RESEARCH ARTICLE OPEN ACCESS

Mediating Role of Green Marketing Mix on the Effects of Green Supply Chain Management Practices in Sustainability among Manufacturing Firms in First Philippine Industrial Park, Batangas

Mary Jane R. Gorre, Gregoria J. Doble
Graduate School, Batangas State University
Email: jane.mary.gorre@gmail.com
Graduate School, Batangas State University
Email: gregoria.doble@g.batstate-u.edu.ph

----------**********----------

Abstract :

In this fast-paced era, companies are at risk of harming ecosystems when the demand for goods and services rises due to universal population growth and globalization thus, nowadays, firm are now shifting to green concepts leading to more sustainable processes. The study assesses the mediating role of green marketing mix on the effects of green supply chain management practices in sustainability among manufacturing firms in First Philippine Industrial Park, Batangas. This specifically determines the profile of the respondents in terms of registered business activity, number of years in operation, and number of employees. Likewise, it assesses the firm sustainability, green supply chain management practices, and green marketing mix of the manufacturing firms. Further, the study finds out if the green marketing mix mediates the effect of internal and external green supply chain management practices on firm sustainability.

The descriptive method of research design with a survey questionnaire. The respondents of the study included the manufacturing firms located inside the FPIP. From the 134 locators, only 105 participants were selected. From that, the researchers used a simple random sampling. The statistical tools applied are frequency, percentage, mean, one-way analysis of variance, and simple and multiple linear regression.

Findings revealed that most of the manufacturing companies engaged in business operations from 5 years to 10 years with less than 5000 employees. That the registered business activity, number of years in operation, and number of employees are not significant in the responses when grouped according to profile, only external green supply chain management practices particularly the reverse logistics significantly affect the firm sustainability and found out that green marketing mix mediates the effect of internal and external green supply chain management practices with direct connection to firm sustainability.

Keywords **— Green Marketing Mix, Geen Supply Chain Management, Firm Sustainability, manufacturing firm, Industrial Park.**

----------**********----------

Introduction

Globalization has a profound impact on manufacturing facilities, and it has created both challenges and opportunities for businesses. By embracing technology, focusing on quality, managing supply chains carefully, cultivating cultural intelligence, and building strong partnerships, manufacturing facilities can succeed in the global marketplace. However, it is also important for businesses to be aware of the potential downsides of globalization. Another potential downside is the environmental impact of global trade. As goods are transported around the world, they contribute to greenhouse gas emissions and other environmental problems. Manufacturing facilities need to be mindful of their environmental impact and take steps to reduce their carbon

footprint (Globalization and Its Impact on Manufacturing Facilities, 2023).

Green Supply Chain Management (GSCM) refers to the idea of implementing sustainable practices in the supply chain. As per the GSCM principle, all stages of supply chain management including product design, sourcing and selection, manufacturing, production, and end-of-life management must be as per the global sustainability standards. (Ramachandran, 2024). The new norm also involves the Green Marketing Mix which comprises a marketing strategy connected to the environmental movement toward the production of products that are safe in nature and humans in a holistic approach.

Developing countries, including the Philippines, become the nest of investors that boost economic opportunities and engagements, the Philippines' economy is currently rising at its fastest rate in Southeast Asia. In an emerging economy like the Philippines, firms across the world are struggling to adopt green practices for supply chain management practices in their end–to–end business. (Jakhar et al, 2019) and only a few businesses practice GSCM due to the lack of integration and acceptance of sustainability and concern for the environment. Some manufacturing companies may be compliant but not fully aware and would like to know how green supply chain management affects the company's performance. (Guia et al., 2018). of which are governed by supply chain and quality management policies and practices. (Noroña et al., 2021).

In the manufacturing sector, applying the green concept to supply chain management is receiving more attention because supply chain activities have a higher potential to have an environmental impact. Philippine Economic Zone Authority (PEZA) promotes the establishment of economic zones in the Philippines for foreign investments. (Philippine Economic Zone Authority, n.d.) and one of the most known locators under Special Economic Zone (SEZ), is FPIP. The fact that the manufacturing sector pollutes the environment tremendously, studies are scarce, and the manufacturing industries in the context of South Asian developing countries (Mamum et al, 2022), raises the concern that manufacturing firms are facing pressure to adopt sustainable practices contribute significantly to environmental issues. Manufacturing companies become a significant contributor to carbon emissions and severe pollution, thus, to lessen the impact, a question arises whether the Philippines businesses should embrace green marketing as a goal and ecological health. (Bellarmine, 2024).

