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Food Industries Organizational Performance attributed impact on Eco-Efficient Supply Chain Management and Sustainability

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ABSTRACT

It is a well-known fact that the food business significantly backs for improvement of green supply chain management (GSCM) practices in digital age. Experimental examination grounded on participant comments received for the same, within an Indian backdrop, is not so exhaustive. To address the issues, the study, focus to do a factual analysis and how the GSCM practices improve the sustainability and impact of its influence over the profitability analysed in this paper in more detail which is not pointed out in earlier studies. A test study was conducted over various states of India on a standardized questionnaire among 168 participants. Out of 168, 155 participants responded to the survey. The participants were chosen by sampling (snowball) method by contacting their dealers, suppliers, partners etc. This research study uses percentage analysis to determine participant perspectives and reality about GSCM strategies for sustainability. Regression analysis was used to ascertain the direct correlation between the company's profitability and its use of green supply chain management strategies. The regression line equation $\hat{Y}$ = 6.2561 - 0.6636X. The result reveals GSCM Practices will impact profitability and improve workable aspects. Relationship, The R is -0.5126, indicating that profitability will be significantly have a negative effect achieving the sustainability. The review has shown that an indication of the GSCM may account for 26.3% of the variation in GSCM practices that impact profitability, rendering to the R2 of 0.2627.

KEYWORDS: Green Supply Chain Management, Food Industry, Sustainability, Management Strategies, Organization performance.

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INTRODUCTION

Nowadays, distribution is a relevant and current issue within production economics. In the developed and developing countries food industries are considered as the largest manufacturing sector. The food production and distribution industry continues to devour much of the natural resource base and must maintain increasing demand, in spite of a number of developments. The sector has never been able to deliver a sustainable food supply. The natural issues of the food industry related to agriculture, waste, public health, and food security have been joined by newer issues such as localism, fair trade, climate change, and oil dependence. Social and environmental sustainability issues are emerging in the food industry. Some of the questions deliberated includes can food be produced, dispersed, and disbursed in a workable method with no additional costs? How can standards and technology be combined to minimize food waste, reach sustainable development, and cut operational costs? How will technologies and standards affect food supply chain operations? (Li, D., Wang, X., Chan, H. K., & Manzini, R., 2014).

The modern, globalised world is becoming more conscious of and concerned about the environment. The anti-environmental laws that were implemented during the early industrial revolution are no longer practical. It is necessary for industrialization & the earth to coexist in order to achieve sustainable development. Today, enhancing performance is no longer sufficient for the prime goal of an organization; its policies have to be eco-friendly as well. Consequently, "green supply chain management" (GSCM) accepted through variety of contexts. Customers do inquire about the environmental effects of the things they are buying as awareness of ecological alarms and the requirement to stop global warming grows. Businesses should be prepared for inquiries on the environmental impact of their supplier chains, manufacturing procedures, carbon footprints, and recycling practices. In addition, organisations must implement systems and procedures that maximise environmental conservation and minimise their negative environmental effects, as well as be sensitive to the needs of diverse societal stakeholders (Verma, A. S., 2014).

LITERATURE REVIEW

Another research study on green practices with an exploratory theme is to determine the significance and extent of applying open innovation methods in the supply chain for food and drink. Case study analysis is used, with six small-business examples are the viewpoints of two customers (Arcese, G., Flammini, S., Azevedo, J. M., & Papetti, P., 2015).

Based on Taiwanese restaurant companies, a different study examined importance of (GSCM) practices and company performance. Four—corporate environment policy, green packaging, eco-friendly stuff, and economical transport—were

determined by factor analysis. Green capability, organizational performance, and primary GSCM practice characteristics like corporate environmental policy, packaging waste, cost-efficient transportation, and product recycling were all analysed under the research. Results shows the green practices in Taiwanese restaurants have an indirect impact on firm performance through green capability, and higher levels of supplier ability for green and green capability will improve organisational performance, specifically environmental and economic performance (Chiu, J. Z., & Hsieh, C. C., 2016).

GSCM is a widely accepted and critical strategy for increasing environmental sustainability. Commercial enterprises are beginning to experience pressure from society to enhance the quality of environmental conservation since the contemporary period has made it more challenging to protect the natural environment. The recognised factors of GSCM were green distribution, green manufacturing and design, and eco-friendly purchases (Weeratunge, R. D., & Herath, R., 2017).

Critical concern for Iranian food enterprises food-related businesses and has been recognised as a challenge for several governments. Additionally, a study showed how structural equation modelling, or SEM, to experiment the techniques affect sustainability's social, economic, and environmental components which enhance sustainability supply chain routine, sustainable supplier management techniques, best practices, and sustainable customer management practices need to be improved (Emamisaleh, K., Rahmani, K., & Iranzadeh, S., 2018).

Over recent years, environmental impact caused by the production and consumption of food has been of growing concern throughout Europe. Under the legislative approach to CSR, food and agribusiness are often exposed to general interests, and they increasingly feel pressure related to addressing challenges brought about by sustainability. Businesses in the food industry face various pressures exerted by consumers, governments, the media, and non-governmental organizations to give a proper and detailed account of how their activities impact society, reduce all negative implications, and protect natural resources that are scarce. Retailers also started to pay more attention to environmental issues in the supply chain and at the shop level (Petljak, K., 2019).

While institutional performance appears negatively on internal practices, it appears favourable and considerable influence on outward green practices. External green cooperation is negatively impacted by leadership pressure as well. Organisational and economic success also appear to be positively and significantly impacted by both internal and external influences. As might be predicted, organisational success appears to be influenced by economic performance. Additionally, external green collaboration has a favourable impact on internal green practices. Food sector organisations and decision-makers get comprehensive information on establishing a green supply chain from various organisational viewpoints. This information may assist the decision-makers in developing strategies. A creative endeavour was undertaken to evaluate the organizational and financial performance of Pakistan's food business with a revised form of the Ahmed & Najmi model. For the first time on how leadership and institutions can affect the food industry's performance through green practices found in the study (Siddiqui, M. I. A., & Siddiqui, D. A., 2020).

