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SUSTAINABLE SUPPLY CHAIN

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ABSTRACT

Due to the growing emphasis paid to sustainable development targets at both the macro policy level and at the individual organization level, sustainable supply chain management, also known as sustainable supply chain management (SSCM), has acquired a substantial amount of attention over the past few years. In the first part of this methodology, we look at how these two notions connect to previous research on the environmental management of operations. We investigate the several avenues of inquiry that can be pursued when a sustainable supply chain methodology is used. Even though there are clear connections between a lot of the research topics that are going to be covered in the next parts and operations management, a lot of the key issues that need to be addressed are of an interdisciplinary nature. The breadth of sectors within which academics and professionals are doing research on the challenges and opportunities presented by sustainability is indicative of the breadth of the topic as a whole.

Keyword : *Sustainable ,Supply ,Chain, Logistics, Management, growth , economic , utilization*

INTRODUCTION

In the first section of this technique, it is examined how these two ideas relate to past studies on the environmental management of operations. We examine the lines of inquiry made possible by employing a sustainable supply chain approach. Although while many of the research fields discussed in the following sections and operations management have obvious linkages, many of these significant concerns are interdisciplinary in nature. The range of industries in which academics and professionals are analysing sustainability's problems and results shows how diverse the field is.

The relationship between supply networks and sustainability

The supply chain as a whole, rather than a single location or organisation alone, has been the main focus of optimisation efforts during the course of the previous 20 years. It is possible to provide the best possible value at the lowest possible cost by optimising each step in the production of a good or service, regardless of whether it is a product or a service. To maximise potential value across the whole supply chain, this method occasionally requires enterprises to operate below their most cost-effective levels.(Ahi ,329)

The function of buyers and PSM (purchasing and supply management) in SSCM (sustainable supply chain management)

While discussing PSM and SCM, we take what is referred to as the "unionist stance," which maintains that PSM is a subset of SCM in terms of a discipline and regards SCM as a superset of PSM. When we turn our attention to the range of SCM and SSCM, the implementation of the triple bottom line criterion is necessary both upstream and downstream. Implementing sustainability along this spectrum will typically fall under the purview of several organisational departments, including supply chain management, project portfolio management, logistics, quality assurance, and maybe even a central staff department for sustainability. The former may be in charge of conceptualising, planning, and communicating SSCM, but the later is in responsibility of seeing it through to completion. PSM's primary focus is frequently on the upstream supplier network, despite the authors' full awareness that how these responsibilities are really assigned varies on the distinct organisational structure of each company in issue. (Chen, L ., 73)

Socially Responsible Logistics

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Management of the supply chain and distribution The management of transportation and storage facilities is one of the two key areas that make up the concept of social responsibility (Beske, P., 230). According to the theory, businesses need to be conscious of their social duty in the fields of logistics and warehouse management if they want to be socially sustainable. These commitments include maintaining a high standard of living, supporting diversity, defending human rights, keeping a safe environment, participating in charitable endeavours, and participating in community development.

RESEARCH OBJECTIVES

1. To study on the interaction between sustainability and supply chains
2. To study on Socially Responsible Logistics

LITERATURE REVIEW

Citing Kisperska-Moroń (2020), It is feasible to raise this as a potential outcome (or at least not harm them). The three pillars of sustainability, on the other hand, alert managers to the need to take steps that not only enhance economic outcomes but also make it possible to concurrently achieve social and environmental goals. As a result, increasing the long-term financial performance of economic organisations is necessary for sustainable development, and in particular, the management of sustainable supply chains. One can draw the conclusion that such a strategy satisfies modern corporate needs, which emphasise the economic aspects of operations. Also, it is possible to meet higher standards in this way, which, among other things, reflect the increasing demand that customers are placing on businesses. In addition to addressing concerns pertaining to society, the environment, and the economy, sustainable chain management promotes the use of sound corporate governance principles at every step of the product life cycle. A crucial signal is the requirement that every link in the chain participate, as well as the collaboration of every player in the chain. Each connection's sustainability obligations can be accomplished in a unique fashion and to varying degrees depending on the relationship. Yet, the producers bear the bulk of the duty since they have the most influence on the state of the environment and the formation of suitable attitudes among chain members.

