

Regulation effectivity to sustainable competitive advantage on rice mill industry evidence Indonesia

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Abstract: The purpose of this study is to analyse and prove the impact of regulatory effectiveness on the supply chain and its impact on sustainable competitive advantage for rice milling companies in Indonesia. The research method used was a quantitative analysis, employing a sample of 200 rice milling companies in East Java. The results of this research indicate that regulations do not have a significant effect on the supply chain, Regulations do not have a substantial effect on sustainability Competitive Advantage, Supply chain has a significant impact on sustainable competitive advantage, in addition, flexibility management can moderate the relationship between the supply chain and sustainable competitive advantage, but flexibility management is not able to moderate the regulatory relationship with sustainable competitive advantage.

Keywords: *Flexibility management, Regulation, Supply chain, Sustainable competitive advantage.*

1. Introduction

Regulation is an act of authority in the form of Government rules that aim to protect the interests of the public, promote safety, health, and public welfare and create a fair and sustainable environment by controlling, regulating, and supervising certain activities, industries or entities to ensure compliance with certain standards. (Anaf et al., 2018). Regulation is effective in improving quality and reducing pollution. (Shang et al., 2020) Regulation, when effectively implemented, has the potential to significantly improve the business climate, fostering a more conducive environment for companies to thrive. (Dvořákov & Zborková, 2014).

In Indonesia, the government uses regulations to control the food security system and enhance the competitive advantage of the rice milling industry. (Barinda & Ayuningtyas, 2022). However, the complexity of regulations, in the form of additional rules or requirements, that govern food security in Indonesia creates cost and supply chain complexity, increases costs and reduces efficiency, creating uncertainty and business risk. (Muhammad et al., 2024) (María et al., 2021)(Ersoy et al., 2021)Implementing regulations, such as labour relations regulations, working conditions, and environmental management, exerts pressure that has become an obstacle for companies to manage the sustainability of their supply chains competitively. For example, strict regulations on the price of imported medicines have decreased competitiveness and profits. (Ersoy et al., 2021) Many countries experience confusion and inconsistency when implementing regulations.

Given the importance of food security in developed and developing countries, researching food security supply chains is necessary. There have been many previous studies that have explored food security, but there is not enough research on food security associated with *the supply chain* in the rice milling industry and sustainable competitive advantage; besides that, this study also repositions the model by adding flexibility management as a moderating variable whether the impact strengthens or

weakens the sustainable competitive advantage. This study aims to determine the effect of regulations on sustainable competitive advantage in rice milling companies in East Java.

2. Literature Review

2.1. Regulation of Supply Chain

Some researchers point to the positive impact of regulations on supply chains. The Government can set a minimum quota to increase shipping companies' resilience by building a stable transportation flow to reduce risks. (Uman & Sommanawat, 2019). Selling prices based on restrictive and trading regulations are higher than those without restrictive and trading regulations, which can provide insights for the business industry to make pricing decisions (Chen & Yuyu, 2024). Customs has a significant influence on the establishment of sustainable supply chain practices, and effective risk management has also been found to contribute positively to sustainable supply chain initiatives. Sustainable supply chain practices increase the coefficient of customs logistics. (Cantele et al., 2023)

However, Guowe (2024) found that Government regulations promoting environmentally friendly technologies are ineffective in improving sustainability. Meanwhile, the fact that global sustainability supply chain regulations are only carried out by developed countries while in developing countries is very lacking (Smith et al., 2024).

H₁: Regulations have a positive and significant effect on the sustainability of the supply chain in the rice milling industry in East Java.

2.2. Regulation of Sustainable Competitive Advantage

According to (Sun et al., 2021) The significant negative impact of the import ban on the growth of import value at the company level, especially for state-owned enterprises (SOEs), was found. (Shang et al., 2020) Waste paper import regulations in China positively impact the production of high-quality waste paper with less dirt content, which can improve product quality. (Kantamaturapoj et al., 2022) Government policies are very effective in sustainable food management by reducing imports to protect local products in Bangkok, (Mahrinasari et al., 2024) The government plays a significant role in mediating the relationship between sustainable competitive advantage, providing a sense of reassurance about the regulatory oversight.

H₂: Regulations have a positive and significant effect on sustainable competitive advantage in the rice milling industry in East Java.

2.3. Supply Chain to Sustainable Competitive Advantage

The supply chain is a product that can quickly and efficiently reach consumers so that companies can compete competitively. (Buranasiri et al., 2024) Shows that supply chain collaboration has a greater influence and can increase sustainable competitive advantage (Buranasiri et al., 2024). Partnerships are the most influential aspect of the SDGs in addition to showing that supply chain collaboration has a greater influence on increasing sustainable competitive advantage (Cantele et al., 2023) The success of the supply chain can improve sustainability performance. (Perdana et al., 2023) it is Stated that coordination is very important in the supply chain, especially in information sharing and the ability to circulate. According to (Robert et al., 2023), who researched the quality of the supply chain consisting of production sites and the production process greatly affects the sustainability of the supply chain. (Yan et al., 2023) The rate of price fluctuations significantly impacts the retail industry in determining optimal prices.