Issues have been practicing sustainable methods for a number of decades with a view to mitigating the negative impacts on environmental sustainability. This pressure stems from severe environmental legislation and consumer awareness. The study assessed the methods and significance of environmentally friendly activities in food supply chains. Explanatory variables were transportation, green production, green design and packaging, internal environmental management, and the green information system. Chinese and Pakistani food processing firms are employed to test PLS-SEM hypotheses.

The results showed that executing GSCM strategies is favourably and significantly correlated with inner environmentally friendly management and environmental information systems. The findings also demonstrate that improving organisational accomplishment is pointedly aided by green practices in the food stuff stock series (Qin, X., Godil, D. I., Sarwat, S., Yu, Z., Khan, S. A. R., & Shujaat, S., 2021).

Figure 1: The Cycle of Green Supply Chain and Its Relation with Green Transportation.

Source: Raeda Saada's work offers a framework linking GSCM theory with practical transportation/logistics strategies. Businesses that have accomplished a highest grade of eco-friendly manufacture gained with high customer satisfaction through the application of green design knowledge are better able to advance a sustainably viable benefit, which in turn increases customer loyalty, draws in new clients, and enhances customer purchasing behaviour and business profitability. In an effort to improve the perception of green product development in society and increase customer satisfaction, a second study focus on green design and environmental performance. The study took institutional environmental moderation & GSCM external into account. The collected results show that the institutional environment's moderation and the external GSCM practices mediating roles in considerable influence on ecological functioning with positive design (Bashirkhodaparasti, R., & Sepasie, M., 2022).

A structural equation model (SEM) constructed in another study found a strong relationship between environmental health and four of the six GSC risk variables. The study's conclusions may be implemented on the outside by working with suppliers and consumers on a variety of green initiatives, such as working together on energy-saving design, procurement, production, and packaging. Through a reduction in the influence of SCM hazards, this can raise the standard of environmental health. The levels of internal organizational commitment to GSCM establishment of an internal eco-performance evaluation system may be fostered by several processes and actions to create an environmentally friendly milieu in businesses (El Ayoubi, M. S., & Radmehr, M., 2023).

Another study focusing on determining and prioritising the biggest obstacles practising the GSCM in the Vietnamese agriculture sector has found seven major barrier clusters, including 19 individual sub-barriers. The financial expenses and external stakeholder's categories have come to light as the two most important impediments that need to be addressed right now. In the meantime, strategic management and technological clusters have less of an effect on the use of GSCM (Do, M. H., Huang, Y. F., & Phan, V. D. V., 2024).

RESEARCH GAPS

GSCM ideology and the factual analysis established on the opinions of the participants in the Indian scenario doesn't explore in a detailed way. To address these issues this study do a factual analysis and how the GSCM practices improve the sustainability and impact of its influence over the profitability analysed in this paper in more detail which is not pointed out in earlier studies.

OBJECTIVE

i.Categorizing the evidences and views of the participants for GSCM methods & business sustainability.
ii.Classifying the impact of management practices pertaining to profitability aspects.

METHODOLOGY

168 individuals took part in a test study that was carried out longitudinally across numerous Indian states on the use of a standardized questionnaire. The survey obtained answers from 155 out of 168 participants. Participants ensued by sampling (snowball)method by contacting their dealers, suppliers, partners etc. This research study aims to refer the facts and participants opinions regarding GSCM practices for sustainability through percentage analysis. The regression method applied in the linear equation which influences GSCM practices in the profitability of the business.

RESULTS SUMMARY

6.1 FACTUAL EXPLORATION

To understand the information that this research provides, the survey was done and displayed graphically in a manner that made the facts easily understandable through the opinions of the participants. Figure 2 illustrates the percentage of the gender of the participants. Figure 3 displays the percentage of the educational profile of the respondent.