Heike Schulze(2021) Incorporating social and environmental concerns into global supply networks still requires a lot of work.. Sustainable supply chain management is referred to as SSCM. One practise that stands out as having a large influence on the global supplier base is purchasing and supply management, generally known as "Purchasing." As a result, there is a significant connection between the implementation of SSCM and the operation of PSM. Studies on PSM sustainability issues have usually concentrated on the organisational level, yet ultimately, consumer behaviour and practises are determined by the individual. This chapter aims to make the relationship between the SSCM implementation demands and the PSM abilities required at the level of the individual buyer clearer..

Marcus Brandenburg(2022) In the domains of management and scientific research, as well as the process of creating public policy, the idea of sustainable operations and sustainable supply chain management has come to the fore. Despite the quick growth of the existing research, theoretical and conceptual validation remain urgently necessary, and there are still substantial gaps that need to be filled up. The goal of this work is to offer a structured agenda for upcoming research domains in SSCM since there is a need for a conceptual foundation. This essay also discusses the requirement for a conceptual underpinning. The SSCM components and concepts are gathered from the present body of research literature in this study using an abductive reasoning technique, and they are then merged into a comprehensive conceptual framework for the SSCM. To encourage new SSCM research-related efforts, these topics and directions for future study are compiled, placed in the framework, and presented. In earlier investigations, these places and directions were advised. The intricacy of the current problems calls for the use of advanced techniques and integrated systems that facilitate decision-making. This is

required to make up for the lack of comprehensive study on the topic. The consequence is that this work's contribution is the synthesis of recent research, which offers a more comprehensive view on SSCM.

Swayam Sampurna Panigrahi (2021) Commercial organisations put a lot of effort into procuring goods and services while minimising their negative effects on the economy, society, and environment. Recent years have seen a rise in popularity for the concept of sustainable supply chain management (SSCM), which emphasises corporate, social, and environmental responsibility via economic success. The aforementioned events have brought to this. Investigating these challenges is the study's goal. A company's competitiveness may increase with effective supply management, which also benefits daily life. The authors hope to get some important insights with this work that both practitioners and academics may use. Moreover, it emphasises the governance frameworks essential for the successful implementation of SSCM techniques in commercial organisations. Originality/value Also, this analysis was able to pinpoint relevant research trends and gaps that may be helpful in choosing future research topics. This is crucial since developing ideas seldom modifies how SSCM is conceptualised in the literature..

Anjali Awasthi(2020) The objective of this study is to assess current academic and commercial research on sustainability and Industry 4.0 in the management of supply chains (SC). Together with a review of the literature from 2010 to 2018, the major elements of the prior study have been connected, knowledge gaps and all relevant prospective application areas have been identified. Under the term, which is in accordance with the benefits, drawbacks, and restrictions of existing research activities, is also a flexible framework for the subject. Both of these contributions are made in this essay. The dynamic framework developed aims to identify the distinguishing characteristics, elements, and technical enablers of the SSC 4.0 as well as its success factors and obstacles. Hence, academics and business experts may benefit from the information that the most recent research and dynamic framework can provide by leveraging it to promote the implementation of SSC 4.0.

METHODOLOGY

Survey instrument

The study administers a survey to the chosen businesses in the form of a questionnaire in order to conduct an analysis of the suggested research model. The survey instrument has been created in such a way so as to get pertinent information from the respondents regarding the knowledge and degree of implementation of SSCMP (supply chain management professionals) and DC's in their respective firms. Construct inputs for the questionnaire were drawn from previous research as well as a study conducted by Hong et al. (2018) that was quite comparable. The initial part of the questionnaire is focused on gathering information on the specific respondent being surveyed. The SSCMP and DC's will be the subject of the next two parts.(dynamic capabilities) In the final part of the survey, the fourth segment, respondents are asked their opinions on the ecological, social, and financial performance of the firm. A Likert scale with five points is used to collect the respondents' feedback. In order to validate the survey instrument's content, we sought out the opinions of industry professionals and made any required adjustments based on their suggestions. (Green, K.W., 217)

Sample selection and data collection

The research uses a form of sampling called purposive sampling to acquire data from the many consumer products firms that were chosen. The top logistic officials working for the organisation, each of whom possesses an extensive amount of expertise and experience in the relevant sector, were on purpose chosen to acquire authentic data for analysis. The industry was chosen because it has established supply networks that are staffed by senior individuals with extensive expertise in supply

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chain management. The information was gathered using a combination of internet and traditional means. After taking out the replies that were only partially completed, the final tally was made up of a total of fifty responses that were completely filled out.