Objectives

This objective of the study is to assess the mediating role of green marketing mix on the effects of green supply chain management practices in sustainability among manufacturing firms in First Philippine Industrial Park, Batangas.

Materials and Methods

Research Design

To meet this objective, the researcher used the descriptive approach design using quantitative research, in which numerical data were used to obtain information about the variables as its research design.

Respondents of the study

The respondents of the study were employees of the manufacturing companies located in First Philippine Industrial Park (FPIP) in Batangas the updated list of the firms can be found in their online website, PEZA Company Profile Information System. This includes employees under the supply chain management particularly handling importation and exportation (ImpEx), purchasing, and logistics. Also, those from the compliance department, quality section, and PCO (Pollution Control Officer). As to Raosoft sample size calculator. The calculations showed that a minimum sample size of 105 respondents is the recommended size to be chosen as representatives of the 134 individuals from manufacturing firms to express a 4.6% of margin of error and 95.4% confidence level. As to the sampling design, the researcher used a simple random sampling method, wherein every member of the population has an equal and fair chance of being selected. Using this

approach, respondents were randomly chosen using an online wheel of names available on the internet, entered the 134 firms, and selected a company one at a time until reaching a total of one hundred five (105) PEZA manufacturing companies. The researcher sent the questionnaires online to registered email addresses through google forms and face to face survey if only needed for follow up. To gather accurate email addresses and ensure a seamless survey distribution, validation was required before starting. This includes the comprehensive list of all population members, the ability to contact or reach each selected member, and sufficient time and resources to collect data from the required sample size, particularly valid email addresses, phone numbers, and designations. Additionally, if a respondent declines to participate in the survey, suitable replacements will be prepared, provided they meet the same criteria as identified for the original respondents in the study, the same approach using the wheel of names.

Data Gathering Instrument

The research involved collecting secondary data from publicly listed PEZA citizen's chapter, the PEZA Company Profile Information System, online sources, journals, articles, and related studies from the internet. Since the data was freely available and accessible to the public, no permission from the relevant agencies was required. The date-gathering instrument was composed of four parts. The first part identifies the profile of the respondents, which includes registered business activity, number of years in operation, and the number of employees which are relative questions for manufacturing firms. The second part, focused on the firm sustainability and to measure through economic performance. Third part, variables under green supply chain management practices are subdivided into internal and external GSCM. The last part is the mediating variable green marketing mix of the manufacturing firms, green products, green design, green promotion, and green distribution. The researcher followed the pilot testing after the validation of the expert and panel, and which tabulated summary sent to statistician for reliability results. In the questionnaire, a 7-point Likert Scale was utilized to gauge the respondent's levels of agreement, this facilitates advantages to the researcher by gaining a deeper understanding in respondent's interpretations, which effectively contributed to the collection of relevant information for the study.

Data Gathering Procedure

To gather data for the study, the researcher followed a series of steps. A letter addressed to the respondents named to the specific department involved in the study to answer the given questions noted by the adviser, also attached the courtesy letter to the Office of the Director General who subsequently delegated to the PEZA Zone Manager of FPIP to officially write down the intention of allowing the researcher to conduct the formal study in their concerned PEZA premise. After some validation, the survey questionnaire was relayed to the Regulatory Compliance and ESH Lead of the same institution, from there he assigned the Environmental Stewardship and Sustainability Department to give further assistance, given that all parties involved were committed to maintaining confidentiality and the organization values the privacy of its employees, it was essential to ensure the utmost discretion. The questionnaire will be sent via email, specifically by Google Sheets. Estimate that each respondent will take approximately five (5) to ten (10) minutes to complete the questionnaire upon submission. The researcher will monitor the respondents daily to check their progress.

Forms to the organizations that had not yet responded, to follow the second reminder if still no feedback after 2 days. After this, the researcher asked for support from the sustainability department of FPIP to connect directly to their people via group chat (AFLI) for those manufacturing companies not yet done with the survey after the second follow-up via email. The researcher also conducted physical dissemination of the survey questionnaire dated October 9-13, 2024 for face-to-face follow-up. After the entire survey questionnaire was collected, the researcher compiled, analyzed, and interpreted the data in a coding sheet, making it ready for computation.