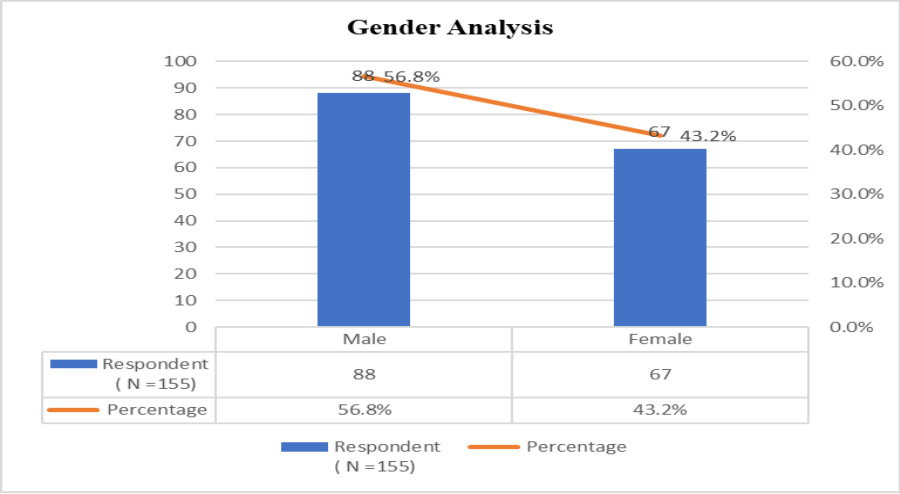

Figure 2. Contributor's Gender percentage

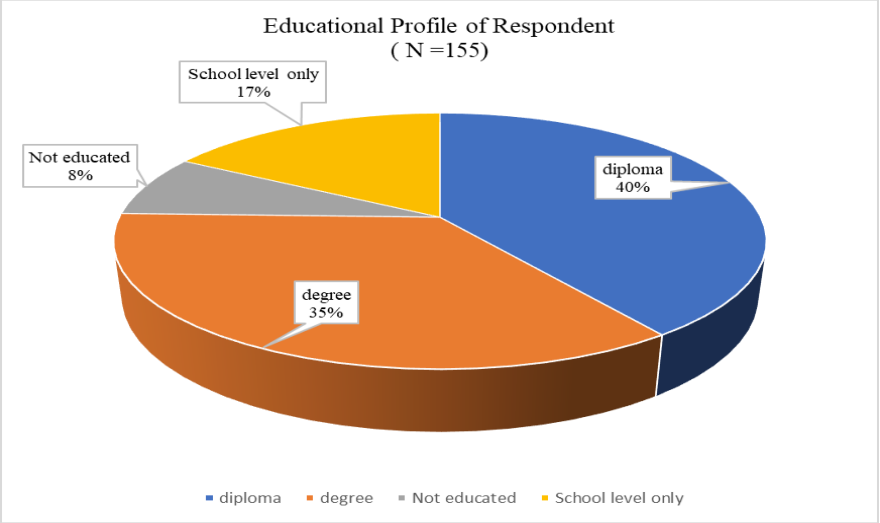

Figure 3. Contributor's Education profile percentage

Figure 4 indicates the contributor's industrial classification percentage whereas Figure 5 Contributor's Experience Level percentage.

