

## THE ROLE OF GREEN PRODUCT INNOVATION AS A MEDIATOR FOR GREEN CUSTOMER INTEGRATION ON ECONOMIC PERFORMANCE IN THE AGRO-FOOD AND BEVERAGE INDUSTRY IN JAMBI PROVINCE

Indra Budaya <sup>1)</sup>, Anggil Novra Lova <sup>2)</sup>, Elex Sarmigi <sup>3)</sup>

<sup>1,2)</sup>STIE Sakti Alam Kerinci, Sungai Penuh, Indonesia, <sup>2)</sup>Institut Agama Islam Negeri Kerinci, Sungai Penuh, Indonesia

Corresponding author: elexsarmigi@gmail.com

### Abstract

*This research aims to find out and explain how green customer integration on economic performance is mediated by green product innovation in agro-industry, both directly and indirectly. Background Problems: Green businesses refer to any business that adheres to environmental sustainability standards in its management, its efforts to use renewable resources, and its struggle to reduce the negative environmental impact of its actions in increasing its business income. Novelty: Green product innovation has an essential role in mediating the relationship between green customer integration and economic performance. Research Methods: This research is quantitative. The sampling method used was purposive sampling with a research instrument in the form of a questionnaire distributed to 240 respondents who were food and beverage agro-industry business actors in Jambi Province. Finding/Results: green customer integration has a direct effect on green product innovation and economic performance. Conclusion: These findings prove that Green Customer Integration determines economic performance. The better a company integrates environmentally friendly products with its consumers, it can increase environmentally friendly product innovation, which can influence economic performance or business profits*

**Keywords:** Economic Performance; Green Customer Integration

### Introduction

The economic development of a business is often inversely proportional to the development of the environment. Economic development in recent years cannot go hand in hand with sustainable resource management and reduction in pollution (Teng et al., 2014). The industry's goal of increasing productivity and efficiency often results in a decrease in environmental quality. There are still many companies that often do not pay attention to environmental aspects, so in the production process, they produce various problems in the environment, such as excessive use of natural resources and careless waste disposal, which causes water, air and soil pollution in the surrounding environment.

The environment has become an important strategic issue. Global warming, bioterrorism and increasing pollution mean that there is now no more significant threat to business and society than the relentless exploitation and destruction of the environment (David & David, 2017). One of the causes of damage to the environment and marine ecosystems is the accumulation of waste from industry and households, where natural conditions have changed over the last 30-40 years since the introduction of plastic (Azaria et al., 2013).

This has been a challenging problem for the government and business organisations in Jambi Province in recent years. Based on observations made at several agro-industries in Jambi Province show that currently, only a few business actors are aware of the impact of food and water waste, excessive use of electricity and packaging containing plastic on environmental sustainability. Apart from that, it was also discovered that most of the agro-industry still faces fundamental problems because it is traditional and has been passed down from generation to generation. The agro-industry still needs to improve in management and has not anticipated changes in the environment due to limitations in innovating its products.

With environmental degradation becoming one of the significant threats to human survival in the future, an increasing number of organizations are being encouraged to adopt environmentally friendly innovation as a strategy to achieve environmental protection and economic growth. Environmentally friendly innovation is innovation in products, processes, and management that can lead organizations to achieve sustainable competitive advantage effectively.

Economic consumption patterns also lead to high levels of energy and material utilization among business organizations; the term 'business organizations' here refers to manufacturing companies, which are believed to be major contributors to environmental problems and resource depletion (Eltayeb et al., 2011). According to et al. (2012), According to Wisner et al. (2012), business activities throughout the product development process can create major problems for the natural environment, including increased carbon monoxide emissions, unnecessary packaging materials, abandoned toxic materials, and other types of industrial pollution. These issues have also forced manufacturers to take significant responsibility for improving their development and production processes to ensure environmental sustainability, which, in the long term, can transform their businesses into more 'eco-friendly' business entities (Meera & Chitramani, 2014).

In responding to economic and environmental problems, several researchers have developed models in an effort to improve economic performance but also maintain the environment ; research such as that conducted by Su et al. explains that in order to improve company performance and the environment, there is a need for green innovation practices. Green supply chain management (GSCM) has recently emerged to comply with regulations for environmental protection (Abdullah & Musa, 2014). Increasing environmental pollution significantly affects companies' business operations (Y.-S. Chen et al., 2016; De Marchi, 2012). Both industrial policies and stakeholder pressure encourage companies to pursue sustainable development in terms of environmental performance, which has brought new concerns and challenges to companies' innovative activities (Lioutas et al., 2018).

