the supply chain include:

1. Greenhouse Gas Emissions: Manufacturing processes, transportation, and energy consumption contribute to the emission of greenhouse gases such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), which contribute to climate change. (William F Lamb, 2021)
2. Pollution and Waste: Chemical pollutants, solid waste, and wastewater discharged from manufacturing facilities or improper waste management can contaminate air, water, and soil.
3. Deforestation and Habitat Destruction: Unsustainable sourcing of raw materials, particularly in industries like logging, agriculture, and mining, can result in deforestation and habitat destruction, leading to the loss of biodiversity. (Bodo, T., Gimah, B. G., & Seomoni, K. J. 2021)
4. Water and Energy Consumption: Excessive water usage and energy consumption in production processes can strain natural resources and contribute to resource depletion.
5. Air Pollution: Emission of pollutants, such as particulate matter and harmful gases, from transportation vehicles and manufacturing processes can contribute to air pollution and degrade air quality.
6. Packaging Waste: Excessive and non-recyclable packaging materials contribute to waste generation and landfill accumulation.

b. Social Impacts:

Sustainability has significant social impacts on the supply chain, influencing various stakeholders involved. Firstly, it promotes fair labor practices by ensuring safe working conditions, fair wages, and equal opportunities for workers along the supply chain. This improves the livelihoods of workers and contributes to poverty reduction. Secondly, sustainability encourages the inclusion and empowerment of local communities, particularly in developing regions. It emphasizes community engagement, respect for indigenous rights, and the preservation of cultural heritage. Thirdly, sustainable supply chains prioritize ethical sourcing and responsible production, reducing the negative social impacts associated with activities such as child labor, forced labor, and environmental pollution. By considering social factors, sustainability in the supply chain fosters a more equitable and inclusive society while addressing systemic issues and promoting positive change. (Sarkis et al. (2011)

c. Economic impacts

Sustainability has profound economic impacts on the supply chain, providing both short-term benefits and long-term value creation. Implementing sustainable practices can lead to cost savings through improved resource efficiency, reduced waste, and optimized logistics. Sustainable supply chain practices,

such as energy conservation and waste reduction, can result in significant cost reductions for businesses. Moreover, sustainability can enhance a company's reputation, brand image, and customer loyalty, ultimately driving market competitiveness and long-term profitability. The organizations with sustainable supply chains experienced higher financial performance and increased market share compared to their peers. By integrating sustainability into the supply chain, businesses can achieve economic benefits while also contributing to environmental and social well-being, creating a win-win scenario for all stakeholders involved (Zabihollah Rezaee ,2018).

d. Technological impacts:

Sustainability has significant technological impacts on the supply chain, driving innovation, efficiency, and transparency. Advancements in technology, such as the Internet of Things (IoT), big data analytics, and blockchain, have enabled greater visibility and traceability throughout the supply chain, promoting sustainability practices. For instance, IoT sensors can monitor energy consumption, optimize transportation routes, and track environmental conditions, leading to reduced resource use and emissions. Big data analytics provide valuable insights for identifying areas of improvement, optimizing processes, and making informed decisions to minimize waste and enhance efficiency. Additionally, blockchain technology ensures transparency and accountability by securely recording and verifying supply chain transactions, which helps combat issues like counterfeit products and unethical sourcing. These technological advancements have the potential to revolutionize supply chains, making them more sustainable, resilient, and responsive to evolving environmental and social challenges. (Sodhi, M. S., & Tang, C. S. 2011)

Chapter Three:

Results and Discussions:

This section will elaborate the results and analysis about the impact of sustainability on supply chain for the comprehensive analysis of Jubail industrial city. The discussion contains some descriptive statistics including a bar graph and finally Pearson Correlation analysis has been performed.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	34	54.8	54.8	54.8
	Male	28	45.2	45.2	100.0
	Total	62	100.0	100.0	

Table (1): Distribution of Genders

The table displays the distribution of genders among the 62 people who made up the sample. The gender distribution of these people is as follows: 28 (45.2%) males and 34 (54.8%) females. The gender distribution in the given sample size can be summarized in the table above.

Years of Experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-3	19	30.6	30.6	30.6
	4-6	9	14.5	14.5	45.2
	7-9	14	22.6	22.6	67.7
	10+	20	32.3	32.3	100.0
	Total	62	100.0	100.0	

Table (2): distribution of responders based on their years of experience

The distribution of responders based on their years of experience is shown in the table. It displays the quantity and proportion of respondents for each experience level, including 0–3 years, 4-6 years, 7-9 years, and 10 years or more. The cumulative percentage of respondents up to each experience range is shown in the "Cumulative Percent" column. For instance, only 7-9 years of experience are reported highest among others by 67.7% of respondents.