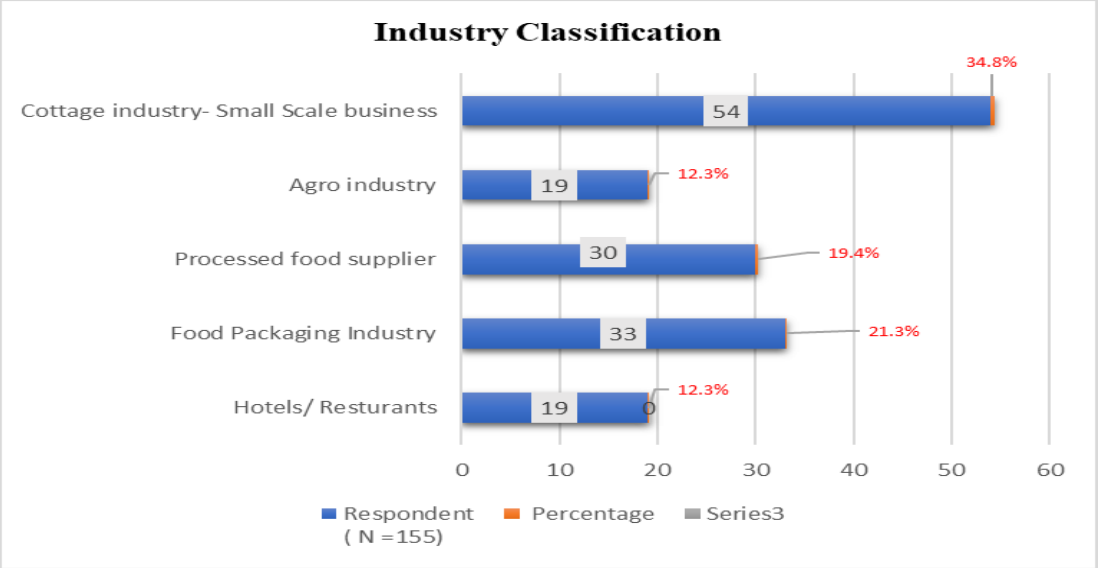

Figure 4. Contributor's Industrial classification percentage

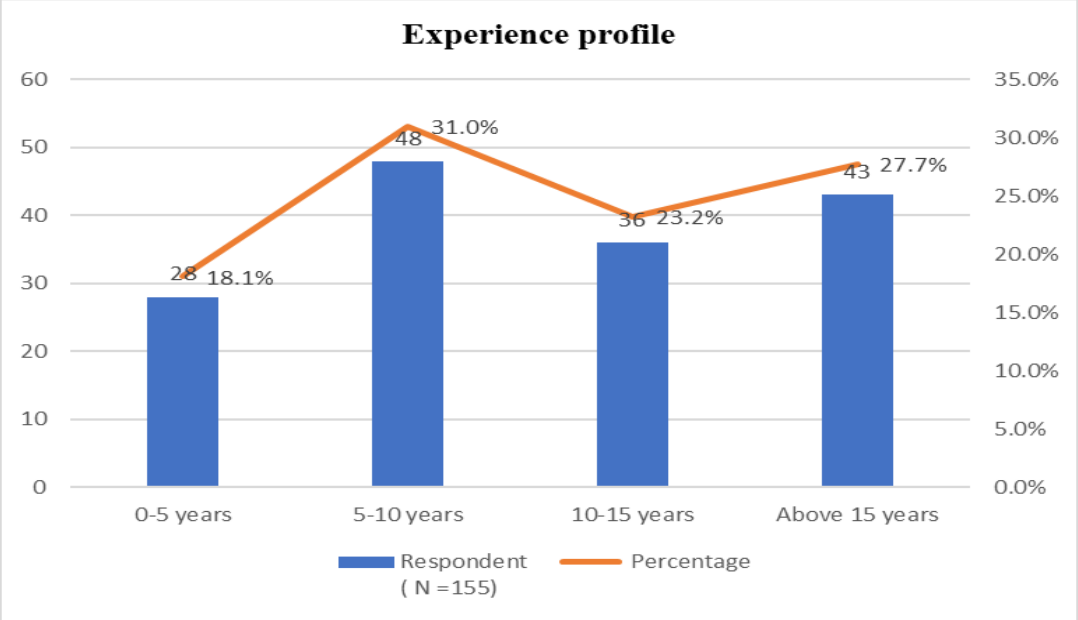

Figure 5. Participant's Experience Level percentage

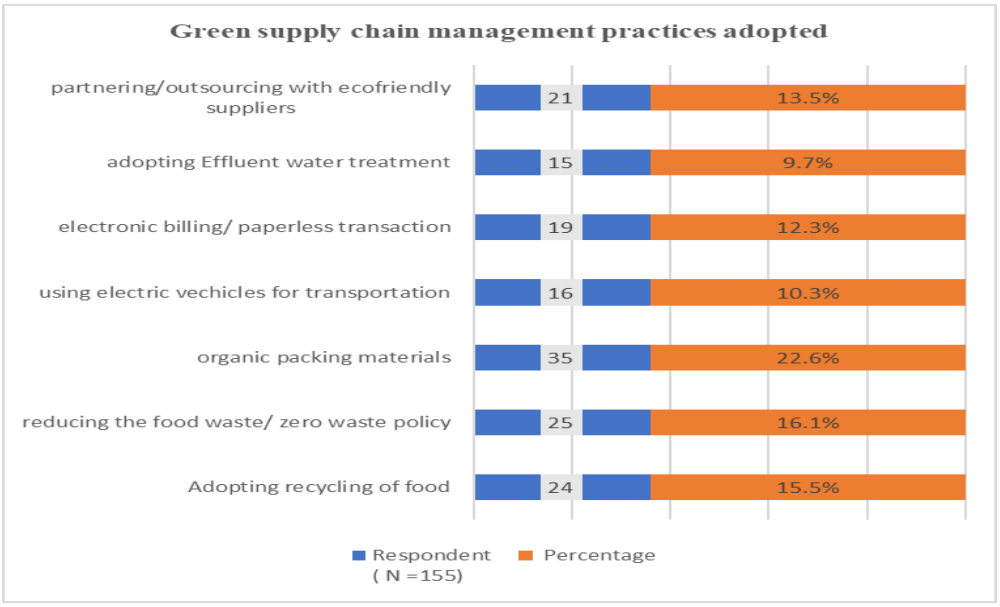

Figure 6. Contributor opines percentage against GSCM practices implemented in the organization

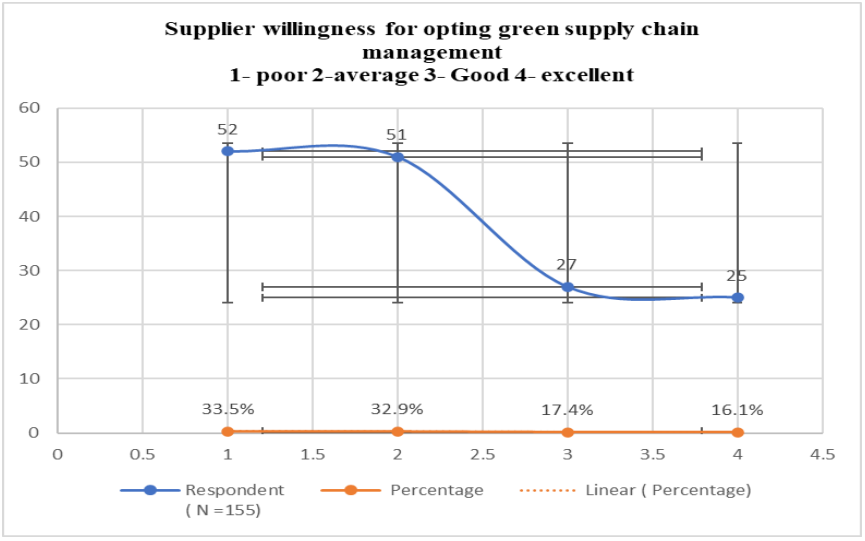

Figure 7 indicates the contributor opines percentage against supplier willingness for GSCM.

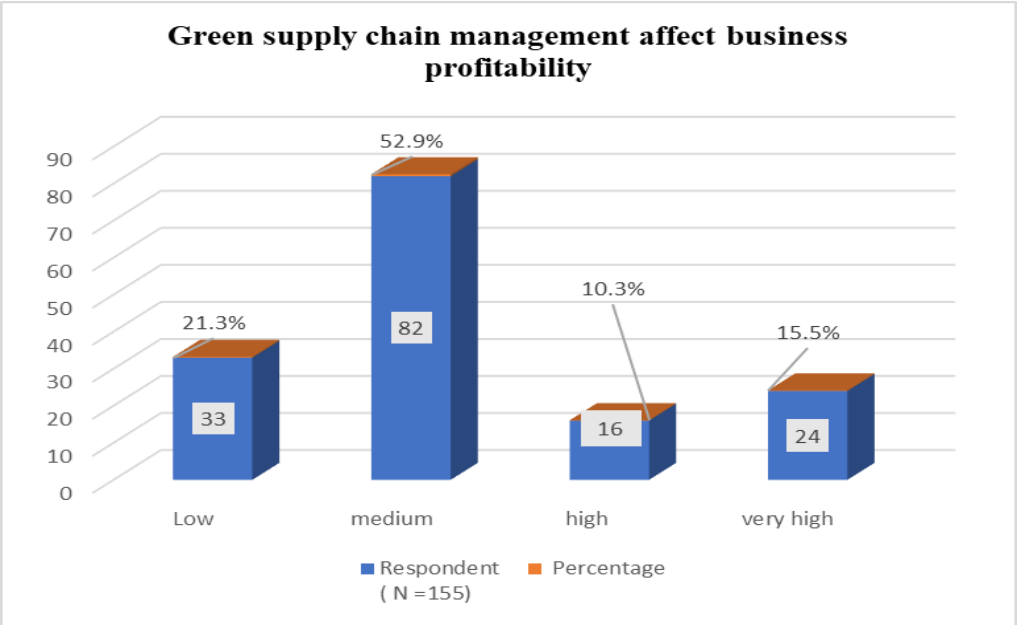

Figure 8. Contributor opines percentage against GSCM affects business profitability.