This broad perspective does not consider that different performance effects can be created by using different integration mechanisms by different GSCI dimensions, which apparently lead to different outcomes. Evidence suggests that customer cooperation can be more effective than supplier cooperation in improving environmental performance (Amui et al., 2017). The three dimensions of GSCI (Green internal, green supplier integration and customer) have been proven to produce different environmental, cost and financial benefits (Wong et al., 2018). So, we propose a deeper study of one of the dimensions, namely Green customer integration (GCI), in answering the problems of sustainable economic issues in protecting the environment.

Adopting green practices is an essential consideration for companies today. Many industries are changing to adopt an eco-friendly mindset. Furthermore, more and more companies are considering green innovation as a critical approach to reducing their negative impact on the environment (Albort-Morant et al., 2018). Green product innovation uses cleaner materials and product technology to (re)design products and packaging.

Therefore, implementing a green innovation strategy that seeks to integrate environmentally friendly concepts into the entire product life cycle can help companies reduce environmental damage and meet strict environmental regulations. In addition, considering the global trend towards environmentally friendly development, green innovation can help companies achieve “win-win” outcomes in terms of profits, social benefits, and competitive advantages, especially in emerging markets such as China (Chen & Liu, 2019).

## **Literature Review**

### **Green Product Innovation**

Corporate green technology innovation is the process of applying green innovation ideas to product innovation and process innovation in line with the development of ecological civilization, and this process ends with marketing green products or services (Aboelmaged dan Hashem, 2019; Li et al., 2019; Ma et al., 2019). Green product innovation is a form of advanced innovation that can relatively control pollution from emissions originating from its source (Hu et al., 2017). This not only reduces or prevents the emergence of pollutants but also helps companies meet environmental protection standards, thereby improving their social reputation (Ling Guo et al., 2017). Corporate green technology innovation is the process of applying green innovation ideas to product innovation and process innovation in line with the development of ecological civilization, and the process ends with the launch of green products or services on the market (Aboelmaged, 2019; Li et al., 2019; Ma et al., 2019).

Finally, governments, academic research institutions, and other social groups have widely recognized the importance of green technological innovation for high-quality economic and social development (Dugoua dan Dumas, 2021; Sharma et al., 2021; Wang et al., 2021). Company environmentally friendly technological innovations such as green product innovation (Weng et al., 2015; Xie et al., 2019). Environmental performance and market competitiveness are essential drivers for progressing from green product innovation to improved economic performance (Ma et al., 2021; Yook et al., 2018). In other words, a company's green product innovation improves its financial performance not only through environmental performance but also through market competitiveness. However, there is yet to be definitive information regarding the link between green technology innovation and the economic performance of transmission lines. Previous studies on improving the financial or economic performance of various green technology innovations have yet to be comprehensive, and little attention has been paid to the internal relationships of various environmentally friendly innovations.

### **Green Customer Integration**

Customer integration refers to maintaining relationships with downstream customers to ensure that manufacturing, distribution, and marketing comply with environmental regulations to improve the company's economics. On the other hand, as suppliers to customers, manufacturers typically employ environmental collaboration rather than monitoring to integrate with their customers (Wu, 2013). Standard customer integration practices include joint planning with customers to achieve environmental goals, joint selection of environmental strategies to reduce environmental impacts, and collaboration in the production of cleaner and environmentally friendly packaging. Integrating with customers improves information sharing between them and the organization. Furthermore, relationships with customers enable organizations to deduce core

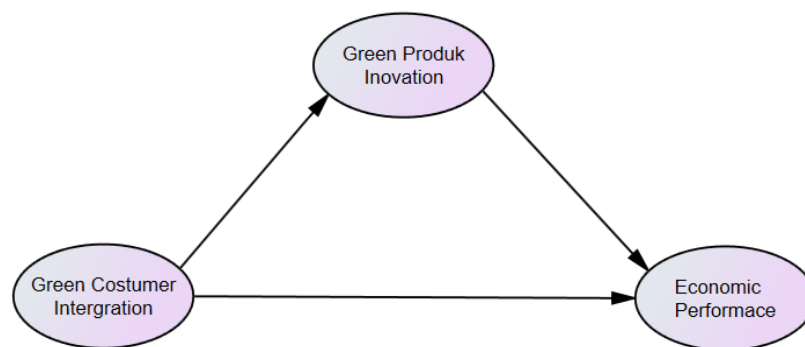
competencies (Flynn et al., 2018). Customer integration involves sharing information between the organization and the customer.

