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Second-Order Confirmatory Factor Analysis of the Contribution of the Tapioca Starch Industry in Green Supply Chain Management

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Abstract

Purpose: This research aims to analyze and verify the structural congruence of the second-order confirmatory factor model of green supply chain management in the Thai tapioca starch industry. **Research design data, and methodology:** To test influencing factors affecting of contribution have impact to green supply chain management addition system level and course quality. Data were collected from 182 members of the Thai Tapioca Starch Association, who are involved in the production of cassava starch or cassava starch-based products. Out of the 182 surveys distributed, 102 were returned and analyzed using second-order confirmatory factor analysis. **Results:** The research results showed that there were three factors with the following weights: green transportation (DEL) with the highest factor loading value of 0.728, followed by green manufacturing (PRO) with the highest factor loading value of 0.728. 0.702, and the green purchasing (PUR) with the loading value of 0.513. Additionally, the model's goodness of fit was assessed with the second-order confirmatory factor analysis, resulting in a $\chi 2$ value of 22.290, $p = 0.0222$, $\chi 2/df = 2.03$, CFI = 0.971, and RMSEA = 0.084, which meet the criteria for a good fit. **Conclusion:** This research contributes to promoting and supporting activities aimed at enhancing the green supply chain management in the cassava starch industry, emphasizing responsibility towards the community, society, and the environment.

Keywords : Second-order confirmatory factor analysis, the contribution of the tapioca starch industry, green supply chain management

1. Introduction

The active involvement of the tapioca starch industry in green supply chain management is considered a pivotal factor in conducting businesses that exemplifies a commitment to societal and environmental responsibility. This significance is underscored by the fact that the manufacturing industry stands as a causal and contributing element to the repercussions of global warming and the alterations in climatic conditions, particularly within developing nations (Taylor & Plambeck, 2007). What is interesting and emerging as a trend in entrepreneurial endeavors is not merely a focus on investment for production. Instead, there is an increasing emphasis on enhancing the significance of business management strategies that are more socially and environmentally responsible. This involves, progressively, the development of factories and warehouses designed to be environmentally friendly. This approach is significant not only for its capacity to contribute to a sustained reduction in environmental impact but also for its potential to generate long-term energy savings and cost reductions (Saipin & Chaiyanan, 2018). Furthermore, the expectations of stakeholders who seek to have their environmental needs met are numerous and steadily increasing (Sathaye et al., 2006). The manufacturing industry needs to prioritize the adaptation and modification of production processes in the pursuit of sourcing raw materials that consider environmental aspects and social responsibility (Harini & Meenakshi, 2012). This transformation is coupled with the implementation of a green supply chain system that connects activities from upstream to downstream (Esper et al., 2007). This serves to promote a positive image, instill credibility, foster trust, and stimulate the development of a green economy within the industrial

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sector. Consequently, it leads to an increase in the value of the country's green GDP. (Esfahbodi et al., 2016).

Simultaneously, the manufacturing sector has been compelled, both internally and externally, to implement a green supply chain system. This includes factors like executive supports, organizational strategies, customer demand for environmentally friendly products, as well as compliance with laws and regulations, competitive pressures, and the expectations of various stakeholder groups (Zhu et al.,(2008 . Therefore, managing a green supply chain is a critical key to driving the Thai manufacturing industry to create added value for products and services, reduce production costs, and efficiently use resources. It also fosters collaboration between the manufacturing industry and suppliers. This connects the idea that businesses must have social and environmental responsibility as an integral part of operations that consider the maintenance of quality of life, sustainable resource utilization, and environmental preservation, alongside profitability. Consequently, the utilization of natural resources as production inputs, the establishment of environmentally friendly energy-efficient production processes, and the rigorous control of waste to prevent its release into the public domain are pivotal mechanisms for conducting contemporary business operations.

Cassava, a root vegetable, ranks as the fifth most important food crop globally, following corn, wheat, rice, and potatoes. In 2021, worldwide cassava production reached an estimated 275 million tons. Thailand holds the position of the world's largest cassava exporter, thanks to its readily available cassava raw materials, placing it second only to Nigeria (63 million tons) in total production volume (35.1 million tons) according to the Office of Agricultural Economics (.(2022Cassava production in Thailand continues to rise.