Figure 8 reveals the participant opines percentage against GSCM affects business profitability. However, Figure 9 indicates the contributor's percentage of Challenges while adopting GSCM.

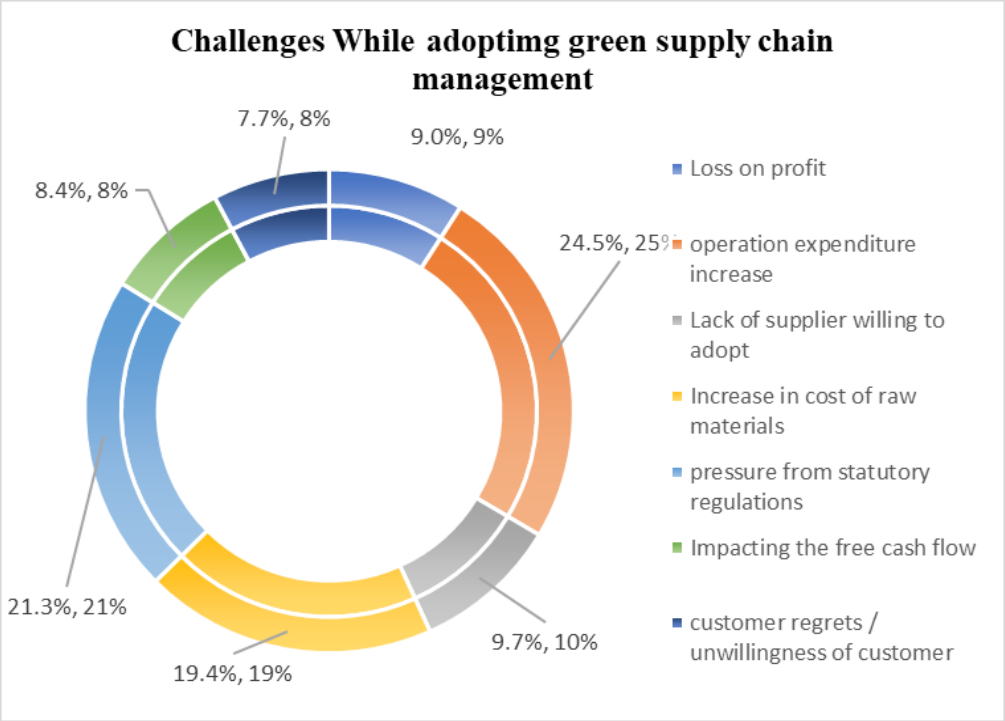

Figure 9. Contributor opines percentage Challenges while adopting GSCM

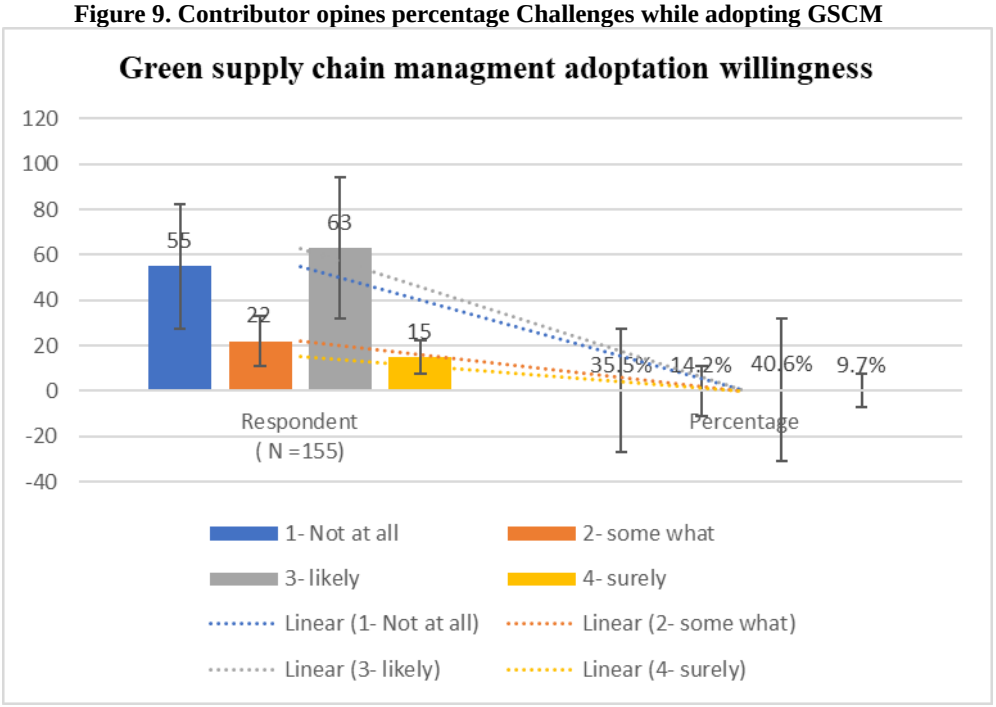

Figure 10. Contributor opines percentage on willingness of adopting GSCM

Figure 10 shows the contributor's percentage of willingness to accept GSCM. Figure 11 reveals the contributors opines the percentage of willingness to implement GSCM.