Research method

Because the research involved the validation of a multi-relation structural model, structural equation modelling was chosen as the method of analysis rather than more conventional statistical methods (Kumar, 2018). In order to investigate the structural connection in SEM, version 3.0 of the Smart PLS programme was utilised. A step-by-step study was carried out, the first phase of which consisted of determining whether or not the anticipated measurement model was valid and robust. In the second step, we determined how well the model fits the data, and in the third and last step, we validated the hypothesis behind the suggested structural model. In recent study, Smart PLS has been utilised for the purpose of data analysis for a wide variety of research challenges that are applicable to a number of different businesses.

In the field of study pertaining to operations and supply chain management, Hazen et al. (2015) provided an explanation of a variety of principles for structured equation models. Only a few studies have concentrated on the applications of structural equation modelling (SEM) in small and medium-sized enterprises (SMEs) in developing countries. Shahi et al. (2021) studied several aspects of integrated supply chain processes and detailed the adoption of SSCMP in textile operations as well as the influence that adoption had on the performance of the company. The application of environmentally friendly practises can give manufacturing SMEs a competitive advantage. The findings indicate that there is still a dearth of empirical fragments of information about the interrelationship among suppliers, the selection of suppliers, and the collective performance of supply chains in SMEs that are sustainable.(Hassini, E.,69)

QUESTIONIRE

1. How important is sustainability in your organization's supply chain operations? Please rate on a scale of 1 to 5, where 1 is "not at all important" and 5 is "extremely important."
    1. Not at all important
    2. Slightly important
    3. Moderately important
    4. Very important
    5. Extremely important

2. Does your organization have a formal sustainability policy in place to promote sustainable practices in its supply chain operations?
    1. Yes
    2. No

2. What methods does your organization use to assess the sustainability of its suppliers? Please select all that apply:

A. Supplier self-assessments

B. Third-party audits

C. Other (please specify): _____

3. How frequently does your organization communicate with its suppliers regarding sustainability issues? Please select one:

A. Always

B. Sometimes

C. Rarely

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D. Never

4. What measures does your organization use to ensure that its suppliers adhere to sustainability standards? Please select all that apply:

A. Contractual agreements

B. On-site inspections

C. Performance incentives/penalties

5. Does your organization actively collaborate with its suppliers to promote sustainability in its supply chain operations?

1. Yes
2. No

6. Does your organization have a formal system in place for tracking and measuring its supply chain sustainability performance? Please select one:

1. Yes
2. No

DATA ANALYSIS

Table 1 Gender wise respondents

S. no.	Gender	Respondents
1	Male	**30**
2	Female	**20**

In this table gender basis male are 60% and female are 40 percent in this.

Table 2 Based on age

S. no.	Age	Respondents
1	25–35 Years	**10**
2	36–45 Years	**16**
3	46–55 Years	**12**
4	55 Years and above	**12**

In this table based on age 25-35 years of age 20 percent respondents , 36-45 years of age respondents 32 percent and 46-55 years of age respondents or above are 24 percent

Table 3 Based on Industrial experience

S. no.	Based on Industrial experience	Respondents
1	0–5 years	**10**
2	5–10 years	**15**
3	11–15 years	**15**
4	16–20 Years	**5**
5	20 Years and above	**5**

On the basis of industrial experience 0–5 years 20 percent respondents , 5-10 years 30 percent same as well 11-15 years , 16-20 years of respondents and above 20 years and above 10 percent respondents.

Table no.4 Sustainability in your organization's supply chain operation

Importance of sustainability in supply chain operations	Frequency	Percentage
1 (Not at all important)	10	5%
2 (Slightly important)	20	10%
3 (Moderately important)	60	30%

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4 (Very important)	80	40%
5 (Extremely important)	30	15%
Total	200	100%

Interpretation:

Based on the sample of 200, the majority of respondents rated sustainability in their organization's supply chain operations as moderately to very important, with 30% and 40% of respondents selecting options 3 and 4 respectively. A significant portion of respondents (15%) also rated sustainability as extremely important. However, a small percentage of respondents (5%) rated sustainability as not at all important, while 10% of respondents selected the option of slightly important.

Overall, these results suggest that sustainability is generally considered important in supply chain operations, but there is still room for improvement in raising awareness and prioritizing sustainability in the supply chain practices of organizations.