The demand for cassava has grown due to its use as a substitute for other crops and in recovering downstream industries. This rise contributes to food and energy security. While floods caused a temporary decrease in production, attractive prices, government support measures, and favorable weather conditions have all been contributing factors.

Despite these positive aspects, there's a lack of research on the supply chain and logistics management system specifically for cassava. Unlike other agricultural products such as rice, rubber, and fruit, cassava hasn't received the same level of study in supply chain management. Therefore, the importance of researching the cassava starch industry's participation in an environmentally friendly supply chain management system is crucial.

Thus, the researchers are interested in studying the involvement of the tapioca starch industry in green supply chain management. This study aims to analyze and confirm the structural conformity of the second-tier involvement of the tapioca starch industry in green supply chain management. The benefits derived from this research can contribute to a deeper understanding and awareness of operations that prioritize environmental concerns through the participation of the tapioca starch industry in green supply chain management. Furthermore, this study provides a framework for further research into the involvement of the tapioca starch industry in green supply chain management.

2. Literature Review

This section begins with the discussion of the two overarching theories applied in this paper, which are Corporate Social Responsibility (CSR) and Green Supply Chain Management (GSCM). This is followed by the development of hypotheses to contribute in green supply chain management to raise understanding and awareness of environmentally conscious operations of the tapioca starch industry.

2.1 Corporate Social Responsibility (CSR)

Contribution is a part of business operations that acknowledges the importance of social responsibility (Drumm, 1998), resulting in actions or contributions to achieve the set objectives and goals (Davis, 1973). The concept of social responsibility or CSR has led scholars to provide various definitions. For example, the World Business Council defined that *" Corporate Social Responsibility is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large".*

Similarly, Barnard (1968) introduced the concept of corporate social responsibility based on stakeholder theory, connecting factors that could drive corporate social responsibility, including leadership factors. This is because leaders play a crucial role in guiding the company's social responsibility initiatives, which serve to establish stability for the company and business owners by setting an example and fostering value and innovative change for their followers. Furthermore, social responsibility assists the company in operating with integrity and ethics.

According to Fatima and Elbanna (2023) proponents of corporate social responsibility (CSR) believe it's more than just fulfilling social obligations. They view CSR as a strategic opportunity for businesses. When CSR is approached strategically, it's driven by the core values and vision of top management. Instead of being seen as an added expense, CSR becomes a deliberate initiative companies

can leverage to differentiate themselves from competitors in the marketplace. This strategic approach to CSR allows businesses to gain a competitive edge and build a stronger reputation.

CSR is seen as the foundation for Green Supply Chain Management. This approach is being adopted by many tapioca starch companies. Sustainability is a key concept here, and there are several important factors to consider.

2.2 Green Supply Chain Management

The concept of green supply chain management is a supply chain management that considers environmental factors. It encompasses the product life cycle from raw materials to finished products delivered to consumers, including various aspects related to environmental supply chain activities. (Guide & Srivastava, 1998)

2.2.1 Green purchasing is defined as an environmental purchasing consisting of involvement in activities that include the reduction, reuse, and recycling of materials in the process of purchasing. Furthermore, green purchasing is a solution for environmentally concerned, economically conservative business, and a concept of acquiring a selection of products and services that minimizes environmental impact (Ninlawan et al., 2010).

H1: Green purchasing contributes to GSCM endeavor.

2.2.2 Green manufacturing is defined as production processes that utilize inputs with relatively low environmental impacts, are highly efficient, and generate minimal waste or pollution. Green manufacturing can result in lower raw material costs, increasing production efficiency, fewer environmental and occupational safety expenses, and an enhanced corporate image. (Ninlawan et al., 2010; Tseng et al., 2019).

H2: Green manufacturing contributes to GSCM endeavor.

2.2.3 Green transportation consists of green packaging and green logistics. Packaging characteristics such as size, shape, and materials have an impact on transportation due to their effect on the transport characteristics of a product. Improved packaging, along with rearranged loading patterns, can reduce material usage, increase warehouse, and trailer space utilization, and decrease the amount of handling required. (Dubey et al., 2017; Ninlawan et al., 2010).

H3: Green transportation contributes to GSCM endeavor.