After tallying the responses, the data was promptly submitted to the statistician for further analysis. The expert applied statistical treatments to ascertain reliable results for the study. Based on the results provided by the statistician, pertinent findings, conclusions, and recommendations will be formulated.

Statistical Treatment of Data

To arrive at factual findings and conclusions, the researcher applied a statistical method to obtain an accurate and reliable result of the interpretation. The Statistical Package for Social Sciences (SPSS) was employed in the statistical analysis of data. The following statistical tools were used in the study. Frequency and Percentage, Mean, Analysis of Variance (ONEWAY) and Simple and Multiple Linear Regression.

Results and Discussion

This consists of the data of the study which was presented, analyzed, and interpreted by the researcher. The data were derived from the questionnaires issued by the researcher to their respondents.

Table 1. Registered Business Activity.

Registered Business Activity	Frequency	Percentage
Electronic components/ Semicon	33	31.43
Food products and Beverages	1	0.95
Parts and accessories of vehicle	3	2.86
Rubber and Plastic Products	14	13.33
Others	54	51.43
Total	**105**	**100**

The results revealed that most of the manufacturing companies in FPIP business activity falls in "Others" category which is not listed on the selection earned 51.43 percent with a frequency of 54 out of 105, next engaged in electronic components/ semicon with 31.43 percent with a frequency of 33. It was then followed by an activity related to rubber and plastic products with 13.33 percent with a frequency of 14, the parts and accessories of vehicles with 2.86 percent with a frequency of 3 and food products and beverages with 0.95 percent and with 1 frequency respectively. From the results, the total number of manufacturing companies surveyed is 105 and "others" category dominates with 54 companies, this suggests that many businesses fall outside the specified categories The electronic components/semicon products indicate a strong presence of enterprises in this sector, rubber and plastic products registered businesses shows a moderate level of activity in this industry. The parts and accessories of vehicles indicate a limited number of enterprises involved in this sector lastly, the food products and beverages sector suggest that few businesses are registered in this area.

Table 2. Number of years in operation.

Number of years in operation	Frequency	Percentage
Less than 5 years	14	13.33
5 years to 10 years	34	32.38
11years to 15years	28	26.67
More than 15years	29	27.62
Total	**105**	**100**

The table shows the duration of manufacturing companies in the operations inside FPIP, some with less than five years with a frequency of 14 out of 105 and a percentage of 13.33, five years to ten years yields the highest data with a frequency of 34 out of 105 with 32.38 percent, eleven years to fifteen years in operations with 28 frequency and 26.67 percent and more than fifteen years with frequency of 29 and 27.62 percent. The highest frequency of the number of years in operations was five years to ten years, a significant number of entities have been operating for a moderate amount of time. Close numbers between more than fifteen years, this group shows that a notable number of entities have been operating for a long time. For economic theory, however, business longevity is a rather complicated issue, as in the face of the classic equilibrium model no company should prevail over others in market competition without some extraordinary rights (provided e.g. by the state), extraordinary capabilities (e.g. in technology), or capability to continually develop new processes and routines to meet the competition. That, firm having been in operation for at least five or 10 years can be considered long-lived. (Napolitano, et al., 2015). Moreover, the longevity of a business categorizes the achievability of an enterprise to support itself, to continue its stability and durability (Alagao, et al., 2023).

Table 3. Number of Employees.

Number of Employees	Frequency	Percentage
Less than 5000	86	81.90
5001- 10000	11	10.48
10001 – 15000	2	1.90
More than 15000	6	5.71
Total	**105**	**100**

The table denotes the number of employees, less than five thousand employees with a frequency of 86 out of 105 and a percentage of 81.90, five thousand one to ten thousand employees with 11 frequency and 10.48 percent, then thousand one to fifteen thousand employees with a frequency of 2 with 1.90 percent and more than fifteen thousand employees with frequency of 6 and 5.71 percent. This manifests that the manufacturing sector contributes to the employment of most manufacturing companies in FPIP with 86 frequencies out of 105. The manufacturing industry in the Philippines continues to be a vital pillar of the national economy, contributing approximately 19% of the gross domestic product (GDP) as of 2022. Employing about 7% of the country's labor force, the sector is not only a significant source of employment but also a dynamic driver of economic growth. (Moral, 2023).