Role of the Respondents in Organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Operations and production	31	50.0	50.0	50.0
	Manager	21	33.9	33.9	83.9
	Executive	10	16.1	16.1	100.0
	Total	62	100.0	100.0	

Table (3): respondents' positions within the organization means

The table summarizes the respondents' positions within the organization. Each role category (Operations and production, Manager, and Executive) is represented by the number and proportion of respondents. The running sum of respondents up to each role category is shown in the "Cumulative Percent" column. For instance, 83.9% of respondents have management-level positions or lower, whereas 16.1% serve in executive roles.

Type of the Organization Respondents works					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Industrial	39	62.9	62.9	62.9

	Trading	11	17.7	17.7	80.6
	Recycling	1	1.6	1.6	82.3
	Educational	5	8.1	8.1	90.3
	Health and Medical	6	9.7	9.7	100.0
	Total	62	100.0	100.0	

Table (4): distribution of responders across different organizational types

The distribution of responders across different organizational types is seen in the table. For each of the following organization types: Industrial, Trading, Recycling, Educational, and Health and Medical, it shows the number and percentage of responses. The cumulative percentage of respondents up to each organization type is displayed in the "Cumulative Percent" column. In the industrial or trading sectors, for instance, 80.6% of respondents work, whilst 9.7% work in health and medical organizations.

Moreover, to assess the impact of sustainability on the supply chain a questionnaire was developed, and some questions have been asked of the respondents. The descriptive statistics for assessing the impact of sustainability on the supply chain are as follows:

The organization uses sustainability criteria to evaluate performance.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	11	17.7	17.7	17.7
	Agree	28	45.2	45.2	62.9
	Neutral	14	22.6	22.6	85.5
	Disagree	5	8.1	8.1	93.5
	Strongly disagree	4	6.5	6.5	100.0
	Total	62	100.0	100.0	

Table (5): sustainability criteria means

The table demonstrates how performance is evaluated using sustainability criteria by respondents' organizations. For each degree of agreement—strongly agree, agree, neutral, disagree, and strongly disagree—it indicates the total number and percentage of responses. The "Cumulative Percent" column shows the cumulative sum of answers up to each degree of agreement. For instance, 62.9% of the respondents agreed or strongly agreed that their organizations assess performance using sustainability criteria. However, 6.5% of respondents strongly disagreed with this idea about sustainability.

The organization delivers environmental management training to improve employee awareness, skills, and know-how in sustainability management					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	21	33.9	33.9	33.9
	Agree	22	35.5	35.5	69.4
	Neutral	10	16.1	16.1	85.5
	Disagree	8	12.9	12.9	98.4
	Strongly disagree	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

Table (6): Environmental management training means

The above table shows if environmental management training is offered by respondents' organizations to increase staff knowledge and proficiency in sustainability management. It displays the number and proportion of responses for various degrees of agreement: agree, neutral, agree, disagree, and strongly disagree. The "Cumulative Percent" column shows the cumulative sum of answers up to each degree of agreement. For instance, 69.4% of respondents agree or strongly agree that their companies provide environmental management training to increase staff members' knowledge of and aptitude for sustainability.

The organization encourages employees to volunteer for local charitable works.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	16	25.8	25.8	25.8
	Agree	18	29.0	29.0	54.8
	Neutral	16	25.8	25.8	80.6
	Disagree	8	12.9	12.9	93.5
	Strongly disagree	4	6.5	6.5	100.0
	Total	62	100.0	100.0	

Table (7): The organization encourages employees to volunteer for local charitable works means

The table (7) explores whether respondents' organizations promote employee volunteering for local charitable activities. It presents the count and percentage of responses for different levels of agreement: Strongly agree, Agree, Neutral, Disagree, and Strongly disagree. The "Cumulative Percent" column provides the cumulative total of responses up to each agreement level. For example, 54.8% of

respondents agree or strongly agree that their organizations encourage employees to volunteer for local charitable works.

Does your company have a sustainability policy or strategy in place?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	15	24.2	24.2	24.2
	Agree	26	41.9	41.9	66.1
	Neutral	13	21.0	21.0	87.1
	Disagree	5	8.1	8.1	95.2
	Strongly disagree	3	4.8	4.8	100.0
	Total	62	100.0	100.0	

Table (8): The organization sustainability policy means

The table (8) shown assesses whether the companies of the respondents have a sustainability policy or strategy in place. The "Cumulative Percent" column shows the cumulative percentage of responses up to each agreement level. In this regard, 66.1% agree or strongly agree that their organizations have a sustainability policy or strategy in place. However, 4.8% strongly disagreed.