Green supply chain management (GSCM) focuses on three key areas: green purchasing, green manufacturing, and green transportation. Implementing a green supply chain can be driven by two main factors:

1) Improved Supplier Collaboration: Companies may seek to enhance cooperation with suppliers regarding environmental performance. This can be beneficial for developing eco-friendly products.

2) Supplier Environmental Performance: Companies may aim to improve the environmental performance of their suppliers. This often involves ensuring suppliers meet environmental standards like ISO 14001.

The final producer in the supply chain, typically having the highest profits and being a prime target for environmental certification, often initiates these green efforts. They may call on their suppliers to participate in these efforts to respond to consumer needs. Studies by Gilbert (2001) highlight that green supply chain practices not only reduce costs and increase efficiency, but also promote environmental conservation, raise awareness, build reputation, and improve the organization's image

Green purchasing involves incorporating environmentally conscious practices throughout the purchasing process, focusing on reducing, reusing, and recycling materials. The objective is to minimize resource usage and environmental impact. Salam (2008) and Carter and Carter (1998) identify selecting suppliers based on green practices as the most crucial activity in green supply chain management.

Green manufacturing encompasses various environmentally friendly production practices, such as pollution prevention and product stewardship. These practices can influence various competitive outcomes, including production costs and product quality. Thanki et al. (2016) and Dieste et al. (2019) propose integrating green production as a way for manufacturing industries to reduce negative environmental impacts.

Green transportation focuses on using environmentally friendly packaging, transportation methods, and cargo arrangement formats. These practices can reduce material use, increase usable space in storage and transportation, and minimize unnecessary handling during distribution (Ho et al., 2009; Shekari & Ghatari, 2013).

3. Research Methods and Materials

3.1 Research Framework

The purpose of this research is to analyze and test the construct validity using second-order confirmatory factor analysis of the contribution of the tapioca starch industry to green supply chain management. The researcher synthesized theoretical concepts related to the contribution in green supply chain management within the tapioca starch industry. The study was able to identify four latent variables and eleven observed variables, comprising three indicators of green purchasing, three of green manufacturing, two of green transportation, and three of the benefits arising from the contribution of tapioca starch factories. Figure 1 illustrates the conceptual framework of the study.

The author examines how to implement Green Supply Chain Management (GSCM) across all three areas of a company's operations: green purchasing, green manufacturing, and green transportation. The goal is to identify which companies will benefit most from adopting GSCM practices. To achieve this, the author uses a statistical technique called Second-Order Confirmatory Factor Analysis that incorporates a variable called 'benefit'.

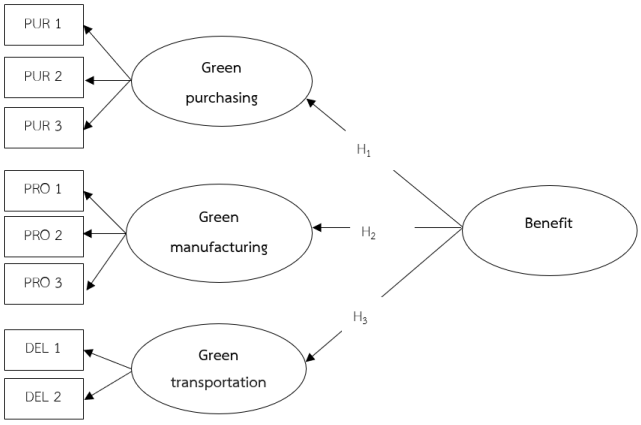


Figure 1: Conceptual Framework

3.2 Research Methodology

A questionnaire was used as a research tool. It consists of 2 parts of questions as follows: Part 1 is questions about general information from the respondents, which are a check-list type, and the second part is questions about opinions on the contribution of the tapioca starch industry in green supply chain management. There are 1 1 questions, consisting of 1) Contribution in green purchasing, 3 questions, 2) Contribution in green manufacturing, 3 questions, and 3) Contribution in green transportation, 2 items. These questions employ a 5-level Likert rating scale, ranging from 1 to 5, with each question assessing an individual variable. The scale is used to gauge the level of practice, or the outcomes achieved from the activities, where 1 represents the lowest contribution and 5 signifies the highest.