Table 4. Firm sustainability as to economic performance.

Firm Sustainability	Mean	Interpretation
1. Our company has increased its market share and new market opportunities.	5.93	Agree
2. Our company has increased the number of new customers.	5.96	Agree
3. Our company has increased customer loyalty and built green corporate image.	6.19	Agree
Composite Mean	**6.03**	**Agree**

Table 4 shows the descriptive statistics on the variable tested in firm sustainability
as to the economic performance including the mean score for each as well as the composite mean. Respondents agree that their company has increased its market share and new market opportunities with a mean score of 5.93 and sustainable as to the level of agreement equivalent to its interpretation. Next, the respondents have agreed also that their company has increased the number of new customers with the mean score of 5.96 and sustainable as to the level of agreement equivalent to its interpretation also. Last, positive feedback on their assessment that their company has increased customer loyalty and built a green corporate image with a mean score of 5.93 equivalent also to sustainable as to the level of agreement equivalent to its interpretation. This suggests that the period in which corporations merely adopt sustainable practices are being overshadowed by a new era where companies are actively reshaping the market to enhance sustainability. In our rapidly changing world, the question of whether to integrate sustainability into your business strategy is no longer up for debate. This is supported by the article of DXG Group, (2023) that the demand for sustainable products and services are on the rise. Consumers today are more informed about the environmental and social impacts of their purchasing decisions. They are actively seeking out businesses that prioritize sustainability.

Table 5. Assessment on internal green supply chain management practices in terms of Eco-design.

Eco-design	Mean	Interpretation
1. Our company follows the low carbon footprint including efficient processes to reduce solid waste throughout the product manufacturing stage.	6.30	Agree
2. Our company considers Life Cycle Assessment (LCA) to assess the product environmental performances through a life cycle perspective.	6.15	Agree
3. Our company is using environmentally friendly design and eco-labelled products.	6.31	Agree
4. Our company has product design to be energy-efficient which reduces energy consumption.	6.09	Agree
5. Our company is using fewer materials and resources for manufacturing of products.	5.95	Agree
6. Our company has product design for reuse, recycle, recovery of material and component parts.	6.32	Agree
7. Our company has product design that avoid or reduce the use of hazardous materials used in product manufacturing.	6.31	Agree
8. Our company promotes cleaner production that are not harmful to the environment.	6.38	Agree
Composite Mean	**6.23**	**Agree**

Summarizes the composite mean 6.23 of the variables related to green supply chain management, with sub-variable internal green supply chain management under eco-design. Overall, respondents feedback interpretation falls to practice, the highest score is the company promotes cleaner production that are not harmful to the environment with mean of 6.38, this illustrates that each manufacturing company implements its own unique preventive measures and specific environmental protection initiatives, likely because they are involved in various registered business activities that require different processes to produce their finished goods, intended to minimize waste and emissions and maximize product output. Whereas the lowest mean score is

the company is using fewer materials and resources for manufacturing of products with 5.95, it may indicate that each product requires a standard bill of materials to be finalized before production begins. The absence of just one item can result in delays and significantly increase overhead costs in the cost of goods sold from an external perspective.

Table 6. Assessment on internal green supply chain management practices in terms of Internal environment management.

Internal Environment Management	Mean	Interpretation
1. Our company is committed to a strong environmental goal, driven by a clear vision and mission core values.	6.39	Agree
2. Our top-level management is dedicated complying with the environmental regulations which communicated to different departments.	6.42	Agree
3. Our mid-level managers and employees support the company programs into sustainability.	6.30	Agree
4. Our company is implementing cross-functional cooperation for environmental improvements.	6.30	Agree
5. Our company is accredited under ISO 14001 as a regulatory compliance.	6.28	Agree
6. Our company has existing Environmental management system (EMS).	6.25	Agree
7. Our company provides clear instructions about the policies towards environmental goal.	6.29	Agree
8. Our company encourage open communication flow.	6.36	Agree
Composite Mean	**6.32**	**Agree**