Meanwhile (Lu et al., 2022) The researcher who researched the supply chain of agricultural products in China found three main agricultural products: staple foods, vegetables, and fruits, and supply chains ranging from agricultural production to handling, storage, processing, and post-harvest distribution. Total losses or residues from staple foods, vegetables, and fruits increased to 7.9%, 27.7%, and 13.2%, respectively, of total production. Residues in staple food products occur at the production stage, post-harvest handling and distribution stages. Bag Surajit (2018), Market forces affect supplier

development. Supplier development can affect supplier and managerial performance. Management and suppliers can affect supplier performance and positively affect sustainable innovation in the supplier network. (Chen et al., 2022), the Analysis shows that the negative relationship between market product competitiveness and supply chain information disclosure will increase when competitors can obtain sustainable competitiveness in using the information disclosed. (Arts et al., 2024), Building collaborative relationships not only helps buyers and suppliers but also results in more sustainable industry practices in terms of intra-organizational collaboration.

H_s: Supply Chain Affects Sustainable Competitive Advantages in the Rice Milling Industry in East Java.

2.4. Flexibility Management

According to (Bastidas-arteaga et al., 2021) When effectively employed, flexibility management can reduce costs, extend the life cycle, increase competitiveness, and better adapt to changes in external conditions, preparing companies for future challenges. (Villafafila-robles et al., 2023) Flexibility management can efficiently optimise energy costs for distributed resources, creating effective and sustainable management performance. Furthermore, Shi and Ying (2024), research show that managers' concerns about energy savings are not money savings. However, the reason for the company's strategy and maintenance is that energy savings reach a certain limit. A tightening of environmental regulations can cause companies to change the proportion of energy saving equipment purchases.

H_s: Flexibility Management moderates the relationship between Regulations and sustainable competitive advantage in the rice milling industry in East Java.

H_s: Flexibility Management can moderate the relationship of the Supply Chain to a sustainable competitive advantage in the rice milling industry in East Java.

3. Research Methods

3.1. Design Research

This study uses a quantitative approach to measure the impact of regulations on the supply chain and its impact on sustainable competitive advantage in rice milling companies in East Java. It will also measure the influence of flexibility management moderation in relation to government regulations and the supply chain on sustainable competitive advantage.

3.2. Sample and Data Collection

This research was conducted on rice milling companies in East Java. A sample of 200 small—to large-scale milling businesses, as seen from the number of supervisors owned, was taken. The data collection method was carried out with a questionnaire to measure the impact of regulations on the supply chain, its impact on sustainable competitive advantage, and the moderation impact of the Flexibility management variable using the Likert scale.

Table 1.
Variabel penelitian.

Variable	Definition and measurement	References
Independent variabel		
Regulation		(Mallett et al., 2018)
	Government policies in the form of regulations, measured by Fear of Regulation, Avoidance of regulation	
Intervening		
Supply chain		(Koh & Demirbag, 2007)

	Management activities in order to obtain raw materials into goods in process or semi-finished goods, measured by Flexibel, Lead time in productio,n , Cost saving	
Moderating		
Filexibility management Dependent	Management's ability to deal with the situation, measured by Addictive to the Situation, Control of the situation	(Miroshnychenko et al., 2020)
Sustainable competitive advantage		(Cantele & Zardini, 2018),
	Competitive advantage is an innovative activity of the company that significantly affects the ability to compete, measured by management capability, campeny image competitive	

3.3. Data Analysis Method

It was carried out using Smart PLS to test the hypothesis of the impact of regulations on the supply chain, its influence on sustainable competitive advantage, and the impact of flexibility management moderation.

4. Research Result

The results of the hypothesis testing of the impact of moderation on regulations, supply chain and sustainable competitive advantage in rice milling companies in East Java it can be seen in the following model image:

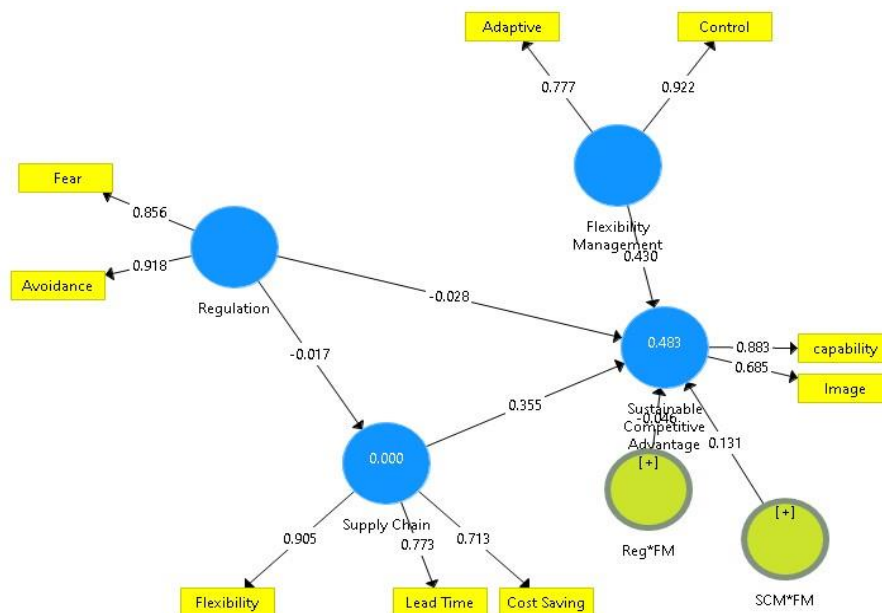


Figure 1.

From the model image above, it can be seen that the regulatory variable has a negative coefficient of 0.017, which means that the more regulations issued by the government, the lower the supply chain of rice milling companies in East Java. Regulations have a P Value of $0.837 > 0.05$, which means that they do not significantly impact sustainable competitive advantage.

The influence of regulations has a negative coefficient of 0.028 on sustainable competitive advantage, meaning that the more regulations issued by the government, the lower the sustainable competitive advantage in rice milling companies in East Java. The regulation has a P-value of $0.655 > 0.05$, meaning it does not significantly affect sustainable competitive advantage.

The supply chain has a coefficient of 0.355, which means that the higher the supply chain, the higher the sustainable competitive advantage of rice milling companies in East Java. The supply chain has a P-Value of $0.000 < 0.05$, significantly affecting sustainable competitive advantage.

For the impact of moderation of the Flexibility management variable on regulation and sustainable competitive advantage, it has a negative coefficient value of 0.046 and a P value of 0.290, which means that the existence of flexibility management does not significantly reduce sustainable competitive advantage.

The impact of the moderation of the Flexibility management variable on the supply chain and sustainable competitive advantage has a positive coefficient value of 0.131 and a P value of 0.000 which means that the existence of flexibility management can significantly improve the supply chain relationship to sustainable competitive advantage.

Table 2.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P Values
Flexibility management -> sustainable competitive advantage	0.430	0.429	0.090	4.772	0.000
Regulasi -> Suply chain	-0.017	-0.015	0.085	0.206	0.837
Regulasi -> sustainable competitive advantage	-0.028	-0.026	0.063	0.448	0.655
Supply chain -> sustainable competitive advantage	0.355	0.361	0.089	3.986	0.000

The impact of moderation can be presented in the following table:

Table 3.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Regulasi*Flexibility Management -> sustainable competitive advantage	-0.046	-0.041	0.042	1.082	0.280
Suplay chain*Flexibility -> sustainable competitive advantage	0.131	0.133	0.026	5.019	0.000

To see the contribution of variables based on the indicators studied it can be seen in the value of the loading factor so that the contribution of the indicator in measuring a model construct can be known; the value of the loading factor can be presented in the following table:

Table 4.

Variable	Indikator	Loading
Independent variabel		
Regulation	Regulatory fear	0.856
	Regulation avoidance	0.918
Intervening		
Supply chain	Flexible	0.905
	Lead time in production	0.773
	Cost Saving	0.713
Moderating		
Flexibility management	Addictive to the situation	0.777
	Situation control	0.992
Dependent		
Sustainable competitive advantage	Management capability	0.883
	Company image competitor	0.655

Regulations do not significantly impact the supply chain of rice milling companies in East Java. The lack of regulation on the supply chain is measured by fear of regulation, reflected in the regulation (HET) of the highest retail price of rice; HET is a problem for rice milling companies where companies are forced to follow the regulation of one maximum price for premium rice products at 13,900, while the medium price is 10,900. At the same time, the price of rice in the market has reached 15,000, so there is a price disparity that is too far compared to the price in the market, so many companies cannot follow Government regulations in determining HET. The results of this study reject the findings (Anaf et al., 2018) the main purpose of regulation is to control, regulate, or supervise certain activities, industries, or entities. The main objectives of regulations are to ensure compliance with certain standards, protect the public interest, promote safety, health, and public welfare, and create a fair and sustainable environment on the other hand different findings put forward by (Muhammad et al., 2024) Regulations can be an obstacle to a competitive, sustainable supply chain because they exert pressure on companies to comply with various standards and regulations related to employment relations, working conditions, and environmental management.