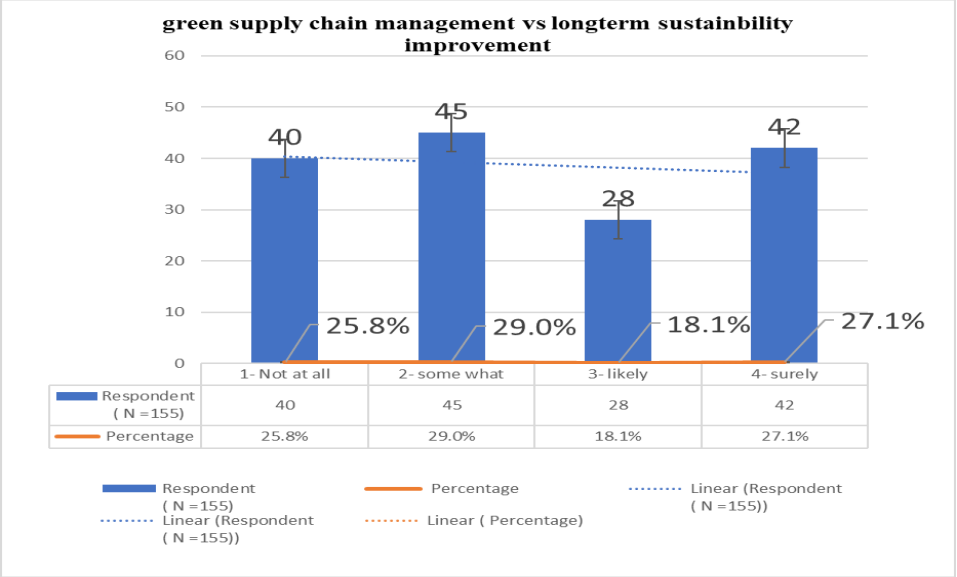

Figure 11. Contributor opines percentage on willingness of adopting GSCM.

6.2 PREDICTIVE MODELING AND INSIGHTS

Best-fit line formula $\hat{Y} = 6.2561 - 0.6636X$

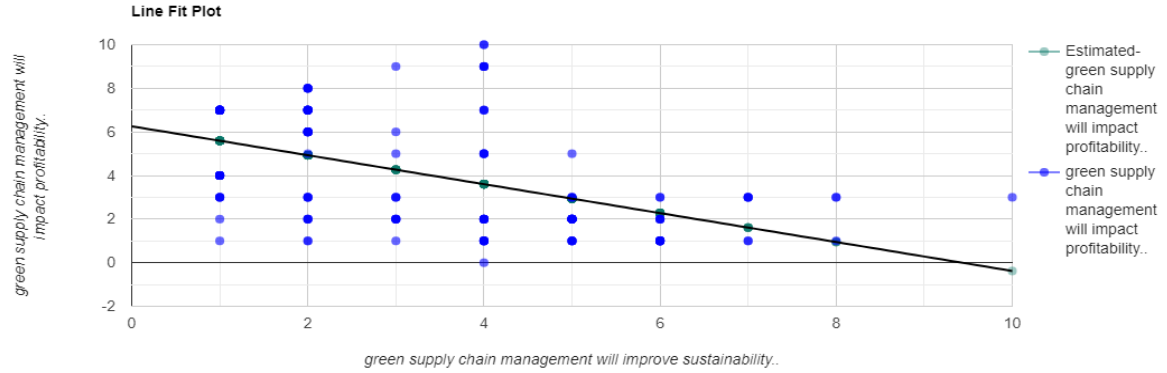

Figure 12. Regression Line fit plot GSCM improve sustainability Vs profitability.

GSCM will improve sustainability, predicted GSCM will impact profitability., $R^2 = .26$, $F(1,153) = 54.52$, $p < .001$. where $\beta = -.66$, $p < .001$, $\alpha = 6.26$, $p < .001$. Figure 12 indicates Regression Line fit plot GSCM improve sustainability Vs profitability.

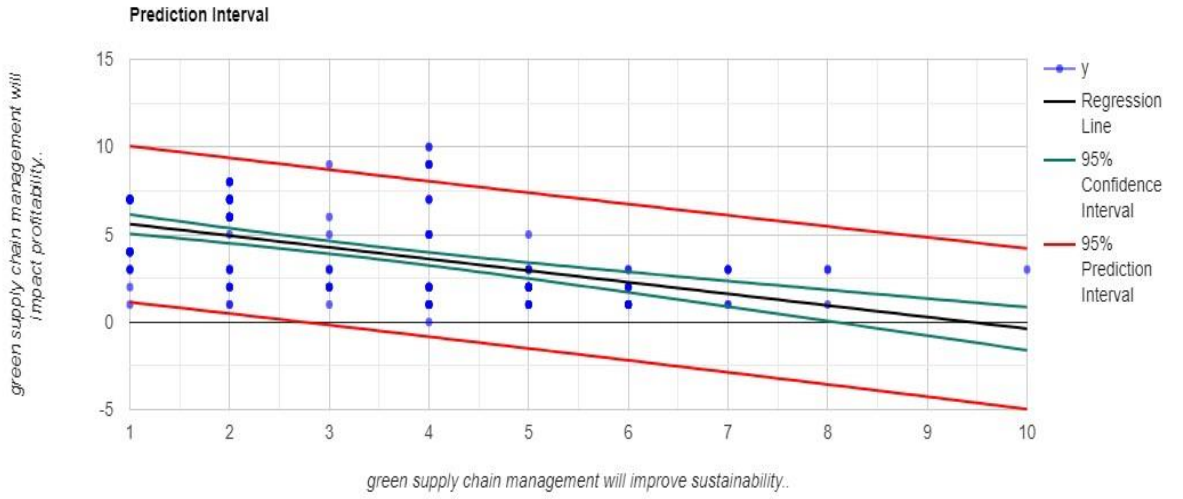

Figure 13. Prediction interval between GSCM improve sustainability Vs profitability.