Table 6 clearly illustrates that the variables related to internal environment management have mean scores that are closely aligned, with a composite mean of 6.32, which indicates practice. Most manufacturing companies believe that all initiatives should begin internally and should be clear to the employees before execution and implementation. The lowest mean score 6.25 that the company has an existing Environmental Management System or so-called EMS and the highest mean score of 6.42 that the company's top-level management is dedicated to complying with the environmental regulations that are communicated to different departments. Based on the study of Quora, (2024), an Environmental Management System (EMS) can offer many benefits, but it also has several disadvantages, very common is related to the cost of implementation, establishing an EMS can require significant financial resources. This includes costs associated with training staff, obtaining certifications, and possibly hiring external consultants; to consider also the complexity wherein organizations may struggle with the documentation, procedures, and compliance requirements necessary for effective management.

Table7. Assessment on green supply chain management practices in terms of Green purchasing.

Green Purchasing	Mean	Interpretation
1. Our company is purchasing environment friendly materials.	6.47	Agree
2. Our company is purchasing non-toxic materials that are not harmful to the environment.	6.34	Agree
3. Our company is purchasing eco label materials that are not harmful to the environment.	6.48	Agree
4. Our company requires the adoption of an Environmental Management System (EMS) by suppliers.	6.38	Agree
5. Our company uses ISO 14001 as a standard for selecting suppliers.	6.37	Agree
6. Our company provides design specification to suppliers that include environmental requirements	6.38	Agree
7. Our company cooperates with the suppliers for environmental purposes.	6.49	Agree
8. Our company is selecting environmentally friendly supplier criteria.	6.35	Agree
Composite Mean	**6.41**	**Agree**

The data indicates a strong commitment by the company to green purchasing practices, as reflected in the individual and composite mean values. Each statement regarding the purchasing of environmentally friendly materials received positive responses, with mean scores ranging from 6.35 to 6.49, all indicating practice. Giving emphasis in top three variable with highest scores of 6.49, 6.48 and 6.47 respectively name that supplier cooperation for environmental goals: The mean score of 6.49 highlights a strong collaborative effort with suppliers on environmental initiatives, showcasing a multifaceted approach to sustainable purchasing. Eco-label materials: The agreement means score of 6.48 for purchasing eco-labeled materials further reinforces the company's focus on product sustainability. Purchasing environmentally friendly materials: The mean score of 6.47 demonstrates that the company actively engages in procuring materials that are environmentally benign. Overall, the composite mean score of 6.41 suggests a consistent agreement across all statements, underscoring the organization's dedication to green purchasing practices and its role in promoting environmental sustainability in its operations and supply chain management.

Table 8. Assessment on green supply chain management practices in terms of Reverse logistics.

Reverse Logistics	Mean	Interpretation
1. Our company has incorporated reverse logistics practices in its supply chain.	6.28	Agree
2. Our company maintains cost records of reverse logistics activities exist for monitoring.	6.24	Agree
3. Our company encourages the use-of-returnable packaging materials.	6.30	Agree
4. Our company returns products to suppliers for recycling, retaining of materials, or remanufacturing.	6.15	Agree
5. Our company assessed the return product by sorting where the products are classified as either having a high remaining useful life (RUL), reached a point of initial end-of-use (EOU), or having a low RUL, essentially reached an end-of-life (EOL) state – concept of Life Cycle Stages.	6.06	Agree
6. Our company manages the complexity of reverse logistics transactions as to volume and variability through scheduling of returns.	6.17	Agree
7. Our company targets consolidation of return products to ensure single mobility reducing carbon emissions.	6.23	Agree
8. Our company provides standard instructions for product returns.	6.26	Agree
Composite Mean	**6.21**	**Agree**

The analysis of reverse logistics practices within the company reveals a generally positive perception among stakeholders. The following interpretations were derived from the mean scores of each statement: The company actively incorporates reverse logistics practices into its supply chain, with a high agreement score of 6.28, indicating strong acceptance of these practices. There is a practice (6.24) that the company keeps cost records of reverse logistics activities, which facilitates monitoring and assessment. The encouragement of returnable packaging materials is well-supported, as shown by a score of 6.30, reflecting a commitment to sustainable practices.

Table 9. Green product assessment.