Basic statistics consisted of mean, standard deviation (SD) and reliability using the alpha coefficient method (α-Coefficient) of Cronbach to find the reliability of the questionnaire. Green purchasing (α-Coefficient) is 0.916, Green manufacturing (α-Coefficient) is 0.827 and Green transportation (α-Coefficient) is 0.746

Second Order CFA (Confirmatory Factor Analysis) was conducted on data that was tested for normal distribution using the Kolmogorov-Smirnov test. The test confirmed that the data follows a normal distribution. A Factor Model analysis was performed to assess the model's compatibility with the data using specialized software. The analysis utilized statistical indices to demonstrate the model's goodness of fit with the data. These indices include p-value > 0.05, $\chi 2/df < 3$, GFI > 0.95, TLI > 0.08, CFI > 0.95, and RMSEA < 0.05 (Hair et al., 2010)."

3.3 Population and Sample Size

The population in this study comprises executives from the enterprises in the tapioca starch production industry or those involved in products made from tapioca starch. Questionnaires were used to collect data from the executives of the enterprises engaged in the manufacture of cassava starch or products from cassava starch, who were also members of the Thai Tapioca Starch Association. Out of 182 distributed questionnaires, 102 were returned and subsequently analyzed using second-order confirmatory factor analysis. The sample size for the confirmatory factor analysis should ideally be approximately 1:10 of the number of questions (Hair et al., 2010). Since there were 8 questions in this research, the recommended sample size should be at least 80 individuals. Consequently, this study adheres to the statistical guidelines and obtained a sample size in accordance with the agreed-upon methodology.

4. Results and Discussion

4.1 Demographic Information

The demographic results sex, age, position/ responsibilities, decision-making power regarding the implementation of the company's environmental policy, factory location of green supply chain management use as shown in Table 1.

Table 1: Demographic Profile (n=102)

Measure	Items	Frequency	Percentage
Sex	Male	65	63.7
	Female	37	36.3
Age	Less 30 years	11	10.8
	31 - 40 years	42	41.2
	41 - 50 years	22	21.6
	51 years up	27	26.4
Position/ Responsibilities	executive level	52	51.0
	Supervisor level	27	26.5
	operational level	23	22.5
Decision-making power regarding the implementation of the company's environmental policy	executive directors	63	61.8
	Board of Directors	36	35.3
	Manager	3	2.9
Factory location	Eastern region	3	2.9
	Western Region	4	3.9
	Northeast region	60	58.8
	Central region	35	34.3

From general information of the respondents, it was found that most of the respondents were male (63.7%), 31 - 40 years old (41.2%), in executive level positions (51%), executive directors and having decision-making power regarding the implementation of the company's environmental policy (61.9%). Most of the cassava starch factories are located in the central region (Bangkok, 34 places) and located in the Northeast region (Nakhon Ratchasima Province, 25 places)

4.2 Second Order Confirmatory Factor Analysis

The results of the second confirmatory factor analysis of the tapioca starch industry's contribution to green supply chain management indicated that each component exhibited a positive value. Furthermore, all aspects showed statistical significance at the 0.05 level, signifying that all three elements were vital indicators when considering the contribution of the tapioca starch industry to green supply chain management. A closer examination of the components revealed that the green transportation aspect (DEL) carried the highest factor loading value of 0.728, followed closely by the green manufacturing aspect (PRO) with a factor loading value of 0.702 while the aspect of green purchasing (PUR) held a factor loading value of 0.513. This demonstrated that all three elements effectively measured the contribution of the tapioca starch industry in green supply chain management, confirming the model aligned with the theoretical framework established by the researcher, as presented in Table 2.

In the context of the second-order Confirmatory Factor Analysis (Second-Order CFA), the statistical values met the conformity test criteria, which included a Chi-Square value of 22.290, CFI (Comparative Fit Index) = 0.971, TLI (Tucker-Lewis Index) = 0.927, and RMSEA (Root Mean Square Error of Approximation) = 0.084. This information was summarized in Table 2 and Figure 2, from which we can conclude the presence of four components, encompassing a total of 12 indicators.

Component 1: Green Purchasing (PUR) comprises 3 indicators: PUR 1, which assesses the importance of procuring materials that reduce waste in production; PUR 2, focusing on the enterprises choosing to purchase from farmers who provide full truck deliveries; and PUR 3, emphasizing the procurement of products from farmers engaged in sustainable agricultural practices, such as organic farming.