The organization Should have optimization processes to reduce of solid wastes, air emission, and noise, and others.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	20	32.3	32.3	32.3
	Agree	29	46.8	46.8	79.0
	Neutral	7	11.3	11.3	90.3
	Disagree	5	8.1	8.1	98.4
	Strongly disagree	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

Table (9): The organization sustainability policy means

The table (9) asked respondents if they believe their companies should apply optimum treatments to reduce solid waste, air pollution, noise, and other challenges. It displays the number and percentage of responses for the following levels of agreement: strongly agree, agree, neutral, disagree, and strongly disagree. For instance, 79.0% of respondents agree or strongly agree that companies should undertake waste reduction and environmental improvement plans.

Your company have procedures in place to assess and manage the safety and environmental impact of chemicals used or produced in the supply chain?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	16	25.8	25.8	25.8
	Agree	28	45.2	45.2	71.0
	Neutral	10	16.1	16.1	87.1
	Disagree	5	8.1	8.1	95.2
	Strongly disagree	3	4.8	4.8	100.0
	Total	62	100.0	100.0	

Table (10): The organization sustainability policy means

The table (10) explores whether respondents' companies have procedures set up to evaluate and manage the safety and environmental effect of chemicals used or brought in by their supply chains. The "Cumulative Percent" column displays the running sum of responses up to each degree of agreement. For example, 71.0% of respondents said their organizations have policies in place to assess and monitor the safety and environmental effect of chemicals in the supply chain.

The organization cooperates with the customers to achieve sustainability objectives.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	8	12.9	12.9	12.9
	Agree	28	45.2	45.2	58.1
	Neutral	19	30.6	30.6	88.7
	Disagree	6	9.7	9.7	98.4
	Strongly disagree	1	1.6	1.6	100.0
	Total	62	100.0	100.0	

Table (11): The collaboration with customers means

Table (11) examines whether the organization collaborates with customers to achieve sustainability objectives. It presents the count and percentage of responses for different levels of agreement: Strongly agree, Agree, Neutral, Disagree, and Strongly disagree. The "Cumulative Percent" column illustrates the running total of responses up to each agreement level. For case, 58.1% of respondents agree or strongly agree that their organization cooperates with customers to achieve sustainability goals.

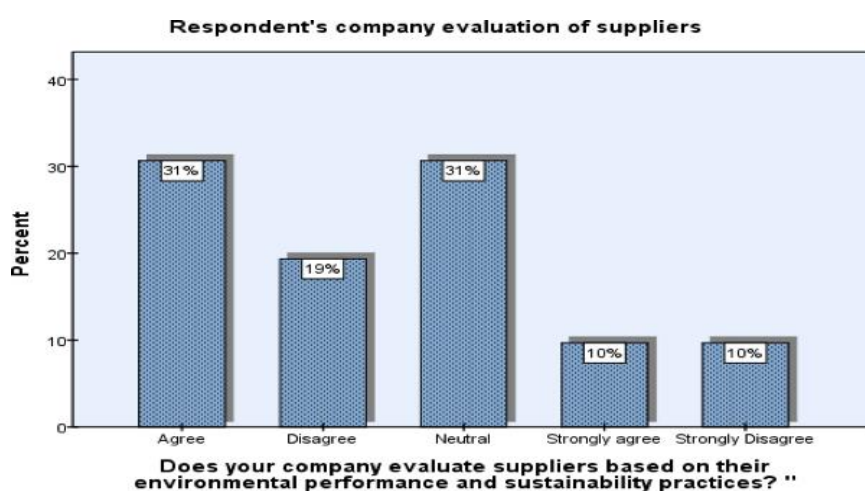
There is a government pressure to apply sustainability initiatives.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	17	27.4	27.4	27.4
	Agree	18	29.0	29.0	56.5
	Neutral	20	32.3	32.3	88.7
	Disagree	5	8.1	8.1	96.8
	Strongly disagree	2	3.2	3.2	100.0
	Total	62	100.0	100.0	

Table (12): The government pressure means

Table (12) explores whether organizations face government pressure to implement sustainability strategies. It shows the number and percentage of responses for the following levels of agreement: strongly agree, agree, neutral, disagree, and strongly disagree. The "Cumulative Percent" column displays the running sum of responses up to each degree of agreement. For example, 56.5% of respondents agreed or strongly agreed that their organizations are under pressure from the government to implement sustainability efforts.