Figure 13 shows Prediction interval between GSCM improve sustainability versus profitability whereas figure 14 shows the Residual plot of GSCM improve sustainability Vs profitability. Furthermore, figure 15 indicates the circulation of degrees of freedom. Figure 16 shows Residuals histogram and Q-Q plots in detail.

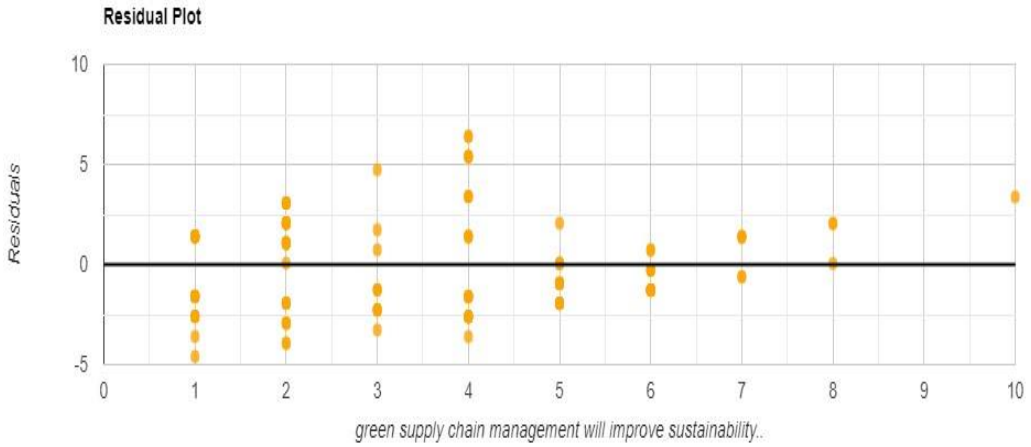

Figure 14. Residual plot - GSCM improve sustainability Vs profitability.

Model Significance Test

Origin	Numerator Degrees of Freedom	Aggregate of Squared Terms	Variance Estimate	Variance Ratio (df_1,df_2)	Significance Probability
Model fitting (between $\hat{y}_i$ and $\bar{y}$)	1	273.2247	273.2247	54.5202 (1,153)	9.234e-12
Residual (between y_i and $\hat{y}_i$)	153	766.7495	5.0114		
Total (between y_i and $\bar{y}$)	154	1039.9742	6.7531		

GSCM will impact profitability and GSCM will improve sustainability. Relationship. R^2 equals 0.2627 with a variability of 26.3% impact profitability is explained by GSCM pertaining to improvement on sustainability.

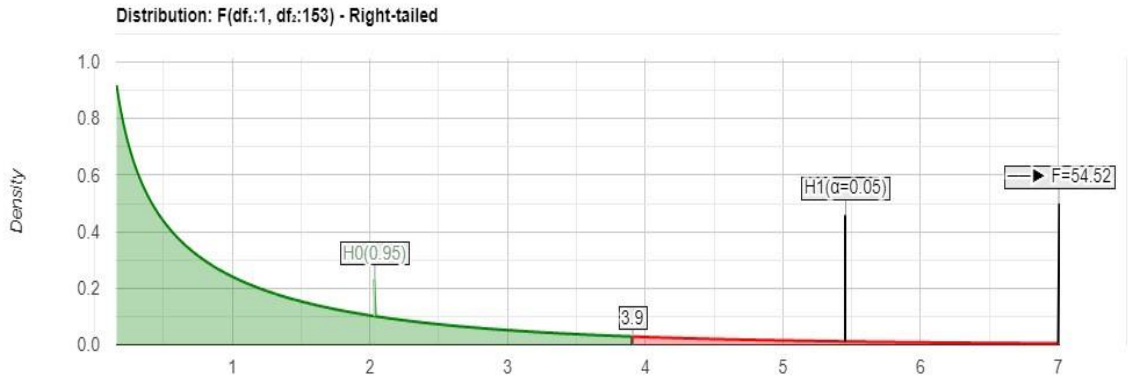

Figure 15. Distribution of Degree of freedom

The correlation coefficient (R) is -0.5126. This indicates that there is a somewhat inverse link between GSCM's impact on profitability and its potential to enhance sustainability.
the residuals (Sres) Standard deviation equals 2.2386.
According to the slope, b_1=-0.6636 CI [-0.8411, -0.486], increasing GSCM will increase sustainability by 1 while decreasing profitability by 0.6636.
If GSCM enhances sustainability, then the y-intercept, b_0 = 6.2561 CI [5.5587, 6.9536], is 0. This reveals that GSCM will influence profitability, which is 6.2561. The value of x-intercept is 9.4283.
Fit quality: Overall regression: p-value = 9.234e-12, F (1,153) = 54.5202, right-tailed. We reject H0 because the p-value is smaller than α (0.05). The model without the independent variable, Y = b0 + ε, does not fit as well as the linear regression model, Y = b0+ b1X + ε.
The slope (b_1): two-tailed, T (153) = -7.3838, p-value = 9.234e-12. For one predictor it is the identical as the p-value for the overall model.
The y-intercept (b_0): two-tailed, T (153) = 17.7213, p-value = 0. Hence, b_0 is significantly different from zero.