Component 2: Green Manufacturing (PRO) is represented by 3 indicators: PRO 1, evaluating machine maintenance practices within the enterprises; PRO 2, which assesses workplace involvement in energy conservation; and PRO 3, focusing on the selection of the right-sized vehicles and fuel choices to reduce CO2 emissions within the community.

Component 3: Green Transportation (DEL) is composed of 2 indicators: DEL 1, which evaluates the enterprises' involvement in selecting green packaging to reduce waste in the community, and DEL 2, which focuses on the implementation of an efficient transportation system, such as full truck load deliveries, to mitigate traffic congestion in the community.

The fourth component incorporates 3 indicators, specifically BEN 1 (cost and expense reduction in business operations), BEN 2 (efficiency in enterprise management), and BEN 3 (compliance with established laws and regulations), as detailed in Table 2.

Table 2: Second Order Confirmatory Factor Analysis Results.

	Estimate	S.E.	t-stat	P-Value
Green purchasing (PUR)	0.513	0.112	4.582**	0.000
PUR 1 Enterprises focus on sourcing materials that reduce production waste.	0.652	0.068	9.581	0.000
PUR 2 Enterprises have the option to purchase with farmers who deliver full trucks.	0.834	0.054	15.567	0.000

	Estimate	S.E.	t-stat	P-Value
PUR 3 Farmers who sell tapioca to enterprises. There is sustainable agriculture such as using the concept of organic agriculture, etc.	0.817	0.054	15.082	0.000
Green manufacturing (PRO)	0.702	0.124	5.643**	0.000
PRO 1 The enterprise has maintenance Always maintain machinery in perfect condition.	0.902	0.050	17.854	0.000
PRO 2 Enterprises participate in energy conservation	0.762	0.061	12.409	0.000
PRO 3 The enterprise selects the appropriate vehicle size and fuel. to reduce CO2 emissions to the community	0.586	0.073	8.019	0.000
Green transportation (DEL)	0.728	0.136	5.348**	0.000
DEL 1 The enterprise involves in the selection of green packaging to reduce waste in the community	0.814	0.073	11.194	0.000
DEL 2 The enterprise has an appropriate transportation system, such as transporting goods in full trucks load to reduce traffic in the community.	0.878	0.069	12.724	0.000
Chi-Square = 22.290, p = 0.0222, X2/df = 2.03, CFI = 0.971, TLI = 0.927, RMSEA = 0.084				

Note: *p< 0.05 **p< 0.01

Table 3: Estimated Correlation Matrix for the Latent Variables.

	PUR	PRO	DEL	BEN
PUR	1.000			
PRO	0.360	1.000		
DEL	0.373	0.511	1.000	
BEN	0.513	0.702	0.728	1.000

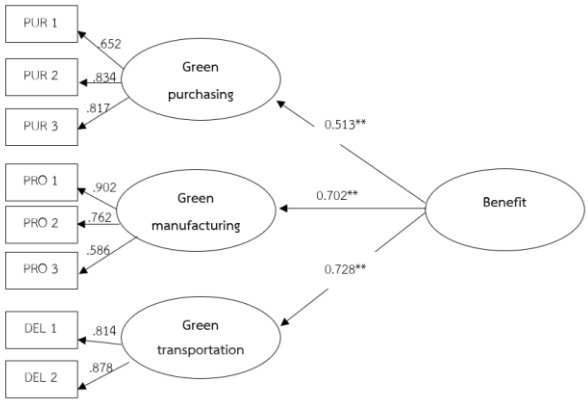
Table 4: The performance test index of the second order confirmatory component analysis model.

Index	Acceptable Value	Statistical Valuers
χ2 (Chi Square)	< 3 (Hair et al., 2010)	2.03
P-value	< 0.05 (Hair et al., 2010)	0.0222
Degrees of Freedom (df)		11
Comparative Fit *Index (CFI)*	> 0.95 (Hair et al., 2010)	0.971
*Tucker Lewis index (*TLI)	> 0.08 (Hair et al., 2010)	0.927

Table 5: (Cont.) The performance test index of the second order confirmatory component analysis model.

