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Gluten Rice Cultivation and Business in Malaysia: A Social Entrepreneurship Approach in Agent-Structure Analysis

Alia Fateha binti Zahari[1], Ahmad Sayyidulhaq Arrobbani Lubis*[2]

[1]Universiti Putra Malaysia, Malaysia
[2]Universitas Sumatera Utara, Indonesia

*Corresponding Author: ahmadsayyidulhaq@gmail.com

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ABSTRACT

The cultivation of gluten rice in Malaysia is growing with global market demand, creating social entrepreneurship opportunities that empower farmers and offer sustainable social, economic and environmental impacts. The main objective of this study is to analyze gluten rice cultivation and business in Malaysia through a social entrepreneurship approach using agent-structure analysis, where the interactions between key agents such as farmers, social entrepreneurs, government, and consumers, as well as the social, economic, and policy structures that influence them, are analyzed to understand their role in shaping a sustainable and competitive gluten rice industry. The research method used is a literature review with a methodological approach involving identification, analysis and synthesis of literature. Data collection techniques were conducted by utilizing various sources such as books, academic journals, research reports, and articles related to social entrepreneurship, actors in networks, and social value production. The data analysis technique used was descriptive qualitative. Based on the research on gluten rice cultivation in Malaysia with a social entrepreneurship approach through agent-structure analysis, the main conclusions include several important points. First, the roles of key agents such as farmers, social entrepreneurs and consumers shape the supply chain that supports business sustainability. Second, social, economic and policy structures, including green regulations and market access, influence industry. Third, the gluten-free rice business provides economic and social benefits, improving farmers' incomes and supporting healthy lifestyles. Finally, sustainable agricultural practices support environmental sustainability and carbon footprint reduction.

Keyword: Agent-structure Analysis, Gluten Rice, Gluten Business, Social Entrepreneurship

1. Introduction

The cultivation of gluten rice in Malaysia is a growing phenomenon as the demand for gluten-free products in the global market increases. The demand is triggered by increasing health awareness, especially among consumers with gluten sensitivity and celiac disease. Therefore, gluten-free rice, derived from gluten-free varieties, is not only an answer to health needs, but also a promising business

opportunity. This paves the way for the development of social entrepreneurship that integrates economic, social and environmental principles in the management of sustainable agricultural enterprises (Schwab, 2020).

A social entrepreneurship approach in the context of gluten rice cultivation offers great potential to create positive social impact, particularly in empowering local farmers. Through the application of social entrepreneurship principles, farmers can gain new economic opportunities and improve their quality of life. By creating new markets for gluten rice, social enterprises can increase income opportunities for farmers, leading to better living standards (Abdildinova, 2024). Thus, gluten rice farming can serve as a solution that focuses on economic benefits.

In this analysis, agent-structure theory offers a relevant framework to understand the dynamic relationship between the various agents involved in the gluten rice business in Malaysia. Key agents such as farmers, social entrepreneurs, government, and consumers play a central role in the success of this venture. Existing structures-whether in terms of agricultural policies, market incentives, or health regulations-influence how these agents interact and adapt in advancing the gluten rice industry. The interaction between these agents and structures determines the sustainability and competitiveness of the gluten rice business, both in the domestic and international markets (Giddens, 1984).

The main objective of this study is to analyze the cultivation and business of gluten rice in Malaysia through a social entrepreneurship approach using agent-structure analysis. This research aims to identify the roles of various key agents in the industry and understand how their interaction with existing social, economic and policy structures can support the development of a sustainable and highly competitive business. As such, this research is expected to provide new insights into the development of a gluten rice business that is not only economically profitable, but also provides significant social and environmental benefits to Malaysian society (Porter & Kramer, 2011).

2. Research Method

The research method used in this study is a literature review with a methodological approach involving the identification, analysis and synthesis of relevant literature on social entrepreneurship and social values. This approach enables a comprehensive understanding of current knowledge related to social entrepreneurship, as well as the application of actor-network theory in social and economic contexts. Data collection techniques were conducted by utilizing various sources such as books, academic journals, research reports, and articles related to social entrepreneurship, actors in networks, and social value production.

The data analysis technique used is descriptive qualitative, which serves to categorize and interpret the data obtained from these literature sources. Data were collected, organized, and categorized based on emerging themes and patterns, and then analyzed to interpret the social and economic implications of the interaction between actors and structures in the context of social

entrepreneurship. The main results of this analysis are summarized to draw conclusions relevant to the research objectives (Kim et al., 2017; Synder, 2019).