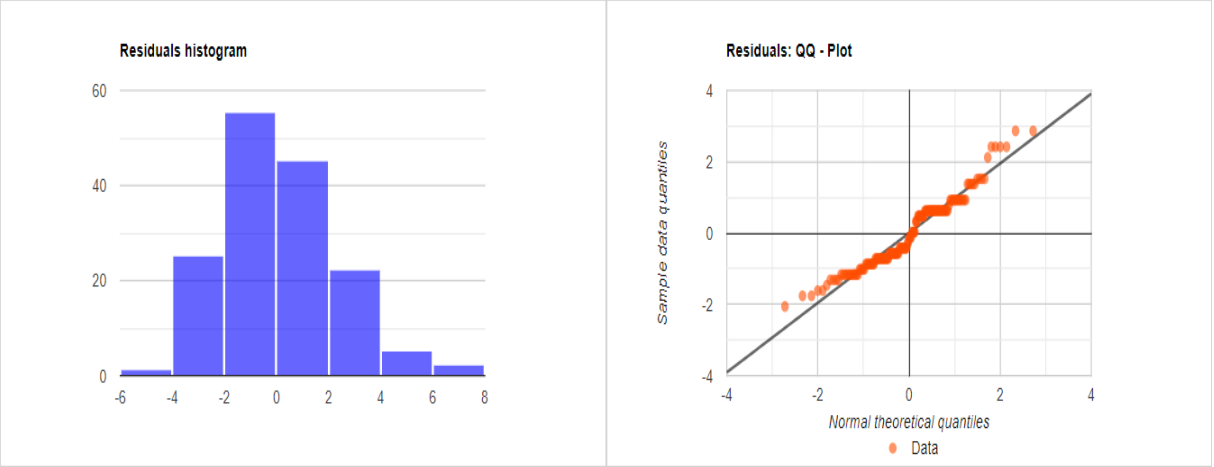

Figure 16. Residuals histogram and Q-Q plots in detail

Normality of the residual errors is assumed by the model of linear regression. 0.00003242 is the p-value of Shapiro-Wilk. The sample size is sufficient not to negatively impact the regression model because, although it's expected that the data would not be distributed on a regular basis, there are no outliers in the data.

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DISCUSSION

In particular, hazardous packaging materials results in a substantial amount of pollution, which makes the packaging business have a very high environmental impact. Controlling the impact of items packaged hazardously can be achieved through the application of environmental management ideas. For most sectors, nevertheless, putting GSCM into practice is a difficult undertaking. Variables (GSCM) prevent the application of GSCM. The decision-making trial and evaluation laboratory (DEMATEL) linked approach has been used in another study to investigate and illustrate the complex causal linkages between elements in a system and to highlight the biggest hurdle to GSCM deployment in the packaging industry. The outcomes display that there is a lack of consumer awareness, training, tracking of progress, and push toward the wider use of GSCM (Wang, Z., Mathiyazhagan, K., Xu, L., &Diabat, A., 2016).

The environment is under tremendous strain due to food production. One way to approach this problem of strategic decision-making is through architecture. The topic has evolved from focusing just on operational and financial difficulties to taking into account the wider environmental and social challenges that industrial organisations confront today. By referring to supply chain operations as "green," one hopes to integrate ecologically sensitive thinking into each and every supply chain process. The technique is predicated on the application of genetic algorithms based decision-making optimization tool TOPSIS (Miranda-Ackerman, M. A., Azzaro-Pantel, C., & Aguilar-Lasserre, A. A., 2017).

For an emerging nation like India, food waste management of an environmental and financial concerning more. Prioritising important procedures as "criteria" for food supply chains outcome with decreased food waste is guaranteeing eco-friendly waste management. The study evaluated twenty-five criteria derived from extant literature and expert contributions to attend the problem of unused decline in the sectors of agriculture and food industries. Each of the above criteria is identified and ranked, and a multi-criteria managerial process called the Best-Worst (BWM) Method is used. Waste avoidance is prioritised more than later phases when it comes to food waste minimization and treatment (Kharola, S., Ram, M., Mangla, S. K., Goyal, N., Nautiyal, O. P., Pant, D., &Kazancoglu, Y., 2022).

The case study includes two sustainability leaders in the Greek food supply chain to analyse the three SSCM models. Its findings indicate that the Hellenic food industry is embracing a unique state-of-the-art SSCM practices, including routine communication, resident sourcing, and investments related to human resource (HR). Conclusions from this study, through different statements, leave a testable model on SSCM in the food sector (Mastos, T., & Gotzamani, K., 2022).

The influence of workable attributes of cuisine distribute series is covered in one more study. A practice's maturity degree of adoption by enterprises is evaluated &recognised from the literature. Current best sustainable methods for distribution management in the food business are discovered through a methodical assessment of the literature. Conversely, attention in the literature—like collaborative practices or environmentally friendly transportation and distribution—remain very uncommon. Furthermore, certain actions seem to directly impact the social, environmental, and economic facets for which a company is responsible. The survey takes into account the opinions of experts who are handling sustainability issues more often (Minardi, F., Botta-Genoulaz, V., & Mangano, G., 2023).

The discoveries deliberated from this inclusive study demonstrate that administrative values has a critical impact and encourages eco-friendly green supply chains scored in the highly competitive food industry of Iraq. It enhances the organization's positive relation with the basics of the dependent variable of eco-friendly distribution in the industrial sector and in keeping with the pursuit of environmental sustainability through developing strategically valuable products for industrial enterprises and keeping pace with the latest opportunities and developments to ensure labor market survival, growth, and continuity (Abdel-Amir, L. D. E. W., 2024).

CONCLUSION

The business of food chain encounters several challenges while adopting GSCM. The pilot study unfolds data and participants' views. The interpretation of findings by the study is confined within the research area; it could be different in other locations. Further, answering the point of this examination "GSCM practices really matter for organizational performance & sustainability? An outlook from the food industry". It matters for future generations, however, a noteworthy impact exists on profitability and challenges while adopting the GSCM in the food industry in terms of loss on profit, operation expenditure increase, lack of suppliers willing to adopt, increase in cost of raw materials, pressure from statutory regulations, Impacting the free cash flow, customer regrets/unwillingness of customer. However, it is crucial that such GSCM practices are adopted appropriately for future sustainable development, keeping in mind the atmosphere and preserving it for the next generation. Another area of future research could be the use of AI models for evaluating the effect of GSCM on the environment in the food business.

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