Index	Acceptable Value	Statistical Valuers
Root Mean. Square Error of Approximation (RMSEA)	< 0.08 (Akinyode, 2016)	0.084

Note: * $p < .05$.



Note: * $p < .05$. ** $p < .01$.
Figure 2: Second Confirmatory Component Model Results.

4.3 Research Hypothesis Testing Result

The research model is calculated as the significance of each variable from its regression weights. Table 5 postulated that all hypotheses were supported with a significance at p = 0.0222. There were three hypotheses in the study.

Table 6: Hypothesis Results of the Second Confirmatory Component Model.

Hypothesis	Estimate	t-Value	Results
H1: PUR → BEN	0.513	4.582**	Supported
H2: PRO → BEN	0.702	5.643**	Supported
H3: DEL → BEN	0.728	5.348**	Supported

Note: * $p < .05$. ** $p < .01$.

Regression coefficient or standardized path coefficient to verify whether the hypothesis is tenable. Table 5 shows that three proposed hypotheses were supported. The contribution in green supply chain management within the tapioca starch industry was green purchasing, green manufacturing, green transportation, to establish GSCM practices for improved collaboration.

5. Conclusion and Recommendation

This study focuses on the Thai tapioca starch industry and how well a specific model (second-order confirmatory factor model) reflects the real-world structure of green supply chain management (GSCM) practices there. The research also examines how factors affecting contributions to GSCM work within the industry, looking at both the system level and the quality of the cassava starch production process itself. To gather information, researchers surveyed 182 members of the Thai Tapioca Starch Association, all involved in cassava starch production. Out of those surveyed, 102 responses were received and analyzed using a

statistical method called second-order confirmatory factor analysis.

5.1 Conclusion and Discussion

Green purchasing refers to the acquisition of goods and services that are environmentally friendly, entails choosing items with minimal emissions of toxic and harmful substances (Saada, 2021). For instance, businesses prioritize sourcing materials that reduce waste during production and opt to buy from farmers who embrace organic agricultural practices. Green public purchasing is a crucial intervention to combat climate change. Both public and private sector purchasing policies and practices can influence the adoption of low-carbon production methods and the supply of eco-friendly products and services (Milios, 2018). Thus, adopting environmentally friendly procurement practices also encourages suppliers to establish GSCM practices for improved collaboration (Walton et al., 1998).

Truong et al. (2023) said that the concept of "Green purchasing" refers to a strategic strategy used by buyers, whereby they purposefully seek out suppliers that align with and actively promote the buyer's environmental aims and objectives. This particular interpretation of the concept of "Green purchasing" is but one of several potential understandings of the phrase. Paulraj (2011) defines "green procurement" as a strategic approach that involves evaluating suppliers based on their technical, environmental, and social attributes in order to inform decision-making processes. Priority is given to the procurement of paper and component containers that prioritize environmental sustainability, specifically focusing on materials like plastic bags and cartons. The concepts of the 3Rs (reuse, recycle, and reduce) are given particular importance, and may be succinctly described as "reduce, reuse, and recycle." The study emphasizes the need of implementing strategies to reduce reliance on paper, such as using electronic communication methods for transmitting purchase orders. Furthermore, the research emphasizes the need of implementing these strategies. Ninlawan et al. (2010) and Lee et al. (2012) argue that the green procurement process needs to include essential elements, including the incorporation of environmental compliance certifications, the use of eco-labeling practices on products, and an assessment of a firm's internal environmental management systems

Green manufacturing encompasses practices such as maintaining machinery in optimal condition, participating in energy conservation to reduce CO2 emissions in the community, and implementing just-in-time manufacturing to minimize the need for storage. These efforts align with the supply chain processes of GSCM (Yang et al., 2020). As a result, adopting green manufacturing practices leads to benefits associated with sustainability and the development of a green economy, achievable by implementing sustainability principles in various countries. The importance of sustainability in a green economy can be viewed from two perspectives. Firstly, it plays a significant role in reducing environmental impacts, such as greenhouse gas emissions. Secondly, it contributes to the reduction of air and noise pollutants and promotes fuel management for sustainable development. It is crucial to highlight that the efficient use of resources is as important, if not more important, than the availability of resources in building a robust infrastructure (Saada, 2021).