GCI uses similar integration mechanisms to increase data processing capacity and understand downstream markets. GCI involves sharing information with customers about environmental goals, practices and strategies, cleaner production techniques, and product life cycle impacts (Song et al., 2018). Customers are more aware of problems and support proactive supplier efforts, resulting in better and more sustainable customer relationships (Wong et al., 2020). GCI coordinates communication and collaboration with clients. Collaborating with customers creates shared environmental responsibility and achieves shared environmental goals. GCI uses market-based integration mechanisms to offer customers more environmentally friendly products in terms of increasing company revenues (Wong et al. 2020). Cooperation promotes the sharing of information about environmental impacts and environmental-related issues, as well as joint decision-making to reduce environmental impacts (Wong and Boon-itt 2015). Collaboration and information exchange help coordinate closed processes and logistics planning activities. Improved information capabilities help identify and influence customer needs, and this new knowledge can better inform innovative activities in green product design, packaging, and logistics.

### Economic Performance

In the literature on regulation and economic performance, two opposing views exist regarding the impact of environmental regulations on firms' economic performance. On the one hand, the traditional or cost-based view emphasizes that the costs incurred by companies in complying with regulations reduce the company's productivity and economic performance. Supporters of this view argue that if green innovation is profitable, then companies that maximize profits will choose such innovation of their own accord (Raza, 2020) in connection with economic performance, explaining that economic performance is the industry's ability to create innovation (Tom et al., 2015), Economic performance, referring to profitability factors in general, is an essential reason for companies to implement GSCM practices. Therefore, some studies code studies that measure economic performance using objective or perceived growth in sales, profits, and market share. Economic performance, referring to profitability factors in general, is an essential reason for companies to implement GSCM practices. Therefore, several studies have coded studies that measure economic performance using objectives or perceived growth in sales, profits and market share. According to Mumtaz et al. (2020), economic performance is related to operational costs consisting of production, organizational processes and processes. Marketing.

There are four direct effect research hypotheses presented in the diagram from Figure 1.



**Figure 1.** Conceptual Framework Model

Customer integration can influence green product innovation (Wong et al. , 2020 and; Wu, 2013), and green product innovation can also influence economic performance (Wang et al., 2021; Wong et al., 2020 Su et al. 2020). The author states that customer integration can also influence economic performance through green product innovation. Because green product innovation is a mediating factor in the relationship between customer integration and economic performance, green product innovation can be the main reason for improving economic performance. The author states that there is a possibility that a green innovation strategy mediates the relationship between customer integration and economic performance.

### Methods

In the context of green innovation, it is hoped that business activities will develop rapidly in maintaining a sustainable environment. Environmentally friendly products are expected to arouse interest, allowing customers to use the products they offer not only for economic functions but also to protect the environment. Therefore, the author makes green innovation (green product innovation) a reference and reference object and research population. The sample for this research consisted of agro-industry players in processed food and beverages from agricultural products in Jambi Province.

The sampling used in this research is a purposive sampling technique, namely determining the sample with specific considerations (selection of sample units) by selecting certain people who will be considered to provide the required data. In determining the sample size, the researcher uses multivariate theory, namely the number of items. Questions x 20 (Lova and Haryono, 2023). For this reason, the sample in this study is 12 question items x 20, so the sample in this study is 240 respondents who were distributed via questionnaires to agro-industry operating as a producer of food and drinks in Jambi Province voluntarily within one month to support this research data. This research was analyzed using structural equation modelling (SEM) using Amos 22. Measurements from previous studies were adopted.

The standard procedure for developing measures to be implemented whenever necessary involves the use of a multi-item green customer integration reliability and unidirectionality index measured with 4 items developed by (Lisi et al., 2020). Green Product Innovation is measured from 4 items developed by (Wang et al., 2021). and e customer loyalty is measured using 4 items developed by (Wang et al., 2021).