Regulations do not impact the supply chain of rice milling companies in East Java. This is reflected in the indicator of regulatory evasion. Regarding avoiding regulations to maintain sustainable competitive advantage, rice milling companies carry out a strategy where the HET disparity for premium rice is 13,900 while for medium, it is 10,900. Rice companies have made a breakthrough by selling medium-quality rice at a premium price, of course, by using different processes so that the quality produced is of premium quality. The results of this study reject the findings. (Shang et al., 2020) Regulations are very effective in improving quality and reducing pollution due to this study in parallel with the findings. (Dvořák & Zborková, 2014) Regulations can improve the quality of business, but the findings are different. (María et al., 2021) Government regulations create cost and supply chain complexity with additional requirements and rules that can increase costs and reduce efficiency.

Regulations do not impact sustainable competitive advantage, HET rules shackle the creativity of rice milling companies, and rice milling entrepreneurs always make breakthroughs. However, with the existence of HET that forces all entrepreneurs to have the same price, finally, people who have creations or breakthroughs in their products become shackled; when we make a breakthrough, it will create production costs. In contrast, the production field for rice that Premium and Medium have not yet met the quality standards set by the Government. The results of the study (Kantamaturapoj et al., 2022) government Policies are very effective in sustainable food management by reducing imports to protect local products in Bangkok, (Mahrinasari et al., 2024) The Government has a significant role in mediating the relationship between sustainable competitive advantage.

Supply chain significantly impacts sustainable competitive advantage; small and medium-sized rice mills have a traditional market segment with an average margin of 2%. In comparison, large-scale rice companies take the modern retail market segment with an expected margin of 5%. To compete competitively, rice milling companies in East Java increase their network with suppliers, in this case farmers and collectors, to maintain the availability of rice raw materials so that the business run can be sustainable. The results of this study support the findings (Buranasiri et al., 2024) partnerships are the most influential aspect of the SDGs, in addition to showing that supply chain collaboration has a greater influence on increasing sustainable competitive advantage, as found (Cantele et al., 2023) The success of the supply chain can increase competitive advantage. as well as Tomy's findings (Perdana et al., 2023) stated that coordination is very important in the supply chain, especially in sharing information and the ability to circulate.

Flexibility management cannot moderate the relationship between regulations and sustainable competitive advantage; in its efforts, the majority of rice milling businesses to improve production quality are carried out rice milling machines so that the rice produced becomes shiny and attracts consumers. However, many rice milling companies produce medium plus rice sold at a premium price in the field. So that the rule is a shackle for rice milling entrepreneurs.

Sustainable competitive advantage small-scale rice milling companies depend on farmers' direct supply, processed and then marketed to the traditional market. In contrast, large-scale rice companies have more technological advantages with the use of dryers and high-tech equipment; in addition to that, in large-scale rice mills the company's image is very important in building sustainable competitive advantage, namely with products that have a brand so that it can penetrate the modern retail market at more competitive prices.

5. Conclusion

This study analyzes the impact of regulations on the supply chain and its impact on Sustainable Competitive Advantage in rice milling companies in East Java. In this study, we examined 200 milling companies. The analysis used is smartPLS to determine the direct impact of regulations on the supply chain and indirect impacts on Sustainable competitive advantage.

The results of this study prove that regulations have a negative and insignificant impact on Sustainable Competitive advantage, government policies that are too strict in determining the price of rice in the market hurt the supply chain, where the government sets a price on rice commodities that do not look at the type of rice, both premium and medium, so that rice milling entrepreneurs are less innovative in making products.

The regulation can reduce the creativity of milling entrepreneurs where entrepreneurs in processing their products try to beautify the rice products produced in the hope that they can be sold at a high price. However, with the implementation of HET or the highest retail price, it can reduce the competitive advantage among entrepreneurs. The results of this study show that government regulations have a negative and insignificant impact on the supply chain. Government regulations in the rice trading system have increased costs to reduce the profits entrepreneurs generate.

In addition, this study also found that the supply chain has a significant impact on Sustainable competitive Advantage in rice milling companies in Java. A good supply chain will determine the company's sustainability, which can ensure the availability of industrial raw materials to accommodate market demand. To become a company that is able to compete and be sustainable, the company must be able to build a supply chain network in order to achieve the desired goals.

This finding is very important for the government, as the regulator of the rice trading system in Indonesia, in taking policies related to the rice supply chain. Entrepreneurs expect an evaluation of the one-price policy or HET of rice by looking at the types of premium and medium rice so that it can increase Sustainable competitive Advantage in rice milling companies.

We realize that research related to the impact of regulations on the supply chain and Sustainable competitive advantage on rice milling companies in East Java is still limited in terms of the number of

research samples, the size of the company seen from the number of employees, so further research is needed in order to improve this research, namely by looking at how the size of the company is based on the business scale criteria in Government regulations (Turnover or Capital) applicable and other variables (Technology, Digitalisai, Sustainable Report).

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