Sangode and Metre (2019) said that "Green manufacturing" involves the use of machines and equipment for manufacturing that is energy efficient and more environmentally friendly. As for many heavy industries, the input material is the energy in the form of fuel used, that post usage emits greenhouse gases, green practices in the manufacturing ensures the limited or the optimum use of such resources. The emissions are properly disposed of or treated to least damage the environment. Further, the recycling programs for raw materials, and reusable components and also products are done to optimize the resources usage. Manufacturing firms are also implementing the product robustness in designing of the product. They are also engaged in measuring the carbon footprint.

Green transportation, including practices and reverse logistics activities, presents opportunities for organizations to enhance their growth and reduce overall production costs. Achieving logistics efficiency is closely tied to promoting an efficient transportation system, such as green transportation (Khan, 2018). For instance, businesses can engage in selecting green packaging to minimize waste in the community or establish effective transportation systems to alleviate traffic congestion. Implementing green transportation practices leads to cost savings in shipment movements, efficient vehicle allocation, and planning possibilities (Navarro et al., 2018).

Colicchia et al. (2017). Results confirm the opportunities to increase the sustainability and efficiency of the supply chain, in line with the extant literature that stresses the opportunities to concurrently reduce CO2 emissions and optimise transportation costs

5.2 Limitations

This study has certain limitations. Firstly, the research findings are based solely on the perspectives of operators within the tapioca starch industry. To address this limitation, future research should involve community members and other stakeholders to gather diverse opinions and perspectives. Secondly, the findings in this study were from quantitative research using a questionnaire as the research tool. Therefore, future scholars should consider incorporating a wider range of observed variables. Qualitative research may also be beneficial to assess stakeholder needs before collecting empirical data.

References

Akinyode, B. F. (2016). The Use of Structural Equation Modeling (SEM) in Built Environment Disciplines. *Research on Humanities and Social Sciences, 6*(6), 109-120.

Barnard, C. I. (1968). *The functions of the executive*. Harvard university press.

Carter, C. R., & Carter, J. R. (1998). Interorganizational determinants of environmental purchasing: initial evidence from the consumer products industries. *Decision sciences, 29*(3), 659-684.

Colicchia, C., Creazza, A., & Dallari, F. (2017). Lean and green supply chain management through intermodal transport: insights from the fast-moving consumer goods industry. *Production Planning & Control, 28*(4), 321-334.

Davis, K. (1973). The case for and against business assumption of social responsibilities. *Academy of Management journal, 16*(2), 312-322.

Dieste, M., Panizzolo, R., Garza-Reyes, J. A., & Anosike, A. (2019). The relationship between lean and environmental performance: Practices and measures. *Journal of Cleaner Production, 224*, 120-131.

Drumm, A. (1998). New approaches to community-based ecotourism management. Learning from Ecuador. *Ecotourism: a guide for planners and managers*, 197-213.

Dubey, R., Gunasekaran, A., & Papadopoulos, T. (2017). Green supply chain management: theoretical framework and further research directions. *Benchmarking: An International Journal, 24*(1), 184-218. https://doi.org/10.1108/BIJ-01-2016-0011

Esfahbodi, A., Zhang, Y., & Watson, G. (2016). Sustainable supply chain management in emerging economies: Trade-offs between environmental and cost performance. *International Journal of Production Economics, 181*, 350-366.

Esper, T. L., Fugate, B. S., & Davis-Sramek, B. (2007). Logistics learning capability: sustaining the competitive advantage gained through logistics leverage. *Journal of Business Logistics, 28*(2), 57-82.

Fatima, T., & Elbanna, S. (2023). Corporate social responsibility (CSR) implementation: A review and a research agenda towards an integrative framework. *Journal of Business Ethics, 183*(1), 105-121.

Gilbert, S. (2001, December). *Integrated summary. Greening supply chain: enhancing competitiveness through green productivity*. APO. https://www.apo-tokyo.org/wp-content /uploads/2014/07/ind_gp_gsc-2000.pdf

Guide, V. D. R., & Srivastava, R. (1998). Inventory Buffers in Recoverable Manufacturing. *Journal of Operations Management, 16*(5), 551-568.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective*. Pearson Prentice Hall.