3. Results and Discussion

Social Change Through Gluten Rice Cultivation

The Health Impact of Cultivating Gluten Rice

The cultivation of gluten rice provides a solution to the increasing global demand for gluten-free products. According to the Celiac Disease Foundation (2020), the prevalence of celiac disease and gluten sensitivity is increasing globally, including in Malaysia, driving the demand for gluten-free foods. As a safe and healthy alternative, gluten-free rice is the answer for individuals with gluten intolerance. Therefore, the development of gluten rice cultivation in Malaysia not only fulfills the needs of gluten-intolerant consumers, but also opens up new market opportunities for health-focused products.

Gluten-free rice can provide health benefits to individuals who suffer from celiac disease or have gluten sensitivity, which is increasingly common in different countries. Glutinous rice is rich in bioactive compounds that exhibit antioxidant, anti-inflammatory, and anti-diabetic properties. Glutinous rice has been associated with reduced risk of chronic diseases due to its antioxidant properties and its ability to lower cholesterol levels (Ali & Hashim, 2024). With diets becoming more health-conscious, gluten-free rice products can be a safer option for many people, both those with certain diseases and those who care about a healthy lifestyle.

As a major producer of gluten-free rice, Malaysia has great potential to strengthen its position in the international market. In addition to meeting local needs, the global demand for gluten-free products is increasing, and with innovations in gluten rice cultivation, Malaysia can take advantage of the global trend. Thus, gluten rice cultivation is not only beneficial for gluten-sensitive individuals, but also contributes to the trend of healthier food consumption in society, strengthening Malaysia's position in the global market. Malaysia's rice industry has evolved from small-scale farming to a very important food crop, yet it still faces challenges such as climate change, soil fertility issues, and competition from cheaper producers in the region (Dorairaj & Govender, 2023; Fatah, 2017).

Economic Opportunities for Local Farmers

According to a report by the Malaysian Ministry of Agriculture (2022), smallholder farmers in Malaysia often struggle to compete in the market due to the low value of their products. Smallholder farmers often lack sustainable access to profitable produce markets, which reduces their bargaining power (Onumah et al., 2007). In this case, switching to gluten rice cultivation becomes an opportunity to access a wider market at a higher price. Gluten rice, which is gaining recognition as a healthy food

product, provides a more promising alternative for farmers from the B40 group, who often struggle to improve their living standards. By turning their attention to this product, farmers can earn a better income from their agricultural products.

This economic opportunity also opens up access to new and more diverse markets, as demand for gluten-free products comes not only from people with celiac disease, but also from more health-conscious consumers. In a survey across 13 European countries, caregivers and health-conscious individuals reported higher purchasing frequencies of gluten-free products(Dean et al., 2024). The gluten-free market has seen substantial growth, especially in the UK and US, where consumers increasingly associate gluten-free diets with health benefits(Khairuddin & Lasekan, 2021). Gluten-free rice is increasingly sought after for its health benefits, creating a lucrative market for farmers (Binth, 2024). This allows local farmers to sell their crops in wider, even international, markets at more competitive prices. Research shows a strong relationship between household income and food security among smallholder farmers in Langkawi, where sticky rice is cultivated. Higher incomes correlate with better access to food, highlighting the need for financial stability to combat food insecurity (Wardani et al., 2023).

Moreover, with the adoption of a farming model focused on gluten rice, farmers can optimize their production yields and reduce reliance on conventional crops that are more difficult to market. Organic glutinous rice production has shown higher profitability compared to traditional methods, with an average profit of $141.36 per hectare, highlighting its economic viability (Sattaka et al., 2020). The initiative also opens up opportunities for women and youth empowerment in the agribusiness sector. The development of this sector not only provides direct benefits in the form of income for farmers, but also creates new jobs across the supply chain, from cultivation to distribution. By introducing agricultural technologies that are more environmentally friendly and based on sustainability, this opportunity can improve the quality of life of rural communities, especially the most economically vulnerable groups, such as women and youth who have limited access to formal employment.

Table 1. Economic Opportunities for Local Farmers

Factor	Opportunities	Source
High Selling Value	Gluten rice offers higher prices in local and international markets	Onumah et al. (2007)
Production Profit	Organic production provides an average profit of $141.36 per hectare	Sattaka et al. (2020)
Wider	Demand for gluten rice is	Binth (2024)

Market Access	growing among global consumers	

Contribution to Environmental Sustainability

Gluten rice cultivation not only provides social and economic benefits, but also contributes significantly to environmental sustainability. Sustainable agricultural practices applied in gluten rice cultivation, such as reduced chemical use and efficient irrigation, can reduce negative impacts on soil and aquatic ecosystems. According to a report by FAO (2023), these environmentally friendly farming techniques help maintain soil fertility and prevent ecosystem damage, which is crucial in maintaining the carrying capacity of agriculture in the long term. Therefore, gluten rice cultivation can be considered as a solution that supports the sustainability of nature.