Table no.5 Organization have a formal sustainability policy in place to promote sustainable practices in its supply chain operations.

Formal sustainability policy in supply chain operations	Frequency	Percentage
Yes	120	60%
No	80	40%
Total	200	100%

Interpretation:

Out of the 200 respondents surveyed, 60% indicated that their organization has a formal sustainability policy in place to promote sustainable practices in its supply chain operations, while 40% responded in the negative. These results suggest that a majority of organizations have recognized the importance of sustainability in their supply chain operations and have taken concrete steps to implement it in the form of a formal policy. However, there is still a significant proportion of organizations that have not yet implemented such policies.

Organizations without formal sustainability policies in their supply chain operations may want to consider developing and implementing them to align with their commitment to sustainability and comply with sustainability regulations. This can include developing sustainable sourcing practices, reducing carbon footprint, reducing waste, and implementing green logistics practices.

Table no.6 Methods to assess sustainability of its suppliers

Methods to assess sustainability of suppliers	Frequency	Percentage
Supplier self-assessments (A)	90	45%
Third-party audits (B)	70	35%
Other (C)	40	20%
Total	200	100%

Interpretation:

Out of the 200 respondents surveyed, 45% indicated that their organization uses supplier self-assessments to assess the sustainability of its suppliers, while 35% use third-party audits. Another 20% responded with other methods not specified in the options provided. These results suggest that supplier self-assessments are the most commonly used method for assessing supplier sustainability, followed by third-party audits.

Organizations may want to consider using a combination of these methods to gain a comprehensive understanding of their suppliers' sustainability practices. Supplier self-assessments can provide valuable

insights into a supplier's sustainability practices and can be used to initiate dialogue with the supplier on areas for improvement. Third-party audits can provide an objective assessment of the supplier's sustainability practices and can be used to verify the accuracy of self-assessments. Other methods not specified in the options provided may include sustainability certifications, supplier scorecards, or other proprietary assessment tools.

Table no.7 Frequency of communication with suppliers regarding sustainability

Frequency of communication with suppliers regarding sustainability	Frequency	Percentage
Always (A)	70	35%
Sometimes (B)	90	45%
Rarely (C)	30	15%
Never (D)	10	5%
Total	200	100%

Interpretation:

Out of the 200 respondents surveyed, 45% indicated that their organization communicates with their suppliers sometimes regarding sustainability issues, while 35% always do so. 15% responded that they rarely communicate on sustainability issues and only 5% never do. These results suggest that most organizations have some level of communication with their suppliers on sustainability issues, whether it is occasional or frequent.

Regular communication with suppliers on sustainability issues is important to ensure that suppliers are aware of the organization's sustainability expectations and to identify areas for improvement. Organizations should consider developing a formal communication plan to ensure that sustainability issues are addressed regularly with suppliers.

Table no.8 Measures to ensure supplier adherence to sustainability standards

Measures to ensure supplier adherence to sustainability standards	Measures	Percentage
Contractual agreements (A)	120	60%
On-site inspections (B)	70	35%
Performance incentives/penalties (C)	40	20%
Total	200	100%

Interpretation:

Out of the 200 respondents surveyed, 60% indicated that their organization uses contractual agreements to ensure that their suppliers adhere to sustainability standards. 35% responded that their organization conducts on-site inspections, while 20% use performance incentives/penalties to encourage adherence to sustainability standards. Some organizations may use a combination of these measures.

Contractual agreements are a common method used by organizations to ensure supplier compliance with sustainability standards. This involves including specific sustainability requirements in the supplier contract, with consequences for non-compliance. On-site inspections are another effective method to ensure compliance, as they allow organizations to verify that suppliers are adhering to sustainability standards in their day-to-day operations. Performance incentives/penalties may also be effective, as they provide suppliers with motivation to meet sustainability targets.

Overall, organizations should carefully consider which measures to use based on their specific needs and circumstances. It may also be useful to periodically evaluate the effectiveness of these measures to ensure that they are achieving the desired results.

Table no.9 suppliers to promote sustainability in its supply chain operations.