The psychometric properties of the measures were assessed using confirmatory factor analysis (CFA). The scoring model is classified by Amos 22 with the highest probability. As a step to perfect the scale, a standard CFA loading estimate is carried out ; if the factor loading value exceeds 0.50, then the measurement accuracy can be verified (Lova & Budaya, 2023).

**Result and Discussion**

**Table 1.** Structural Equation Model (SEM)

Variabel		Estimate	S.E.	C.R.	P
Green Costumer Integration	---> Green Product Innovation	,622	,114	5,117	***
Green Product Innovation	---> Economic Performance	,207	,050	4,993	***
Green Costumer Integration	---> Economic Performance	,141	,056	4,973	***

Source: AMOS.22

From Table 1, it can be concluded that green customer integration has a significant direct effect on green product innovation. The results of testing the relationship between each of these variables directly show a CR value of 5.117 greater than 1.96 (5.118 > 1.96) with a probability smaller than 0 .05 (0.00 < 0.05), so that the better the company's communication or relationship with customers will have a positive impact on the development of environmentally friendly products. The results of this research are in line with the research results of Lisi et al. (2019), Wong et al. (2020) and Wu (2013), showing that green customer integration can influence green product innovation. Thus, research H1 is supported.

Apart from that, from Table 1, it is also concluded that green product innovation has a significant direct effect on economic performance. The results of testing the relationship between each of these variables directly show a CR value of 4.993, which is greater than 1.96 (4.993>1.96) with a probability of smaller than 0.00 (0.00 < 0.05), so the better the company's communication or relationship with customers will have a positive impact on profits or economic performance. The results of this research are in line with the research results of Wang et al. (2021), Wong et al. (2020) and Wu (2013). which shows that green product innovation can influence economic performance. Meanwhile, green customer integration has a direct and significant effect on economic performance. The results of testing the relationship between each of these variables directly show a CR value of 4.973 greater than 1.96 (4.973>1.96) with a probability smaller than 0.00 (0, 00 < 0.05), so that the better the company's communication or relationship with customers will have a positive impact on profits or economic performance. The results of this research are in line with the research results of Wang et al. (2021), Wong et al. (2020) and Wu (2013). which shows that green customer integration can influence economic performance.

**Table 2.** Green product innovation as a mediator of economic performance

Standardized	Direct Effect	Indirect Effect: green product innovation as mediation	Result
GCI --> EP	0.241	-0.003	Partial mediation

Source: AMOS. 22

From Table 2, the standardized direct effects parameter estimates show that there is a direct influence of green customer integration on the economic performance of 0.241. More significant than the indirect influence of standardized green customer integration on economic performance indirectly through green product innovation of -0.003. So, it can be concluded that green customer integration has a partial effect (partial mediation) on economic performance through green product innovation. This is also proven by the influence of e-service quality on e-trust and economic performance in hypotheses h1a and h1b.

## Conclusion

These findings prove that Green Customer Integration determines economic performance. The better a company integrates environmentally friendly products with its consumers, the more it can increase environmentally friendly product innovation, which can influence economic performance or business profits, the environmentally friendly agro-food and beverage industry as measured by essential information about environmental protection from customers, learning new environmental management capabilities from customers, maintaining relationships with customers increases the company's capacity to maintain environmentally friendly performance, building solid capabilities in understanding environmentally friendly knowledge and customer skills.

This means that these results show that integration with consumers contributes to economic performance or profit in the food and beverage agro-industry so that it can emphasize that the food and beverage agro-industry which is considered to consider consumers will make customers interested in using the product.

Innovation always arises from consumers when comparing the performance or results obtained from a product or service with their expectations. This shows that the agro-food and beverage industry has information from customers, learns new environmental management skills from customers, maintains relationships with customers, increases the company's capacity to maintain environmentally friendly performance, and builds strong capabilities in understanding environmentally friendly knowledge and customer skills influencing product innovation. That will be developed apart from that, developing product innovation can also increase the profits or value of the company.

This study also plays an essential role in better understanding the role of green product innovation as a mediator in the relationship between different food and beverage products. Therefore, the contribution of this research is to build a deeper understanding of innovation in increasing profitability, related to the importance of green product innovation as a mediator of customer interaction, which aims to improve economic performance continuously.

Therefore, an agro-industry that cares about the environment in carrying out its business activities and seeking profitability in the food and beverage sector must be able to use its customers as references in developing environmentally friendly products. The findings in this research strengthen this statement because green product innovation has an essential role in mediating customer integration towards economic performance.

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