To elaborate more of the study some graphical representations are performed. Which includes Bar charts. One of the most fundamental chart types is the bar chart, and one of your most useful tools when it comes to exploring and understanding your data. A bar chart (aka bar graph, column chart) plots numeric values for levels of a categorical feature as bars. Levels are plotted on one chart axis, and values are plotted on the other axis. Each categorical value claims one bar, and the length of each bar corresponds to the bar's value. Bars are plotted on a common baseline to allow for easy comparison of values.

Graph (1) bar chart explains the distribution of respondents' company sustainability evaluation

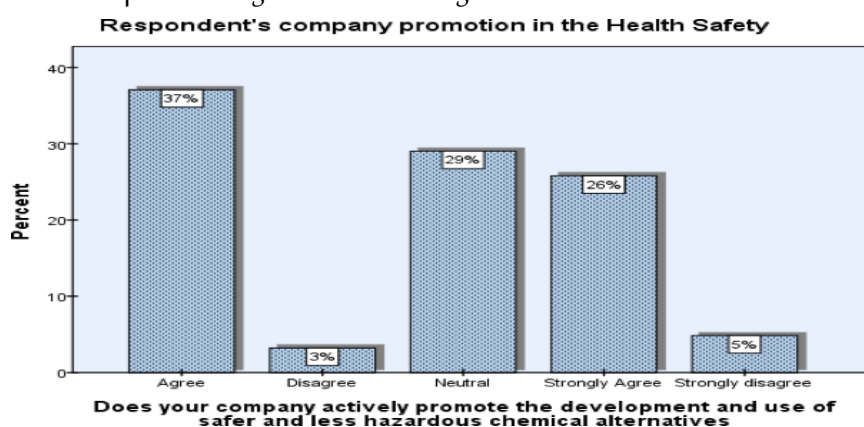


Graph 1

accordingly. Which tells us that 31% of the respondents agreed about their company concerns over supply chain management and sustainability.

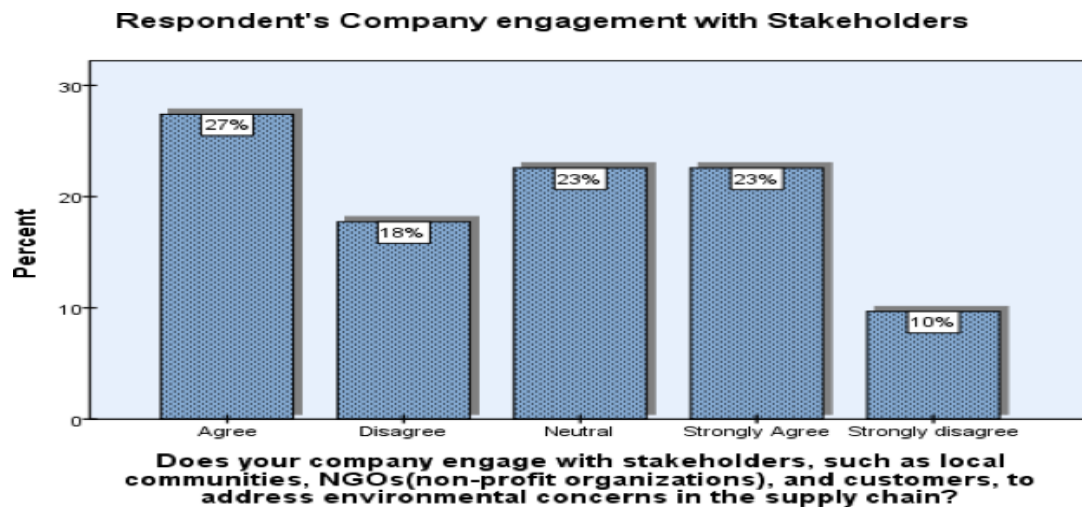
Graph (2) bar chart shows the respondent's organization concern about health and safety of their workers. Which shows 37% of the respondents agreed that their organization shows

great concern to their employees and development of their health and safety over the use of lesser hazardous chemical alternatives.