Green Product	Mean	Interpretation
1. Our product contains eco-friendly raw materials.	6.43	Agree
2. Our product passed the quality inspection and final test.	6.52	Strongly Agree
3. Our product is ISO certified standards.	6.51	Strongly Agree
4. Our product is safe on human health.	6.45	Agree
5. Our product packaging is biodegradable.	6.16	Agree
6. Our product packaging is non-toxic.	6.38	Agree
7. Our product is green-compliant and does not harm or pollute the environment.	6.41	Agree
8. Our product is durable and have low maintenance requirements.	6.35	Agree
Composite Mean	**6.40**	**Agree**

Table 9 results, presents an evaluation of various attributes of a green product based on the mean scores of responses, indicating levels of agreement among respondents. It also indicates a strong consumer agreement on various eco-friendly attributes. The composite mean score of 6.40 with verbal interpretation of agree, suggests a consensus on the importance of sustainability in product offerings. There is a strong agreement among the respondents that the product passed the quality inspection and final test with 6.52 mean score linked to the product is ISO certified standards with mean score of 6.51. This envisions that manufacturers are committed to serving quality products to their end customers.

Table 10. Green price assessment.

Green Price	Mean	Interpretation
1. Our price of the product is proportional to the quality.	6.53	Strongly Agree
2. Our price is associated with green product processing.	6.43	Agree
3. Our customers are comfortable paying a premium for green products.	6.39	Agree
4. Our company offers financial incentive in choosing eco-friendly products.	6.13	Agree
5. Our company offers competitive prices.	6.39	Agree
6. Our company pricing is fair and reasonable.	6.50	Strongly Agree
7. Our company pricing is in line with green effort investments and allow sustainability.	6.46	Agree
8. Our company performs price audit.	6.46	Agree
Composite Mean	**6.41**	**Agree**

The table shows the respondent's perception of green pricing of their company. The highest mean score of 6.53 that the price of the product is proportional to the quality, followed by a 6.50 mean score tells that company pricing is fair and reasonable, with verbal interpretation of high practice. The same mean score of 6.46 with verbal interpretation of practice, for pricing is in line with green effort investments and allows sustainability and that company performs price audit accordingly. Lowest mean score of 6.63 with a verbal interpretation of practice pertains to the company offers a financial incentive in choosing eco-friendly products.

Table 11. Green promotion assessment.

Green Promotion	Mean	Interpretation
1. Our company advertisement contains eco-friendly messages.	6.30	Agree
2. Our company product displays the corporate image of environmental responsibility	6.41	Agree
3. Our company is supporting corporate social responsibility towards environmental advocacy.	6.41	Agree
4. Our company marketing communication focused to reinforce and educate environment protection.	6.34	Agree
5. Our company initiate seminars and conferences related to the environment.	6.29	Agree
6. Our company provides complete, correct and easy-to-understand information on products' environmental performance.	6.30	Agree
7. Our company collaborates with other organization promoting green practices through trade fair and other conferences.	6.26	Agree
8. Our company is dedicated to give awareness on sustainability through online and other media platform.	6.25	Agree
Composite Mean	**6.32**	**Agree**

The findings related to "Green Promotion" present an evaluation of customers' perceptions regarding the promotion of green products which varies from every manufacturing company based on the average mean scores. This shows that the highest score mean of 6.41, with verbal interpretation of practice, that company product displays the corporate image of environmental responsibility and supports corporate social

responsibility towards environmental advocacy. Closer mean scores of 6.25, 6.26, and 6.29 respectively, with a verbal interpretation of practice that the company is dedicated to give awareness on sustainability through online and other media platforms.

Table 12. Green distribution assessment.

Green Distribution	Mean	Interpretation
1. Our company is dealing with transport agents friendly to the environment	6.39	Agree
2. Our company maximizes delivery routes to effect fuel efficient on transportation fleet.	6.36	Agree
3. Our company location is strategic and accessible to cut down on transportation emissions.	6.35	Agree
4. Our company consider the modes of delivery which has less impact to the environment.	6.32	Agree
5. Our company uses minimum packaging materials to utilize space during stuffing which increases number of deliverables.	6.38	Agree
6. Our company ensures that their accredited transportation partners are ISO certified.	6.33	Agree
7. Our company performs audits to all partner channels in transportation every year.	6.28	Agree
8. Our company commits on-time delivery.	6.50	Strongly Agree
Composite Mean	**6.36**	**Agree**

These results suggest that the company is actively pursuing strategies aligned with green logistics principles, such as route optimization, eco-friendly packaging, and partnerships with certified transport providers. This approach not only mitigates environmental impacts but also positions the company favorably in an increasingly eco-conscious market. Products that are delivered to customers by the promised delivery date.