As climate change becomes a growing concern, environmentally friendly farming techniques are becoming a strategic measure to meet the challenge. Farmers who adopt eco-friendly practices can not only improve their production efficiency, but also reduce the carbon footprint of their farming activities. For example, the use of greener farming technologies, such as water-efficient irrigation and the use of organic pesticides, allows farmers to adapt to climate change while keeping their yields stable without harming the environment. Sattaka et al. (2017) also highlighted that in Vietnam, agricultural extension services support small-scale glutinous rice farmers, which not only improves food security, but also promotes sustainable agricultural practices, allowing local communities to maintain their cultural ties with glutinous rice while improving sustainability.

Thus, gluten rice cultivation can be an agricultural model that prioritizes sustainability and environmental sustainability. In addition to providing solutions for public health and economic opportunities for local farmers, it also serves as an effort to maintain the balance of nature and reduce the negative impacts caused by conventional agricultural practices. This makes gluten rice cultivation not only an economic product, but also part of a larger initiative to protect the environment and natural resources that are increasingly under threat. The adoption of sustainable farming methods, such as organic production that reduces agrochemical inputs and improves soil health, contributes to environmental preservation (Abobatta & Fouad, 2024).

Developing and Implementing Solutions

Research and Development of Gluten Rice Varieties

Research and development (R&D) plays an important role in the successful cultivation of gluten rice, especially in creating ideal varieties. The selected rice varieties should have high yields, be resistant to pests, and be adaptable to the local climate, such as in Malaysia. The development of varieties that are suitable for local conditions is essential so that agricultural products not only meet

the needs of the domestic market but are also able to compete in the international market. Countries like Laos and Thailand, with significant glutinous rice varieties, are well-positioned to leverage this market due to their rich genetic diversity (Sattaka, 2016). To achieve this, collaboration between the government and research institutions is crucial in providing farmers with the necessary resources to adopt improved varieties. Several rice-producing countries have implemented similar initiatives, which have proven to accelerate the adoption of improved varieties that are naturally gluten-free, giving local farmers a competitive advantage to enter the wider market.

Research has shown that the development of multi-resistant rice varieties through gene pyramiding has been effective in improving resistance to biotic and abiotic stresses. Haque et al. (2021) noted that this method has successfully created rice varieties that are not only resistant to pests and diseases, but also able to withstand erratic environmental conditions. In addition, genetic engineering techniques also allow the incorporation of resistance genes from different sources, which increases disease resistance in plants (Abas et al., 2024; Koshariya et al., 2024).

As such, research and development of innovative gluten rice varieties is key in improving the sustainability of this agricultural sector. Collaboration between stakeholders and the application of cultivation methods that focus on resilience as well as sustainability will ensure that gluten rice cultivation can flourish. This will not only provide sustainable economic benefits for farmers, but also meet the growing market demand.

Farmer Training in Sustainable Agriculture Practices

Farmer empowerment through training is an important step in the development of gluten rice cultivation. Training that teaches organic farming techniques, water management and natural pest control can help farmers increase productivity without harming the environment. With these skills, farmers can not only meet market quality standards, but also minimize the risk of losses due to climate change. In addition, effective training programs can also include education on business management and marketing, which are important to help farmers understand market dynamics and manage their businesses independently. Therefore, training should not only focus on technical aspects, but also on developing farmers' entrepreneurial capacity.

Training initiatives, such as the PSRLB Program, have shown significant improvements in organic rice cultivation by teaching sustainable practices such as System of Rice Intensification (SRI) (Rezza & Simatupang, 2023). The GALASA program in Kerala demonstrated that collective action and social mobilization among farmers can enhance empowerment and sustainable agricultural development (Sendikumar, 2016). In Ghana, training programs have been shown to improve the socioeconomic status of participants, help them acquire assets, and enhance their cognitive skills (Issahaku et al., 2022). Effective training can also result in better knowledge transfer, enabling farmers

to adopt modern techniques that can improve their yields and profitability (Veni & Swetha, 2018).

Such training initiatives have been shown to increase farmers' income and strengthen the agricultural sector, contributing to economic growth in rural areas (Anwar et al., 2023). Training programs focused on sustainable agriculture have also shown a positive correlation with the adoption of innovative agricultural practices among small-scale farmers (Pandey et al., 2024).