Graph 2

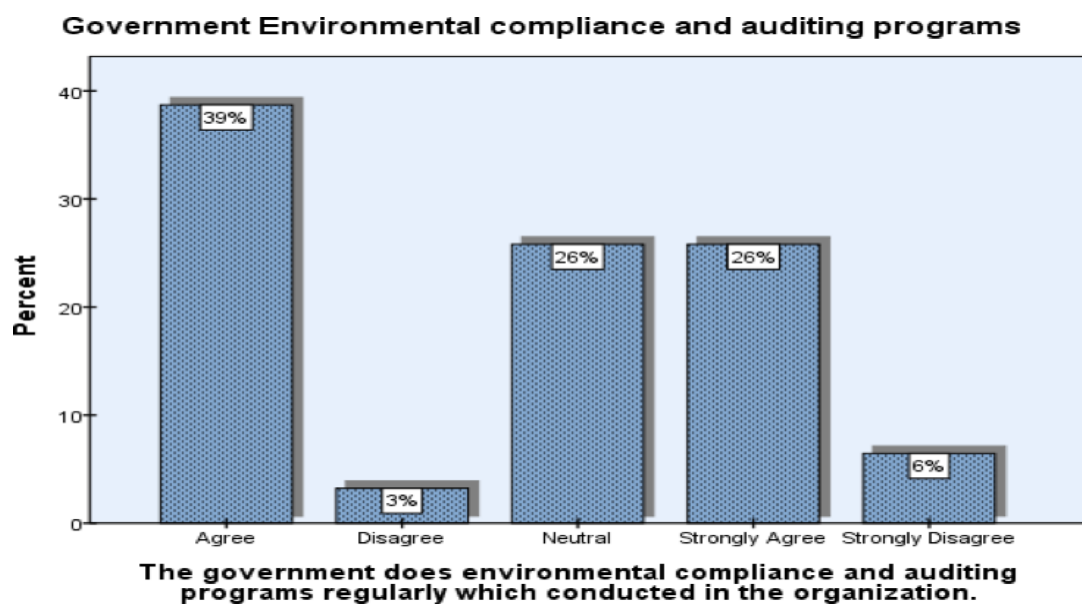
Moreover, the government also shows great concern over the health of their employees and the companies providing different services in the city of Jubail. To show these results in a bar chart we performed some of the analysis using IBM-SPSS Version-22. Different results of the bar charts are shown below.



Graph 3

Graph (3) bar chart shows respondents point of view over respondent's company engagement with different stakeholders such as local communities, NGOs (Non-profit organizations), and customers. Which tells us that 27% of respondents agreed upon their company's concern over their engagement with different stakeholders.

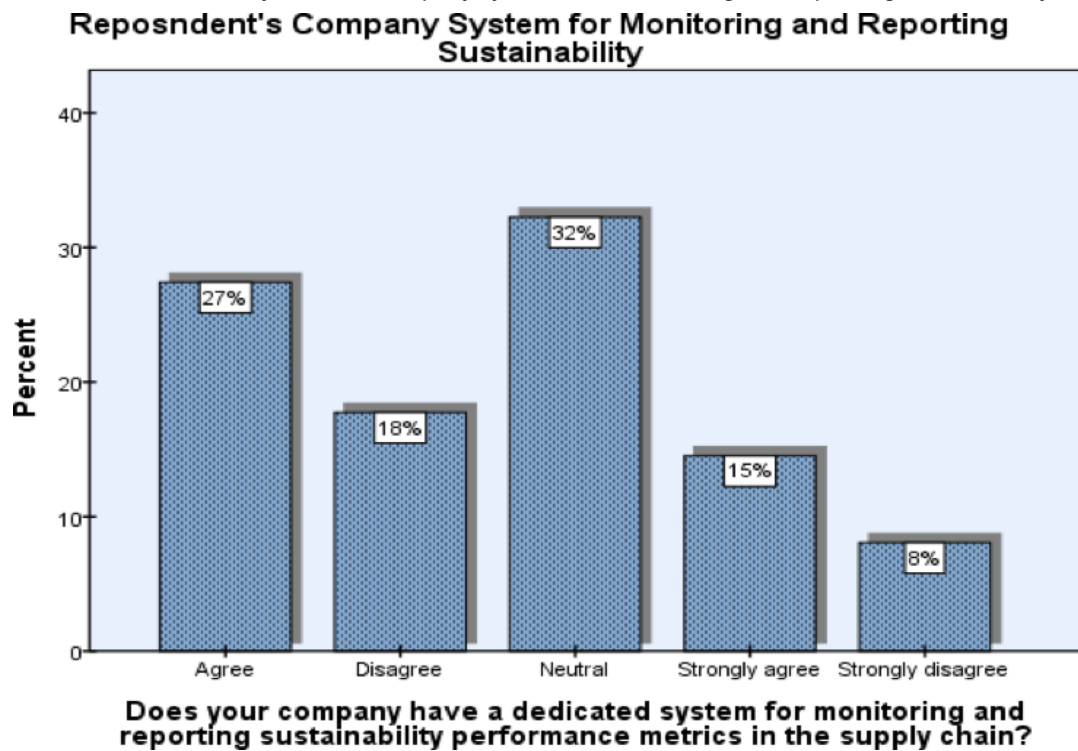
To make auditing and management fruitful the government has planned a lot, their great concern was shown to their employees' health and wellbeing. To get insight into this matter we asked the respondents about their health and wellbeing and how their government ensures their health and wellbeing.