Table 13. Green supply chain management practices effects on firm sustainability.

Firm Sustainability	B	Std. Error	t-value	p-value	Decision on H_o	Interpretation
Constant	1.483	1.120	1.324	0.049	Reject	Significant
Eco-design	0.168	0.175	0.963	0.338	Failed to Reject	No Significant Effect
Internal Environment Management	-0.135	0.161	-0.835	0.406	Failed to Reject	No Significant Effect
Green Purchasing	0.191	0.199	0.960	0.340	Failed to Reject	No Significant Effect
Reverse Logistics	0.504	0.127	3.984	<0.001	Reject	Significant Effect

Model Summary: R = 0.506; R^2 = 0.256
Regression Model: F = 8.601 p = <0.001

Response with the manufacturing companies in FPIP shows that the internal green supply chain management practices including eco-design and internal environment management has no significant affect to dependent variable of firm sustainability. As to the external dimension, green purchasing also no significant affect to firm sustainability, whereas the sub-variable, reverse logistics has significant effect to the firm sustainability aspects. Relative to the experience of one of the respondents, under the sector of medical equipment, that poor planning including incoming and outgoing inspection will lead to cost exposure when it comes to reverse logistics, materials that are not suitable yet approved by the quality department and once arrived specifications are not the same to the needed items, which will lead to the only option to ship back the wrong item and import again the correct one.

Conclusions

Based on the significant findings of the study, the researcher drew the following conclusions:

1. FPIP is the production nest of fabricated metal products, metal pressed parts and resin mold parts, wood and wood products, paper and paper products machinery and equipment, chemicals, transportation equipment, and medical supplies and equipment, wherein most of the manufacturing companies engaged in business operations from 5 years to 10 years with less than 5000 employees.
2. In the assessment of firm sustainability, focused on economic performance; can be attained by increasing customer loyalty and building green corporate image.
3. As to the response, the manufacturing firm were practiced GSCMP and GMM.
4. There is no significant difference as to the responses of firm sustainability, GSCMP, and GMM when grouped according to their profile.
5. The assessment of internal and external green supply chain management practices do not significantly affect the firm sustainability except for reverse logistics.
6. That the results found that the GMM, mediate the effect of GSCMP and reverse logistics to firm sustainability.
7. The researcher come up with a proposed strategies for firm sustainability in FPIP.

Recommendations

Based on the foregoing findings and conclusions, the following recommendations are hereby presented:

1. The manufacturing firms are recommended to include and consider GMM in their processes and daily operations.
2. The firms may re-evaluate, re-assess, and review their current internal and align to the GSCMP incorporate GMM to enhance and implement new processes.

3. Give attention to the process flow of the RL chain through R&D.
4. Boost the cooperation and collaboration through CSR.
5. Start with the internal management and effectively inform the organization.
6. FPIP sustainability team and manufacturing companies may use this study for reference.
7. Future researchers and future MSCM students may conduct similar studies for further exploration among manufacturing firms in another PEZA location.

References

[1] Alagao, J., Gannaban, K., Gasque, A., Libunao, G.,Catacutan, K., *Success of Decade-Old Business in Northern Philippines.* 2023.

[2] Andaya, R.A., Bonifacio, R.B., Noroña, M. *A Supply Chain Environmental Sustainability Model for Micro-Enterprises in the Philippine Food Industry*. School of Industrial Engineering and Engineering Management Mapúa University, Manila, Philippines, 2021.

[3] Moral, M. *The resilient growth and lasting significance of the Philippines manufacturing sector.* 2024.

[4] Napolitano, M., Marino, V., Ojala J. *In search of an integrated framework of business longevity.* 2015.

[5] Planettogether. *Globalization and its impact on Manufacturing Facilities.* 2023.

[6] Udin, M., Hoque, N., Mawla, M., Uddin, A., Mamum, A. *Challenges and pathways to green supply chain management Evidence from manufacturing sectors in an emerging economy.* 2022.