Marketing Strategy and Partnerships

To maximize market potential, effective marketing strategies are essential. Public awareness campaigns regarding the health benefits of gluten-free rice can increase demand. In addition, partnerships with modern retailers and e-commerce platforms can expand the product's reach to a wider range of consumers. Collaboration between the government, non-profit organizations, and businesses is key in creating an efficient supply chain. With policy support such as tax incentives or subsidies for farmers, gluten rice business development can be done faster. This cooperation model also helps in building an inclusive and sustainable agribusiness ecosystem.

Digital marketing can be a very effective tool in increasing market visibility and attracting more customers. Utilizing social media and viral marketing is proven to significantly increase product reach and awareness (Herlina, 2022). Participatory learning approaches that engage farmers in participatory market chains can also increase their capacity to manage their businesses effectively, providing them with the knowledge and skills to thrive in a competitive market (Campilan, 2011).

On the other side, value-added products produced by farmers can help diversify their offerings and meet consumer demand, especially in high-demand metropolitan areas (Feenstra & Lewis, 1999). Despite these various strategies, farmers' markets often face sustainability challenges caused by ineffective management and intense competition. Therefore, addressing these issues through strategic planning and community engagement is crucial to ensure long-term success (Sneed & Fairhurst, 2010).

Table 2: Development and Implementation Strategy of Gluten Rice Cultivation

Key Components	Description and Example	Source
Variety Research and Development	- Focus on high-yielding, pest-resistant, climate-adapted gluten rice varieties - Gene pyramid for biotic-abiotic resistance.	Haque et al. (2021); Abas et al. (2024)
Genetic Engineering Technology	- Combination of resistance genes to improve resistance to plant diseases.	Koshariya et al. (2024)

Government and R&D Institution Collaboration	- Collaboration provides resources and accelerates adoption of improved varieties.	-
Farmer Training	- Organic farming techniques, water management, and natural pest control. - Business management and marketing.	Rezza & Simatupang (2023); Veni & Swetha (2018)
Continuous Training Initiatives	- Examples of programs: PSRLB (Indonesia), GALASA (India), and programs in Ghana.	Sendikumar (2016); Issahaku et al. (2022)
Marketing Strategy	- The gluten-free rice health benefits awareness campaign. - Utilization of social media and e-commerce.	Herlina (2022); Feenstra & Lewis (1999)
Partnership and Policy Support	- Tax incentives and subsidies for farmers. - Inclusive and sustainable agribusiness supply chains.	Sneed & Fairhurst (2010)
Value-added Product Diversification	- Increase product offerings to meet metropolitan demand.	-

Source: Author

Agent-Structure Analysis in Gluten Rice Cultivation

Agent's Role in Gluten Rice Business Success

The successful cultivation of gluten rice involves various key agents that contribute to each other in the production and distribution chain. Each agent, from farmers, government, millers, traders, middlemen, to consumers, has an important role in creating a stable and sustainable business ecosystem. Farmers are the main agents in the gluten rice production chain. They are responsible for the quality and quantity of production. Superior varieties such as Agat, which have high nutritional content, are the main choice in producing quality gluten-free products (Dulka et al., 2020). Support in the form of training on sustainable farming techniques and access to modern technology is needed to increase productivity without damaging the environment.

The government plays an important role as a policy maker and incentivizer. Financial

incentives such as subsidies and tax reductions, as proposed in the Malaysian Ministry of Agriculture report (2022), can attract more farmers to engage in gluten rice cultivation. Policies that support sustainable agriculture and pro-farmer regulations are key in ensuring the success of this sector. On the other hand, rice milling adds substantial value in the production process, accounting for about 40.39% of the total production cost of gluten rice (Pumihic, 2023). Efficiency in the milling process affects the quality of the product that will be distributed to the market. Traders and retailers also play an important role by facilitating market access and product distribution to end consumers. Shorter operating cycles provide benefits to key traders, thus supporting a smooth supply chain (Pumihic, 2023).

In addition, intermediaries such as agricultural cooperatives and technology transfer agencies play a role in facilitating communication and resource sharing between farmers, researchers and policymakers. The technological support and market access they provide can improve production efficiency and competitiveness of gluten rice products (Kishioka et al., 2017). Consumers, as the last agent in this chain, play an important role in determining the direction of production through their preference for healthy and environmentally friendly products. The growing demand for gluten-free products, as reported by the Celiac Disease Foundation (2020), encourages producers to provide a variety of high-quality products. Marketers act as a link between farmers and consumers, ensuring product quality and benefits are effectively communicated (Emodi & Madukwe, 2011).