Graph 4

The Graph (4) bar chart shows the great concern of the respondents about government doing environmental compliance and auditing programs regularly. Up to this extent 39% of respondents agreed upon their government's great concern over their health and safety. However, only 03% disagreed to their government concern.

Moreover, companies also ensure their employees' health and safety by monitoring and auditing systems accomplished within their company. Therefore, below Graph (5) bar chart shows that 32% of respondents gave neutral answers to this question, while keeping in view 27% of respondents agreed over this question. However, 8% of respondents strongly disagreed to this question. Which corresponds to their non availability of their company system for monitoring and reporting sustainability.



Graph 5

Pearson's

Correlation

Analysis:

		Gender:	What is your role in the organization
Gender:	Pearson Correlation	1	-.394**
	Sig. (2-tailed)		.002
	N	62	62
What is your role in the organization	Pearson Correlation	-.394**	1
	Sig. (2-tailed)	.002	
	N	62	62
**. Correlation is significant at the 0.01 level (2-tailed).			

Table (13): Correlation between "Gender" and "Role of the respondent in the organization."

Table (13) shows the correlation between two variables: "Gender" and "Role of the respondent in the organization." The Pearson Correlation coefficient is -0.394, indicating a moderate negative correlation between these two variables. The correlation is statistically significant at the 0.01 level (2-tailed), meaning the relationship between gender and organizational role is unlikely to have occurred by chance.

		The organization cooperates with the customers to achieve sustainability objectives.	The organization uses sustainability criteria to evaluate performance.
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.237
	Sig. (2-tailed)		.063
	N	62	62
The organization uses sustainability criteria to evaluate performance.	Pearson Correlation	.237	1
	Sig. (2-tailed)	.063	
	N	62	62

Table (14): Correlation between "Organization cooperation with customers" and "Organization uses of sustainability criteria"

Table (14) displays the correlation between two variables: "The organization cooperates with the customers to achieve sustainability objectives" and "The organization uses sustainability criteria to evaluate performance." The Pearson Correlation coefficient between these variables is 0.237, indicating a positive but weak correlation. The correlation is not statistically significant at the 0.05 level (2-tailed), as the p-value (Sig. or significance value) is 0.063, which is higher than the common threshold of 0.05.

		The organization cooperates with the customers to achieve sustainability objectives.	Does your company have a sustainability policy or strategy in place?
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.286*
	Sig. (2-tailed)		.024
	N	62	62
	Pearson Correlation	.286*	1
Does your company have a sustainability policy or strategy in place?	Sig. (2-tailed)	.024	
	N	62	62
*. Correlation is significant at the 0.05 level (2-tailed).			

Table (15): Correlation between: "organization cooperation with customers " and "The Company sustainability policy"

Table (15) represents the correlation between variables: "The organization cooperates with the customers to achieve sustainability objectives" and "Does your company have a sustainability policy or strategy in place?". The Pearson Correlation coefficient between these variables is 0.286, indicating a positive but moderate correlation. The correlation is statistically significant at the 0.05 level (2-tailed), as denoted by the asterisk (*) and the p-value (Sig. or significance value) of 0.024. Suggesting rejection of the null hypothesis that there is no correlation between the mentioned variables.

		The organization cooperates with the customers to achieve sustainability objectives.	Does your company actively promote the development and use of safer and less hazardous chemical alternatives
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.306 [*]
	Sig. (2-tailed)		.016
	N	62	62
Does your company actively promote the development and use of safer and less hazardous chemical alternatives	Pearson Correlation	.306 [*]	1
	Sig. (2-tailed)	.016	
	N	62	62
*. Correlation is significant at the 0.05 level (2-tailed).			

Table (16): Correlation between: "organization cooperation with customers " and "Company development of alternatives "

Table (16) explains the correlation between two variables: "The organization cooperates with customers to achieve sustainability objectives" and "Does your company actively promote the development and use of safer and less hazardous chemical alternatives?" The Pearson Correlation coefficient between these variables is 0.306, indicating a positive and moderate correlation. The correlation is statistically significant at the 0.05 level, and the p-value of 0.016, which is less than the threshold of 0.05.

		The organization cooperates with the customers to achieve sustainability objectives.	Does your company evaluate suppliers based on their environmental performance and sustainability practices? "
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.263 [*]
	Sig. (2-tailed)		.039
	N	62	62
	Sig. (2-tailed)	.039	
	N	62	62
*. Correlation is significant at the 0.05 level (2-tailed).			