Harini, V., & Meenakshi, D. T. (2012). Green entrepreneurship alternative (business) solution to save environment. *Asia Pacific Journal of Management & Entrepreneurship Research, 1*(3), 79.

Ho, J. C., Shalishali, M. K., Tseng, T. L. B., & Ang, D. S. (2009). Opportunities in green supply chain management. *The Coastal Business Journal, 8*(1), 2.

Khan, S. A. R. (2018). *Introductory chapter: introduction of green supply chain management.* Green Practices and Strategies in Supply Chain Management.

Lee, S. M., Kim, S. T., & Choi, D. (2012). Green supply chain management and organizational performance. *Industrial Management & Data Systems, 112*(8), 1148-1180.

Milios, L. (2018). Advancing to a Circular Economy: three essential ingredients for a comprehensive policy mix. *Sustainability science, 13*(3), 861-878.

Navarro, P., Cronemyr, P., & Huge-Brodin, M. (2018). Greening logistics by introducing process management–a viable tool for freight transport companies going green. *Supply Chain Forum: An International Journal, 19*(3), 204-218.

Ninlawan, C., Seksan, P., Tossapol, K., & Pilada, W. (2010, March). The implementation of green supply chain management practices in electronics industry. *World Congress on Engineering 2012, 2182*, 1563-1568.

Office of Agricultural Economics. (2022, March). *AGRICULTURAL STATISTICS OF THAILAND 2022.* www.oae.go.th/assets/portals/1/files/jounal/2566/yearbook2565.pdf

Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply management and organizational sustainability. *Journal of Supply Chain Management, 47*(1), 19-37.

Saada, R. (2021). *Green transportation in green supply chain management.* Green Supply Chain-Competitiveness and Sustainability.

Saipin, P., & Chaiyanan, P. (2018). Management efficiency model of the environmentally friendly dyeing industry in Thailand. *Thonburi University Academic Journal, 12*(28), 138-149.

Salam, M. A. (2008, December). Green procurement adoption in manufacturing supply chain. *Proceedings of the 9th Asia Pacific Industrial Engineering & Management Systems Conference*, 1253-1260.

Sangode, P. B., & Metre, S. G. (2019). Green supply chain practices for environmental sustainability: a proposed framework for manufacturing firms. *International Journal of Mechanical and Production Engineering Research and Development*, *9*(2), 287-289.

Sathaye, N., Li, Y., Horvath, A., & Madanat, S. (2006, November). *The environmental impacts of logistics systems and options for mitigation.*UK Berkeley Center for Fortune Urban Trasport. https://escholarship.org/uc/item/7m21d806

Shekari, H., & Ghatari, A. R. (2013). Promoting corporate image: A reflection on green supply chain management approach. *Int. J. Manage. Bus.Res.*, *3*(4), 311-324

Taylor, T. A., & Plambeck, E. L. (2007). Supply chain relationships and contracts: The impact of repeated interaction on capacity investment and procurement. *Management science*, *53*(10), 1577-1593.

Thanki, S., Govindan, K., & Thakkar, J. (2016). An investigation on lean-green implementation practices in Indian SMEs using analytical hierarchy process (AHP) approach. *Journal of cleaner production*, *135*, 284-298.

Truong, K. H. V. T., Ngo, T. C., Le, D. V. G., Bao, T. T., Nguyen, L. T. K., Lam, D. H., & Huynh, A. H. (2023). Contribution To Sustainable Development: Study Case About Influencing of Green Supply Chain Management on Environmental Efficiency. *Migration Letters*, *20*(S7), 936-954.

Tseng, M. L., Islam, M. S., Karia, N., Fauzi, F. A., & Afrin, S. (2019). A literature review on green supply chain management: Trends and future challenges. *Resources, Conservation and Recycling*, *141*, 145-162.

Walton, S. V., Handfield, R. B., & Melnyk, S. A. (1998). The green supply chain: integrating suppliers into environmental management processes. *Journal of Supply Chain Management*, *34*(1), 2-11.

Yang, Z., Sun, J., Zhang, Y., & Wang, Y. (2020). Synergy between green supply chain management and green information systems on corporate sustainability: An informal alignment perspective. *Environment, Development and Sustainability*, *22*, 1165-1186.

Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International journal of production economics*, *111*(2), 261-273.