The interaction between these agents is key to the success of the gluten rice business. Effective collaboration, such as the partnership between farmers and millers, helps to create an efficient supply chain and supports the sustainability of production (Fahim, 2023). In the agent-structure paradigm, these interactions determine the sustainability and competitiveness of the gluten rice business, both in the domestic and international markets. Each agent interacts with existing structures in the system that influence each other. For example, government policies (structure) can encourage or limit farmers' participation in gluten rice cultivation. On the other hand, an increase in consumer demand (agent) for gluten-free products can influence government policies and stimulate industry growth.

The sustainability of the gluten rice business relies heavily on positive interactions between the agents involved and the structures that support them. Farmers supported by pro-environmental agricultural policies and technological training can produce sustainable products that meet market needs, while taking care of their social and economic well-being.

Influence of Structure on Gluten Rice Business Dynamics

Social, economic and policy structures have a significant influence on the development of the gluten rice business. These elements create both opportunities and challenges that shape the dynamics of the sector. In terms of policies, agricultural regulations and tax incentives provided by the

government influence the level of farmer participation in the sector. Policies that support environmentally friendly agricultural practices, as described by FAO (2023), are a driving factor for farmers to adopt sustainable cultivation methods. In addition to providing financial support, these policies also form a framework that facilitates farmers to remain competitive in the market.

Economic structures, including access to markets and financial resources, also affect the sustainability of gluten rice businesses. In the Malaysian context, limited market access is a barrier for smallholder farmers who have limited production capacity. However, local community support and strategic partnerships between farmers and social entrepreneurs can overcome this barrier by sharing resources and opening up wider market access. In addition, the modern rice milling industry also increases the efficiency of the supply chain, which impacts the overall market structure and the level of competition (Azis et al., 2024).

Social structures also play an important role, especially through the norms and values that people hold. Growing awareness of the importance of healthy food and environmental sustainability is shaping consumer preferences towards products such as gluten-free rice. Public health and environmental awareness campaigns reinforce this social structure, creating a market that is more supportive of green products.

The interaction between these structures creates complementary mechanisms. For example, increased regional concentration can lead to slower price adjustments, with price leaders emerging in regions with higher market shares (Brorsen et al., 1991). With synergies between inclusive policies, supportive economic structures, and progressive social norms, the gluten rice business has great potential to expand sustainably.

Table 3. Roles of Actors and Influence of Structures in the Gluten Rice Business

Actors/Structures	Roles and Influence
Farmers	Key actors in gluten rice production, responsible for the quality and quantity of yield, need training in sustainable farming techniques.
Government	Policymakers, financial incentives and regulations that support sustainable and pro-farmer agriculture, increase farmer participation..
Millers and Traders	Millers add value to the product, while traders facilitate distribution of the product to the end consumer, influencing the supply chain and market price.
Intermediaries	Cooperatives and technology transfer institutions facilitate communication and resource sharing between farmers, researchers, and policymakers.

Consumers and Marketers	Consumers determine the direction of production based on preferences for healthy and environmentally friendly products. Marketers effectively connect producers and consumers.
Policy Structure	Government policies that support environmentally friendly agriculture, including tax incentives and regulations that facilitate the adoption of sustainable cultivation methods.
Economic Structure	Access to markets and financial resources affect business sustainability, including the barriers smallholders face in market access.
Social Structure	Growing social awareness of the importance of healthy food and environmental sustainability is shaping consumer preferences for gluten-free rice products.

4. Conclusion

Based on the research on gluten rice cultivation and business in Malaysia with a social entrepreneurship approach through agent-structure analysis, the main conclusions that can be drawn are as follows:

1. **The Role of Key Agents**: This research successfully identified various agents that contribute to the development of the gluten rice business, including farmers, government, social entrepreneurs, millers, traders, and consumers. The interactions between these agents form a complementary supply chain and support the sustainability of the business.
2. **Influence of Social, Economic and Policy Structures**: These structures influence industry dynamics, such as government regulations that support eco-agriculture, access to markets and financial resources for smallholders, and growing consumer preferences for healthy and eco-friendly products.
3. **Social and Economic Benefits**: The cultivation of gluten rice provides significant economic opportunities for local farmers, especially in terms of increased income and market access. In addition, business also creates positive social impacts, such as empowering smallholder farmers and supporting people's healthy lifestyles.
4. **Contribution to Environmental Sustainability**: The use of sustainable agricultural practices in gluten rice cultivation helps to reduce negative impacts on ecosystems, support the reduction of carbon footprints, and conserve natural resources.

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