Table (17): Correlation between: "organization cooperation with customers " and "Company evaluation of suppliers "

Table (17) shows the correlation between variables: "The organization cooperates with customers to achieve sustainability objectives" and "Does your company evaluate suppliers based on their environmental performance and sustainability practices?". The Pearson Correlation coefficient between

these variables is 0.263, indicating a positive and moderate correlation. The correlation is statistically significant at the 0.05 level and the p-value of 0.039.

		The organization cooperates with the customers to achieve sustainability objectives.	Does your company engage with stakeholders, such as local communities, NGOs (non-profit organizations), and customers, to address environmental concerns in the supply chain?
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.451**
	Sig. (2-tailed)		.000
	N	62	62
Does your company engage with stakeholders, such as local communities, NGOs (non-profit organizations), and customers, to address environmental concerns in the supply chain?	Pearson Correlation	.451**	1
	Sig. (2-tailed)	.000	
	N	62	62
**. Correlation is significant at the 0.01 level (2-tailed).			

Table (18): Correlation between: "organization cooperation with customers " and "Company engagement with stakeholders "

Table (18) indicates the correlation between two variables: "The organization cooperates with customers to achieve sustainability objectives" and "Does your company engage with stakeholders, such as local communities, NGOs (non-profit organizations), and customers, to address environmental concerns in the supply chain?" The Pearson Correlation coefficient between these variables is 0.451, suggesting a strong positive correlation. The correlation is highly significant at the 0.01 level (2-tailed), and the p-value of 0.000, which is much lower than the threshold of 0.01.

		The organization cooperates with the customers to achieve sustainability objectives.	There is a government pressures to apply sustainability initiatives.
The organization cooperates with the customers to achieve sustainability objectives.	Pearson Correlation	1	.310*
	Sig. (2-tailed)		.014
	N	62	62
There is a government pressures to apply sustainability initiatives.	Pearson Correlation	.310*	1
	Sig. (2-tailed)	.014	
	N	62	62
*. Correlation is significant at the 0.05 level (2-tailed).			

Table (19): Correlation between: "organization cooperation with customers " and " government pressure to apply sustainability"

Table (19) demonstrates the correlation between variables: "The organization cooperates with customers to achieve sustainability objectives" and "There is government pressure to apply sustainability initiatives." The Pearson Correlation coefficient between these variables is 0.310, indicating a positive and moderate correlation. The correlation is statistically significant at the 0.05 level (2-tailed), and the p-value of 0.014, which is below the threshold of 0.05.

In conclusion, our findings suggest that organizations that cooperate with customers to achieve sustainability objectives tend to exhibit several positive correlations with various sustainability-related practices and factors. This alignment indicates that a commitment to collaboration with customers for sustainability objectives is often linked with practices such as having sustainability policies, engaging with stakeholders, evaluating suppliers based on environmental performance, and responding to government pressure for sustainability initiatives.

Reviewers:

-Mr.Salman AlShammari

Supply Chain Management Manager at GCI

-Abdulaziz Althubaity

VP at Saudi Tabreed.

-Abdalmohsin Almesfir

Procurement Section Head

Fields of Study:

Spatial boundaries:

Jubail Industrial City was chosen because of its destination for local chemical production with a social status, as it is linked to identity of the Saudi society, an industrial area and chemical production with long history of supply chain internationally. It has a great sustainability impact locally and internationally.

Objectivity Border:

Studying the sustainability impact in Jubail Industrial City has a high value and quality being the highest chemical industrial cities in the world since 1975 it is important to keep track of its sustainability and how it is impacting the supply chain and keep improving it.

Time Limits:

Based on the Previous studies of sustainability since 2008, as well as reference and research applicable to our current time 2023.

The researched took time between 6 June 2023 to 27 August 2023

The survey 1 August 2023 to 24 August 2023

Tools used in the study:

An electronic questionnaire was used to collect information.

In depth working on the chemical industrial companies in Jubail

Using and analyzing the UN Goals in Saudi Arabia and in-depth study of its development plan

Recommendation:

Recommendations for Implementing Sustainable Practices in Supply Chain Management for the Chemical Industries:

- 1) Establish Supply Chain Transparency and Traceability:
 - a) Collaborate with suppliers to establish clear communication channels and ensure compliance with ethical and environmental standards.
 - b) Monitor and audit suppliers to identify potential risks and take proactive measures to address them.
- 2) Promote Material Selection and Eco-friendly Alternatives:
 - a) Replace hazardous substances with greener alternatives and prioritize recyclable or biodegradable materials.
 - b) Collaborate with research institutions, industry associations, and regulatory bodies to identify and adopt sustainable alternatives.
- 3) Optimize Energy Efficiency and Reduce Emissions:
 - a) Implement measures such as process improvements, equipment upgrades, and utilization of renewable energy sources to optimize energy efficiency.