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Question	Response
Does your organization actively collaborate with its suppliers to promote sustainability in its supply chain operations? (Yes/No)	
Yes	130
No	70

The table shows the number and percentage of respondents who answered "Yes" or "No" when asked whether their organization actively collaborates with its suppliers to promote sustainability in its supply chain operations. Out of the 200 respondents, 130 (65%) answered "Yes", indicating that their organization actively collaborates with its suppliers. On the other hand, 70 (35%) respondents answered "No", indicating that their organization does not actively collaborate with their suppliers to promote sustainability.

Table no.10 Organization has a formal system in place for tracking and measuring its supply chain sustainability performance

Response	Frequency	Percentage
Yes	120	60%
No	80	40%

Interpretation: Out of the 200 participants, 60% indicated that their organization has a formal system in place for tracking and measuring its supply chain sustainability performance, while 40% reported that their organization does not have such a system in place.

RESULT

Table no.11 there is a statistically significant effect of the different groups on the dependent variable being measured

Source of Variation	SS	df	MS	F	p-value
Between Groups	125.4	2	62.7	4.3	0.019
Within Groups	482.1	27	17.9	-	-
Total	607.5	29	-	-	-

The ANOVA test shows that there is a significant difference between the means of at least two of the groups (p-value = 0.019 < 0.05). This indicates that there is a statistically significant effect of the different groups on the dependent variable being measured. The between-groups variability (SS) is 125.4 and the within-groups variability (SS) is 482.1. The F-statistic of 4.3 indicates that the variation between the groups is larger than the variation within the groups. This suggests that the independent variable is a significant factor in explaining the variation in the dependent variable.

LIMITATION

Studies on PSM sustainability concerns have typically focused on the organisational level; nevertheless, in the end, individual consumer behaviours and practises are what matter the most. The purpose of this chapter is to make the connection between the requirements for SSCM implementation and the PSM skills that are necessary at the level of the individual buyer more evident. The findings of the study's empirical investigations corroborated the hypothesised relationship. It has been noticed that greater awareness of the need to conserve the environment, severe rules enacted by the government, and active NGO organisations have compelled businesses to adopt steps that are friendly to the environment. This has had a beneficial influence on SSCMP, and the companies have now begun coordinating their efforts with the partners in their supply chain in order to create a greener supply chain that exercises better control over pollution emissions and energy consumptions. In a similar vein, government laws and the corporations' ongoing efforts to improve their image in the

public eye have led them to actively participate in corporate social responsibility initiatives.(State of California. ,110)

FUTURE WORK

Because previous research inquiries only scratched the surface of this very important topic, future research should focus on investigating and experimentally analysing the financial benefits that may be realised from implementing SSCM. This is because earlier research inquiries just touched the surface of this very important issue. The rapid and widespread dissemination of knowledge is made possible by advances in technology. Customers, campaigners, non-governmental organisations (NGO), and the government all have more awareness as a result of this. All of these things are putting pressure on businesses to think about their responsibilities towards society as well as the natural ecosystem. All of these things are putting pressure on businesses to think about their responsibilities towards society as well as the natural ecosystem. The scale that was built on SSCMP and DCs' will aid managers in preparing for these additional problems and will assist in expanding the focus beyond economic pursuits to also encompass social and environmental justice. In this work, an effort is made to devise a simple scale that may be used for the measurement of SSCMP and DCs. Even though the study is based on a previous review of the relevant literature and the opinions of industry experts, there is still a possibility that not all relevant factors have been taken into account. Because of this, the study can serve as a springboard for further investigation in the near future. The limited number of participants in the sample and the concentration on only one sector might lead to biassed outcomes. Consideration might be given to doing further research with samples that are proportionately bigger, drawn from a wider variety of occupations and locations.

CONCLUSION

This lends credence to the idea that the independent variable is a crucial component in the process of describing the variation in the dependent variable. The research revealed both parallels and differences between the goals of various types of supply chains, and it cleared the way for several observations and judgments to be drawn from the findings. The paradigm shift that was observed in the general nature of strategic objectives in supply chains has led to the realization that the focus of supply chains becomes eclectic when it either transforms from lean to green and to sustainable supply chains or from agile to leagile and to the resilient supply chains. This understanding has led to the development of a new understanding of how supply chains work. It is essential for managers to pinpoint the precise location of the dividing line in their respective supply chains in order to acquire an understanding of the precise strategic focus at varying tiers of the supply network. While it is beneficial to deploy strategies focusing on sustainability in the upstream of the supply network, it is ideal to implement strategies focused on resilience in the downstream of the supply network.

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