- b) Reduce greenhouse gas emissions to minimize environmental impact and comply with regulations.
- 4) Embrace Waste Management and Circular Economy Principles:
 - a) Minimize waste generation and optimize recycling processes.
 - b) Explore opportunities for resource recovery and implement closed-loop systems.
- 5) Foster Collaboration and Industry Initiatives:
 - a) Engage in collaborations, industry initiatives, and partnerships focused on sustainability.
 - b) Participate in organizations such as the Responsible Care® initiative for access to best practices and knowledge sharing.
- 6) Prioritize Continuous Improvement:
 - a) Implement a culture of continuous improvement in sustainability performance.
 - b) Regularly assess and measure key performance indicators related to sustainability and set targets for improvement.
- 7) Engage Stakeholders:
 - a) Involve suppliers, customers, and other stakeholders in sustainability efforts.
 - b) Seek feedback and input from stakeholders to drive innovation and ensure alignment with sustainability goals.
- 8) Educate and Train Employees:
 - a) Provide training programs and educational resources to raise awareness about sustainability practices.
 - b) Foster a sense of responsibility and engagement among employees to drive sustainable behaviors.
- 9) Monitor and Report Progress:
 - a) Establish a robust monitoring and reporting system to track progress towards sustainability goals.
 - b) Communicate transparently with stakeholders about sustainability initiatives and achievements.

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Appendix:

-The Survey



The Impacts of Sustainability on the Supply Chain: A Comprehensive Analysis Of Jubail Industrial City Chemical Companies

Sustainability has become a critical issue in recent times, and companies are under pressure to minimize their impact on the environment while ensuring their business operations are profitable. The study explores the various ways in which sustainability affects supply chain management.

Introduction:
I am a Master's candidate in Management at the University of Midocean. Currently, to examine the Impact of using the global sustainability procedures in the chemical industries in jubail within the supply chain management, conducting a study titled " The impact of Sustainability on the Supply Chain In the chemical Companies in Jubail Industrial City.

I would like to request your cooperation to answer this questionnaire. Any information obtained will be kept confidential and only used for academic purposes. Your cooperation is highly appreciated.
Thank you in advance for agreeing to participate in this study.

omarfallatah95@gmail.com [Switch account](#)

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Demographic Characteristics and Organization information

Gender : *

☐ Female

☒ Male

Years of Experience: *

☒ 0-3

☐ 4-6

☐ 7-9

☐ 10+

What is your role in the organization *

☒ Operations and production (Professionals fulfilling the responsibilities of the same role)

☐ Manager (Managers and supervisors)

☐ Executive(In charge of an entire organization or large department)

Type of the Organization *

☐ Industrial

☐ Trading

☐ Recycling

☐ Educational

☐ Health and Medical

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Employees' Awareness of Sustainability & Quality:

The organization delivers environmental management training to improve employee awareness, skills, and know-how in sustainability management *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

The organization uses sustainability criteria to evaluate performance. *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

The organization encourages employees to volunteer for local charitable works. *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

Environmental or Sustainability Performance

Does your company have a sustainability policy or strategy in place? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

Your company have initiatives to minimize or eliminate hazardous waste generation and promote responsible waste management practices? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

The organization Should have optimization processes to reduce of solid wastes, air emission, and noise, and others. *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

Product Safety and Chemical Management

Your company have procedures in place to assess and manage the safety and environmental impact of chemicals used or produced in the supply chain? *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

Does your company actively promote the development and use of safer and less hazardous chemical alternatives *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

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Supplier Selection and Management

Does your company evaluate suppliers based on their environmental performance and sustainability practices? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

You assess your suppliers' social and environmental responsibility, including their labor practices and community engagement? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

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Collaboration and Stakeholder Engagement

Does your company engage with stakeholders, such as local communities, NGOs(non-profit organizations), and customers, to address environmental concerns in the supply chain? *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

Do you engage in knowledge-sharing and participate in industry initiatives to drive sustainable practices in the chemical sector? *

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

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Customers & End-consumers

The organization cooperates with the customers to achieve sustainability objectives. *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

The organization develops a mutual understanding of responsibilities regarding sustainability performance with the customer. *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

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Reporting and Transparency:

Does your company have a dedicated system for monitoring and reporting sustainability performance metrics in the supply chain? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly disagree

Do you actively seek third-party certifications or eco-labels to validate your environmental and sustainability claims? *

- ☐ Strongly agree
- ☐ Agree
- ☐ Neutral
- ☐ disagree
- ☐ Strongly disagree

Comments, Suggestion and recommendation, please write it down below:

Your answer

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The 2030 agenda and SDG's:

