

Waqf as a Transformative Mechanism in Malaysia's Rice Sector: From Salam Financing to Retail Integration

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Abstract: *The rice industry in Malaysia is dealing with a confluence of climatic, financial, and structural stressors that jeopardise long-term food security, skew retail pricing, and impair farmer livelihoods. Self-sufficiency levels are dropping, domestic production is stagnating, and smallholders remain dependent on lengthy, opaque supply chains controlled by middlemen despite substantial subsidies and policy reforms. At the same time, vulnerability has increased in key granary areas such as the Muda Agricultural Development Authority (MADA), Kemubu Agricultural Development Authority (KADA), and selected Integrated Agriculture Development Areas (IADAs) due to flood-related disruptions, increased input costs, and post-harvest inefficiencies. In this study, we suggest waqf as a transformative mechanism in Malaysia's rice sector to incorporate Islamic social finance within a circular, climate-resilient agricultural system, thereby reconfiguring Malaysia's rice value chain from pre-harvest funding to retail integration. The study formulates an integrated waqf model for the rice sector by utilising literature, policy documents, comparative case studies (such as Wasil salam in Pakistan and green sukuk in Malaysia), and recent initiatives in Malaysia (including GROWMatch, MyCIF, Agrobank, and social-impact sukuk). As a conceptual paper, it synthesises these strands into a coherent, policy-relevant framework rather than providing econometric estimation or field-based impact evaluation. Within the proposed model, waqf is positioned as a value-chain anchor that: (i) provides clustered smallholders with salam-based pre-season financing and asset support; (ii) deploys green sukuk and crowdfunded capital into sustainable infrastructure and waste-to-resource projects; (iii) applies circular-economy principles to convert by-products into biofertiliser, feed, and energy; and (iv) establishes structured waqf–retailer partnerships to stabilise prices and improve access for low-income consumers. The suggested approach fills funding gaps, lowers farmer vulnerability to middlemen, boosts climate resilience, and opens new avenues for ethical investment by aligning Sharī'ah-compliant risk-sharing with food-security objectives. We conclude that, with appropriate governance, legal backing, and impact assessment, waqf can evolve from a supplementary philanthropic tool into a central pillar of a fair, robust, and sustainable rice ecosystem in Malaysia.*

Keywords: waqf, salam, green sukuk, crowdfunding, rice sector, food security, circular economy, Malaysia, Islamic social finance, retail integration

1. Introduction

Over one-third of Malaysians rely on agriculture for their livelihood (Wahab et al., 2024), with an estimated 16% actively involved in farming and plantation operations (Abidin et al., 2022). Agriculture accounts for more than 7.4% of the country's GDP and remains a key pillar for rural livelihoods and food security. Within this broader sector, the rice industry is at a turning point, facing significant operational, structural, and governance issues that jeopardise consumer welfare, national food security, and farmers' socioeconomic well-being. Despite the fact that rice is still the most significant staple crop in the nation, both economically and culturally, Malaysia is a net importer, and local production has grown very little over the last decade (Hidayah et al., 2024; Zainol et al., 2024). This stagnation is unfolding against a backdrop of increased exposure to global supply shocks, growing urbanisation, and rising demand.

Malaysia's principal rice granaries, namely MADA in Kedah, KADA in Kelantan, and IADA Kerian–Sungai Manik, persistently encounter production obstacles attributable to deteriorating infrastructure, climatic fluctuations, and insufficient technology adoption. In 2023, Kedah and Perlis could not commence rice planting owing to the escalating cost of rice seeds. During the 2023–2024 season, merely 10.6% of the rice was cultivated, in contrast to MADA's objective of 50% (KADA, 2024). Consequently, Malaysia's paddy cultivation area may diminish due to escalating production costs, which have subsequently increased paddy prices (Tey, 2010). In 2024, Malaysia imported rice valued at RM429 million, with 41% sourced from Vietnam, establishing it as Malaysia's primary rice supplier, while Pakistan ranked second with imports totalling RM235 million (42%) (World Integrated Trade Solution, 2024). IRRI predicts that global rice prices will surpass those recorded during the 2008 food crisis, underscoring the urgency of strengthening domestic resilience. The government has implemented a temporary subsidy of RM500 per tonne for millers to guarantee that low-income households have sufficient access to rice, an increase from RM360 per tonne in the previous year (Ministry of Finance, 2023). However, such short-term measures do not fully address deeper value-chain vulnerabilities and climate-related risks.

Inefficiencies in the supply chain's distribution and retail parts make existing weaknesses much worse. This leads to higher costs for consumers, more waste, bigger gaps in income, and more market power for middlemen. Evidence from the Khazanah Research Institute (KRI, 2019) reveals that chronic supply-chain inefficiencies continue to hold back farmers' economic mobility, even when earlier agricultural policies have helped alleviate deep poverty. Many farmers still depend on subsidies a lot and don't have much leverage to negotiate since they have to deal with long, broken distribution systems that involve many middlemen that affect prices, credit access, and access to processing facilities. Without changes to how food is distributed, processed, and sold, Malaysia could keep a system where farmers are still among the lowest-income groups, even though they play a key role in making sure the country has enough food. Islamic financial tools like salam, mushārahah, and qard ḥasan can benefit farmers by giving them Shariah-compliant pre-harvest financing, risk-sharing partnerships, and interest-free microcredit. This makes them less reliant on middlemen and expensive informal lenders. For instance, salam contracts let farmers get paid in advance for future crops, which makes it easier for them to get cash and lessens their risk of getting taken advantage of by middlemen (Obaidullah & Khan, 2008; Dinc, 2020). Mushārahah arrangements can help people own machinery, processing plants, and storage facilities together, which can raise farm-gate prices and provide value (Dusuki and Abdullah, 2007). Waqf-supported financing, which is becoming more popular in Malaysia, can also help small farmers by giving them subsidised

capital, technical help, and shared assets. This helps to promote fair and long-term growth in agriculture (Kahf and Yafai, 2015; Hassan et al., 2023). These tools, when used together, can help restructure the rice value chain to give farmers more leverage, make prices fairer, and make the country's food supply safer. Post-harvest and logistical inefficiencies are a big problem because they cause a lot of rice to be lost before it gets to customers (Ariffin et al., 2023; Abdul-Halim et al., 2022). Old storage facilities, poor drying processes, and unreliable transportation systems all make supplies less reliable and lead to waste. These flaws make prices even more unstable, which hurts disadvantaged households the most. KRI ,2019 states that rising rice prices hurt rural impoverished communities and non-citizens the most. These are groups that policymakers generally ignore.

Compounding these challenges is the fragmented and opaque retail distribution system. Multiple layers of intermediaries inflate prices, reduce efficiency, and undermine traceability. Retailers with significant market power can dictate prices, control payment terms, and impose delivery conditions, while smallholder farmers and small processors struggle to secure equitable returns. Although rice is subject to government price controls, weak enforcement and supply-chain manipulation often lead to periodic price spikes, especially during shortages or peak demand periods (Abdul-Halim et al., 2022). These imbalances distort market signals, weaken consumer trust, and reduce incentives for producers to invest in quality improvements or modernization. Climate-related shocks exacerbate these structural weaknesses. Recent extreme weather events have severely affected key rice-producing regions, particularly those managed by the Muda Agricultural Development Authority (MADA), which contributes approximately 40% of Malaysia's total paddy output (MADA, 2009). Flood-related impacts—including seed shortages, infrastructure damage, and rising production costs—have disrupted local farming communities and weakened broader halal food supply chains. Historically, Malaysia's eight granary areas—Johor, Kedah, Pahang, Melaka, Negeri Sembilan, Kelantan, Terengganu, and Perlis—have experienced significant flood-related losses. Between December 2006 and December 2007 alone, damages amounted to around USD 37.3 million, with relief efforts heavily dependent on government intervention. In the MADA region, floods from 1988 to 2008 became increasingly frequent, followed by further events in 2010, 2017, 2021, and the 2024–2025 floods, which devastated 5,822 hectares of rice fields and incurred losses of RM 32 million. These recurring disasters elevate production costs, threaten rural incomes, disrupt supply stability, and ultimately exacerbate food poverty and reduce rice accessibility for Malaysian households.

This vulnerability is mostly caused by the reliance of the rice industry on conventional and reactive tactics. While short-term relief financing and loan moratoria offer immediate support, they do not address systemic challenges such as climate resilience, waste management, and sustainable farming practices. The concepts of a circular economy, which prioritise resource reuse, waste reduction, and the development of regenerative systems, provide a long-term, sustainable strategy. Agriculturalists can alleviate environmental harm, reduce operational costs, and potentially generate supplementary income by transforming rice by-products (such as husks and straw) into compost, biofuel, or animal feed. This resource-efficient approach reduces the impact of extreme weather events and maintains consistent production. Alongside these circular behaviours, Islamic finance provides ethical and sustainable financial solutions to bolster climate resilience. Water-efficient irrigation, regenerative agriculture, and environmentally sustainable infrastructure can all be financed through tools like waqf, green sukuk, and crowdsourcing. Green sukuk allows investors to fund projects that convert agricultural waste into biomass energy or biofertilizer, with profits disbursed in compliance with Shariah. Malaysian rice growers may improve their ability to withstand flooding, reduce

overall costs, and strengthen national food security by combining Islamic climate finance with circular economy principles. This will ensure that the industry remains a key component of the country's economic and social prosperity.

Countries such as Malaysia, Bangladesh, and the Netherlands offer valuable insights into the amalgamation of innovative financing and sustainable practices. Malaysia has effectively employed green sukuk to fund climate-resilient projects, while Bangladesh's microfinance programmes have supported smallholder farmers in adopting sustainable practices. The Netherlands, through its advanced flood management techniques, serves as a paradigm for cultivating resilient agricultural systems. Incorporating these best practices inside Malaysia's unique Islamic financing framework could produce a comprehensive and tailored solution for rice. Islamic finance offers unique, equity-based ways to mitigate these risks. A lot of projects in Malaysia show how people are getting more involved in farming:

- GROWMatch, initiated by the Securities Commission Malaysia (SC) in 2024, links agricultural entrepreneurs, including paddy farmers, with investors using equity crowdfunding (ECF) and peer-to-peer (P2P) financing platforms.
- MyCIF, a public-private co-investment entity, employs specific co-investment ratios to encourage private funding in agriculture, facilitating over 600 agriculture-related MSMEs in securing nearly RM300 million.
- Agrobank continues to be a principal financier for small-scale farmers encountering difficulties in obtaining conventional bank credit. In 2022, Agrobank allocated RM5.6 billion in financing, predominantly supporting microenterprises.
- Green Sukuk issuance in Malaysia facilitates diverse sustainability projects; although some, such as DanaInfra Sukuk, prioritise public infrastructure over agriculture, the same framework can be modified for paddy-centric efforts. Khazanah's Sukuk Ihsan, a social-impact sukuk, could be specifically designed to fund initiatives focused on enhancing food security within the rice sector.

Existing literature has extensively examined the economic potential of the halal industry, the macro-level implications of climate change, and, more narrowly, the technical aspects of climate-smart agriculture (CSA) in Malaysia's rice granaries (Abdullah et al., 2025; Duasa and Afroz, 2024; Vaghefi et al., 2016; Al-Imran et al., 2022). However, three critical gaps remain. First, there is limited analysis of how Islamic finance instruments, such as waqf, salam, green sukuk, and takaful can be systematically integrated into the rice value chain as part of a coherent food-security strategy rather than as isolated pilots (Hassan et al., 2021; Securities Commission Malaysia, 2024; Khan, 2020). Second, the potential complementarities between these Sharī'ah-compliant instruments and circular-economy practices, particularly the conversion of rice by-products into renewable inputs are largely underexplored, with most studies treating finance and resource sustainability separately. Third, the majority of existing work focuses on technical feasibility (e.g., drought-resistant varieties, precision irrigation) and gives comparatively less attention to institutional design, risk-sharing structures, and incentive mechanisms for smallholder adoption. This paper responds to these gaps by proposing waqf as a transformative mechanism in Malaysia's rice sector, embedding Islamic social finance within a circular, climate-resilient agricultural system that restructures the rice value chain from pre-harvest funding to retail integration.

2. Literature Review

2.1 Waqf

In the past, waqf institutions were crucial in providing the community with public goods (Çizakça, 1998; Islahi, 2018; Kahf, 1994). Significantly, the scope of waqf extends beyond religious activities to encompass several purposes, including housing provision, business capital, infrastructure such as roads and bridges, healthcare, and education. Nevertheless, despite serving a wide range of needs, waqf institutions have historically continued to support governments and contribute to the advancement of society by addressing deficiencies in public-goods provision when state capacity was limited (Çizakça, 1998). Unfortunately, in the present period, waqf institutions have become fewer and often play a more marginal role. Colonial interventions and post-colonial legal reforms in many Muslim-majority countries weakened the institutional base of waqf, leading to asset mismanagement and erosion of public awareness (Kahf, 2011). Yet historical experience, particularly in the Ottoman Empire, where waqf financed a large share of public amenities and productive enterprises demonstrates that waqf can function as a sophisticated, self-reinforcing economic institution when supported by appropriate governance and policy incentives. Building on this legacy, the present study argues that waqf can be re-tooled as a contemporary instrument for food-security and climate resilience in Malaysia's rice sector.

- Perpetuity: Assets that have been designated as waqf cannot be sold, transferred, or used as collateral since they will always remain waqf. Nonetheless, the exchange of a waqf asset for another of equivalent value (*istibdal*) is permissible, contingent upon the fulfilment of all stipulated standards, and if the item in question is alienated and unproductive.
- Permanence of the waqf founder's deed stipulation: The donor's waqf deed stipulation, which covers management, benefit provisioning, beneficiaries, and other matters, must be carried out correctly as stated in the deed as long as it does not violate sharia. If the act becomes unfeasible, the waqf benefit must be directed to the nearest permissible cause as specified in the deed; in the worst-case situation, it will be allocated to the impoverished or utilised for the general good.

Moreover, Ambrose, 2015 emphasized that there are several legal conditions which fulfil the legitimacy of *waqf* assets:

- The asset must have perpetuity characteristics.
- The property given cannot be taken back (permanent one-way transfer).
- The *waqf* founder must be sound in mind, and of age and legally fit.
- The purpose of the *waqf* must be based on charity, both from the founder and *Shari'ah* perspective.
- Beneficiaries and the purpose of *waqf* must be alive, legitimate, and not against *Shari'ah*. *Waqf* on the deceased person is not permissible.

In the past, waqf institutions were crucial in providing the community with public goods (Çizakça, 1998; Islahi, 2018; Kahf, 1994). Significantly, the scope of waqf extends beyond religious activities to encompass several purposes, including housing provision, business capital, infrastructure such as roads and bridges, healthcare, and education. Nevertheless, despite serving a large area, waqf institutions continue to exist and have been shown to support government and contribute to the advancement of society. This demonstrates that the capacity of waqf is effectively utilised and managed, as it was intended to address the deficiency in public goods provision when the government is inadequate (Çizakça, 1998).

Unfortunately, in the present period, there are fewer waqf institutions and they play a much less function. Furthermore, waqf, as a cornerstone of socio-economic stability in the Muslim world, was significantly impacted when Western nations colonised Muslim territories to extend their influence and ideology. As a result, the history of the waqf institution has become virtually forgotten in modern times. As a result, current Muslim governments have had to take some steps to revitalise the waqf institution and establish it as a key institution in Islamic economics (Çizakça, 1998; Kahf, 2011). Waqf has been successful throughout the Ottoman Empire's history, providing the majority of public amenities and serving as a source of funding for enterprises across the empire (Çizakça, 1998). In this way, waqf has effectively benefited Muslims and established itself as a model charitable organisation founded on Shari'ah regulations that unmistakably reflect Islamic principles and teachings. Nonetheless, waqf is not prohibited from functioning as a profit-oriented charitable institution, as noted by Kahf in 2002, for the purpose of serving the public interest, which can be facilitated through the assistance and/or incentives of the Islamic government.

2.2 Concept of Waqf Agriculture

Waqf, as used in Islam, is the holding or confinement of particular property or assets, with the distribution of the assets' advantages according to the conditions of the deed (Kahf, 2016). The assets are now fully owned by Allah SWT, and a board acts as trustee to safeguard waqf assets. The manager or managers are in charge of developing and maintaining the assets to boost sustainability and productivity. Waqf assets, generally comprising tangible properties such as land, buildings, and precious metals, are classified as non-perishable property, indicating that the enjoyment of the asset's benefits does not deplete the asset itself (Kahf, 2016). Waqf is one of the instruments utilised in Islam to safeguard Muslims' wealth because of its innate perpetuity. Waqf falls into three categories, according to Kahf (2016): familial, philanthropic, and religious. Religious waqf is commonly employed for many purposes, including the establishment of mosques, cemeteries, and other related religious functions. Charitable waqf emphasises the socio-economic development of the society, allocating generated revenues to aid the underprivileged and promote the general welfare. Healthcare, infrastructure, educational institutions, libraries, agriculture, services, and other positive efforts are just a few ways that this help could appear. Family waqf is the ultimate category of waqf, wherein the benefits derived from the waqf asset are designated for the descendants, with any residual income allocated to charitable organisations. Consequently, this technique aims to conceptualise charitable giving and familial safeguarding. Thus, waqf in Islam is considered a flexible charitable organisation, contingent upon the actions conforming to the conditions established in the donor's deed. Conversely, the Western foundations restrict the benefits solely to religious and humanitarian aims (Kahf, 2016). Kahf (2011) delineated two attributes of waqf, specified as follows: By using contracts like *muzara'ah*, *musaqah*, and *ijara*, *Waqf* institutions can maximize the productivity and impact of agricultural assets. This can be help to increase social welfare, economic empowerment, and environmental stewardship.

2.3 Agricultural Waqf Initiatives in Malaysia

According to Majid and Sukmana (2023), agricultural waqf could be a useful solution to the rising expense of living and be essential to improving food security. Waqf transcends religious functions and provides benefits to both Muslims and non-Muslims. When properly promoted and managed, waqf can yield substantial benefits for a number of stakeholders. Multiple studies in Malaysia demonstrate that profitable agricultural waqf has favourably impacted community empowerment. Research conducted by Majid and Sukmana (2023), Milawati (2023), and Salim (2022) demonstrates the advantageous effects of agricultural waqf throughout various regions

of the country. Similarly, in Brunei, Kasim (2022) has emphasised the imperative for the progression of agricultural waqf.

The State Islamic Religious Councils (Majlis Agama Islam Negeri, MAIN) and the Malaysian Waqf Foundation (YWM) are in charge of specific programmes that carry out agricultural waqf activities in Malaysia. The Integrated Agricultural Waqf Project (Wakaf Pertanian Bersepadu, WATANI) is a pivotal initiative aimed at strengthening national food security policies, reducing dependence on imported food, optimising the utilisation of idle or underutilised waqf land, generating employment opportunities during the post-pandemic recovery phase, and improving resource efficiency through agricultural and livestock enterprises (Duasa and Munir, 2025).

Additional initiatives include the Pineapple Farm Project in Penang, the Palm Oil Plantation Waqf Project in Perak, and the Waqf Orchard of Knowledge at Universiti Teknologi MARA (UiTM), Melaka Branch (Abdul Hamid et al., 2024). These initiatives are typically managed by the respective MAINs, which collaborate with public and private partners, with revenues distributed according to mutually agreed-upon terms. YWM, alongside MAINs, develops various waqf-based programmes, such as water waqf, healthcare waqf, and agricultural waqf, in partnership with relevant agencies and enterprises. While Malaysia's agricultural waqf efforts exhibit potential social benefits, certain structural and governance issues constrain their overall efficacy. Numerous initiatives, such as WATANI Putrajaya and the Penang pineapple farm, are characterised by their limited scale, significant reliance on government funding, and absence of enduring financial sustainability or reinvestment strategies. Many programmes concentrate exclusively on agricultural production, neglecting the integration of processing, distribution, value addition, or market linking components, which leads to diminished commercial viability. Prolonged gestation periods for specific crops (e.g., oil palm, fruit orchards) postpone the provision of benefits to beneficiaries and result in discrepancies between waqf aims and actual returns. Governance issues are apparent in multi-agency frameworks, ambiguous accountability structures, insufficient technical proficiency among waqf managers, and reporting intricacies in donor-funded initiatives like PERKAYA. Moreover, monoculture plantations—especially palm oil—present environmental hazards and subject waqf projects to volatility in commodity prices. These challenges collectively indicate that existing agricultural waqf models are deficient in comprehensive value-chain integration, operational proficiency, sustainable financing frameworks, and consistent oversight, thus constraining their capacity to bolster food security, elevate farmers, and enhance the long-term productivity of waqf assets. Consequently, a novel integrated Waqf-based sustainable rice sector model is requisite. Current agricultural waqf initiatives, however advantageous, fail to tackle the underlying structural deficiencies impacting productivity, climatic resilience, and long-term sustainability within Malaysia's rice sector. Current programmes frequently function in isolation, concentrating mostly on cultivation, without connecting farmers to contemporary technologies, irrigation systems, storage facilities, processing centres, or dependable market routes. They rely significantly on governmental funding and lack organised reinvestment strategies that would enable waqf assets to expand and maintain themselves over time. Furthermore, institutional fragmentation, insufficient agronomic competence, and prolonged waiting periods for crop returns hinder the prompt and fair allocation of benefits to asnaf and vulnerable agricultural communities.

The proposed approach integrates waqf assets with Islamic financial instruments, value-chain optimisation, circular-economy concepts, and risk-sharing mechanisms to create a self-sustaining ecosystem. This strategy enhances farmer income stability, increases climate

resilience, reduces post-harvest losses, improves market access, and ensures continuous and scalable benefit generation. This methodology offers a thorough and enduring solution for transforming Malaysia's rice sector by tackling the structural, budgetary, and governance shortcomings of existing waqf projects, rather than achieving isolated achievements. Paddy farmers in the MADA, KADA, and IADA regions sometimes experience cash-flow shortages before planting; salam effectively mitigates this problem by offering the following services:

- Payment may be made in advance to the farmer.
- Agricultural items (e.g., rice, vegetables, animal feed) can be given subsequently in specified quantities, qualities, and dates.
- The price is predetermined, ensuring the farmer instant operating capital and income security.

Although there is still little use of salam finance in Malaysia, many Islamic financial institutions and organisations dedicated to development are investigating how it might help smallholders and agricultural businesses. Recent pilot initiatives, especially in agro-food value chains, have demonstrated potential in enhancing collaboration between farmers and downstream processors, including paddy mills, poultry-feed manufacturers, and halal food producers. Forward-purchase techniques have been used by Malaysia's social finance organisations and waqf-related institutions to alleviate farmers' cash flow issues and stabilise their income, much like Pakistan has done. Despite numerous studies examining the impact of flooding on Malaysia's rice-farming sector (Rahman et al., 2023; Zainal et al., 2022), there exists a deficiency of research regarding the incorporation of circular economy principles and Islamic finance instruments to enhance environmental sustainability and financial resilience among smallholder farmers (Hassan et al., 2021). Contemporary research frequently analyses these subjects separately, overlooking the potential synergy that Shariah-compliant financing could provide to circular economy initiatives. The majority of research focuses on technical feasibility (such as precision irrigation and drought-resistant seed varieties) rather than the social and financial barriers to adoption, even though climate-smart agriculture (CSA) has been widely promoted as a way to reduce flood risks (Amran et al., 2022; Gopal et al., 2020). To identify suitable incentive structures, such as takaful or green sukuk, for farmers investing in Climate-Smart Agriculture (CSA) and to evaluate how these tools may be tailored to local conditions, research is needed. The project's objectives are to determine the problems faced by Malaysian rice farmers, develop a model that successfully addresses these problems by fusing Islamic finance and circular economy principles, and gauge investor intentions to assist this industry. This extensive approach aims to guarantee food security and foster sustainability.

2.4 Food Security Issue in Malaysia

Food security is a multifaceted idea that includes the availability, usability, and accessibility of wholesome food to satisfy a population's nutritional requirements. The ability of a food system to satisfy present food demands without jeopardising the capacity of future generations to satisfy their own food needs is referred to as food sustainability (Daud and Sharif, 2024). Food security and sustainability refers to a system of self-sufficiency in which a nation is food sovereign if it produces enough food for its citizens or does not require hard cash to import what is lacking. The Malaysian government has made food security a national priority in addition to a global one. It has a close relationship with the advancement of civilisation, national development, and human survival. Agricultural growth in Malaysia is crucial for maintaining a stable food supply and satisfying domestic demand.

In order to guarantee food security and quality, Malaysia's rice sector is strictly regulated. Rice is a staple meal. Recent years have shown conspicuous evidence of climate change in Malaysia and its ramifications for the rice sector. In the nation's principal granary, recent air temperatures have reached 40 °C during the dry season, in contrast to an average of 31 °C–34 °C, resulting in diminished water reservoirs for irrigation and suboptimal circumstances for rice cultivation (Vaghefi et al., 2016; Mahmood et al., 2022). Within the next ten years, extreme weather events are predicted to cut rice yield by as much as 31% (Vaghefi et al., 2016) and lower the nation's ability to sustain levels of rice self-sufficiency above the minimal national requirement of 65% (Azman et al., 2022). The effects of climate change and food insecurity are most acutely experienced by the impoverished, who are already teetering on the edge of food scarcity and predominantly employed in the agriculture and food production sectors. The most vulnerable people in Malaysia live in Sabah and Kelantan, two states whose economy are primarily dependent on agriculture (Yusuf, 2009). Workers in the agricultural sector experience lower incomes as a result of climate change-induced disruptions, which further pushes them into poverty and food insecurity (Vaghefi et al., 2016). This population is particularly susceptible to abrupt disruptions in food production systems, as evidenced during the COVID-19 pandemic, when individuals already experiencing food poverty encountered exacerbated levels of deprivation.

Agricultural policy has continuously been given priority by the government, even in the face of the industrial sector's concurrent growth. Prior to independence, the nation prioritised the cultivation of food crops, such as rice, fruits, and vegetables (Damin and Mohamed, 2015). Numerous agricultural policies have been put into effect over the years, such as the Food Security Policy (2008–2010), the Second National Agricultural Policy (1992–1998), the Third National Agricultural Policy (1998–2010), and the First National Agricultural Policy (1984–1992) (Aris and Ab Rahman, 2011). According to the National Agro-Food Policy 2021–2030 (NAP 2.0), the agricultural sector is currently thought to be able to guarantee a sufficient food supply by 2050 for an expected 10 billion people on the planet and reduce rural poverty by up to 80%. The National Agro-Food Policy 2021–2030 recognises a number of important problems and obstacles to food security, such as the depletion of natural resources, poor agricultural productivity and innovation, dietary changes and population shifts, food loss and waste, and climate change.

Damin and Mohamed (2015) suggest that in order to maximise agricultural production as a sustainable food source, the government should work with private sector stakeholders, embrace comprehensive planning, strengthen R&D technologies, and take climate factors into account. External partnerships are regarded as a strategic solution, especially for advancing agricultural waqf efforts that serve various stakeholders and enhance national food security in Malaysia. The goals stated in the Food Security Policy Action Plan 2021–2025 are in accordance with this type of cooperation between local communities and business organisations. Four main goals are outlined in the Action Plan: i) to increase domestic resources and diversify food import sources; ii) to improve community and private sector involvement in the food system; iii) to guarantee the availability of safe food at reasonable prices and to encourage healthy eating habits; and iv) to bolster the country's readiness to handle food security emergencies (Ministry of Agriculture and Food Security, 2021).

2.5 Rice Production in Malaysia

In order to increase Malaysia's rice self-sufficiency, key granary areas that concentrate on rice growing include KADA, MADA, and other IADA districts. Table 1 demonstrates a clear trend of stagnation and decline in rice output in Malaysia's designated granary regions between 2018

and 2023. The aggregate output from all granary regions diminished by around 10%, declining from over 1.30 million metric tonnes in 2018 to 1.16 million metric tonnes in 2023, chiefly attributable to decreases in the two major schemes, MADA (−18.9%) and KADA (−10.2%). On the other hand, a number of smaller IADA-managed granary regions saw notable increases, including Rompin (+67.3%), Seberang Perak (+33.4%), Pekan (+29.2%), Kemasin Semarak (+28.2%), Kota Belud (+23.5%), and Batang Lupar (+23.2%). As a result, the combined IADA output increased by about 2.1% over the same period. Nevertheless, these localised improvements were insufficient to offset the decrease in production in the primary granary regions, underscoring the need for a new, more resilient financing and governance model (such as a waqf-based, integrated rice-sector framework) to stabilise yields in the central granary areas while enhancing the more effective smaller initiatives. A number of other factors, including the small economic marketplace, the shrinking area of rice agriculture sites due to urbanisation or land being used for other industries, the lack of advanced agricultural technology, and the shortage of labour to cultivate paddy fields, can also have an impact on Malaysia's rice production trend. In order to ensure that Malaysia can attain 100% SSL for rice production and eliminate the need to import rice from other countries in the future, the average percentage contribution and volume of output show that the productivity of rice in the granary lands should be enhanced. Table 2 presents that MADA consistently records the highest yields (above 4,800 kg/ha in earlier years), although it shows a decline by 2023. KADA follows a similar pattern with moderate reductions over time. The IADA-managed granary zones display substantial variability: high-performing areas such as Pulau Pinang, Barat Laut Selangor, and KETARA regularly exceed 4,300–5,500 kg/ha, whereas Pekan, Rompin, and Batang Lupar show comparatively lower yields. Overall, the table indicates diverging productivity trajectories across granary regions, with some areas improving over time while others experience yield deterioration—highlighting the need for targeted interventions, improved irrigation and input management, and more resilient cultivation models to stabilise national rice yield performance.

Table 1: Granary area's production of rice, 2018-2023(mt)

	2018	2019	2020	2021	2022	2023
Mada	668763	645584	681041	590763	597352	542630
Kada	163897	131958	168725	179425	148918	147166
IADA						
Kerian	107764	97605	87033	99181	87334	88045
Barat_Laut_Selangor	113380	113158	111675	108942	107444	112890
Pulau_Pinang	86864	83282	86095	85124	85624	85642
Seberang_Perah	61610	51925	51670	48707	72119	82162
Terengganu_Utara_KETARA	33907	32718	30619	35621	30108	24695
Kemasin_Semarak	18300	18351	20880	21502	22777	23460
Pekan	11372	9028	16077	15254	14692	14692
Rompin	9591	7878	15007	17014	17508	16049
Kota_Belud	18961	16126	16268	18160	18166	23425
Batang_Lupar	1676	1852	1748	1932	2172	2064

Note: Mada: Muda Agricultural Development Authority, Kada: Kemubu Agricultural Development Authority; IADA: Integrated Agriculture Development Area

Table 2: Granary area’s average yield of paddy, 2018-2023

	2018	2019	2020	2021	2022	2023
Mada	5111	4933	4833	4192	4240	3878
Kada	4695	4032	4621	4874	4096	4095
IADA						
Kerian	3957	3584	3223	3830	3372	3400
Barat_Laut_Selangor	4731	4756	4431	4337	4319	4577
Pulau_Pinang	5228	5012	5022	5655	5052	5054
Seberang_Perah	3417	2923	2774	2613	3918	4479
Terengganu_Utara_KETARA	5349	5162	5407	5218	4410	3884
Kemasin_Semarak	4079	3733	3666	3656	3673	3790
Pekan	2673	2637	2707	3218	3090	2965
Rompin	2910	2373	4156	4610	4431	4466
Kota_Belud	3112	2908	2914	3540	3556	4264
Batang_Lupar	2492	2754	2599	2847	3078	3013

Note: Mada: Muda Agricultural Development Authority, Kada: Kemubu Agricultural Development Authority; IADA: Integrated Agriculture Development Area

2.6 Rice Retailing Process and the Obstacles

Malaysia's rice supply chain has been described as being somewhat fragmented, with several middlemen involved in the distribution process. The rice retail business in Malaysia has a complex, vertically integrated supply chain, with the national rice trade organisation, BERNAS, wielding considerable influence. The government's regulation of a significant segment of the rice industry has elicited criticism regarding its impact on innovation and market competition. Malaysian consumers have a wide range of preferences when it comes to rice varieties, and they are becoming more interested in high-end, speciality, and halal-certified products. Rice retail involves the sale of rice to consumers through various outlets, such as traditional markets, rice shops, and retail stores. Numerous key stakeholders participate in Malaysia's rice supply chain, comprising distributors, merchants, millers, and rice producers (Nugroho and Nurhayati, 2025). The main phases of the rice retailing process are shown in Figure 1, with a focus on the interconnected steps that enable the smooth movement of rice from procurement to final sale. In regions such as Malaysia, where rice holds considerable cultural and economic importance, this strategy is crucial for maintaining the quality, availability, and reliability of rice in the retail market. The process starts with sourcing, in which stores buy rice from farmers, distributors, or wholesalers. Sourcing decisions are influenced by factors such as quality, affordability, supply chain reliability, and compliance with halal standards, particularly in regions where halal adherence affects consumer trust.

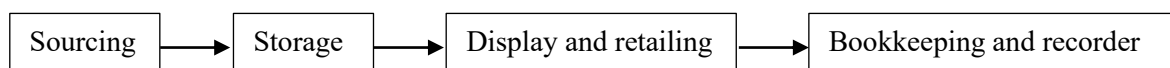


Figure 1: Key stages involved in the rice retailing process

Retailers' choices of items are influenced by the wide range of consumer tastes in Malaysia, including the desire for imported varieties, premium grains, halal-certified rice, and speciality rice. The efficacy of the retail process is influenced by supply chain dependability, compliance with halal regulations, and the calibre of rice provided by mills.

2.7 Rice Milling Process

Harvested paddy is transformed into edible white rice by the primary processing step of rice milling. The procedure entails removing layers of bran, husk, and contaminants before grading and packaging. In Malaysia, millers are essential for maintaining the quality, safety, and marketability of rice provided to consumers. Super Tempatan 15% (ST15), Super Special Tempatan 10% (ST10), and Super Special Tempatan 5% (ST5) are the three categories into which the nation divides its domestically produced white rice based on the percentage of broken grains (Chung et al., 2016).

Additionally, millers work under a system of regulated prices and subsidies. For instance, millers obtain subsidies for generating ST15 at a predetermined retail ceiling price of RM2.60/kg (Bararom, 2010). However, there are price disparities across grades because millers do not receive subsidies for ST5 or ST10. Due to inconsistent enforcement, the paddy purchase deduction system, which applies deductions of 17–18% dependent on moisture and impurity levels, sometimes causes conflict between farmers and millers (Salman, 2010).

To make white rice, the outer layers of rough paddy are removed by the process of rice milling. A rice miller is essential in processing raw paddy and supplying white rice to consumers in the market. The Malaysian rice market categorises domestically produced white rice into three grades: Super Tempatan 15 percent (ST15), Super Special Tempatan 10 percent (SST10), and Super Special Tempatan 5 percent (SST5). The grade number signifies the percentage of broken rice within the rice composition. ST15 has 85 percent head rice and 15 percent broken rice. The Malaysian authorities assesses rice quality according to the percentage of broken grains. Consequently, ST15 is regarded as a lower grade than SST5 and SST10. In exchange for manufacturing ST15 at a set retail price below production costs, a group of rice mills get a rice miller subsidy (Mohidem et al., 2022). The retail price of ST15 is established at RM 1.60/Kg to RM 1.80/Kg (about USD 0.50/Kg to USD 0.55/Kg). Rice mills lacking the miller subsidy provide alternative grades (mostly SST5), which fetches a higher retail price of RM 2.60/Kg (USD 0.80/Kg), being the maximum price for domestically produced rice. Rice millers frequently have a deficit in paddy procurement due to Malaysia's paddy supply not meeting local demand. Malaysia imports over 30 percent of its rice usage.

This intensifies the detrimental practice of a flat deduction rate, as rice millers must compete for paddy (Baharom, 2010). Based on the amount of moisture content and undesirable stuff in rough rice, there are precise guidelines for paddy farmers' payment deductions. Nonetheless, the payment deduction is infrequently implemented due to significant opposition from paddy growers. Consequently, a uniform deduction rate of 17-18 percent has emerged as standard, irrespective of the real average deduction rate, which is approximately 23-24 percent (Salman, 2010). For rice millers, this raises production costs since they buy paddies that are practically unrecoverable. Paddy purchases account for around 85 percent of a rice miller's overall production expenses on average. Another big problem for rice millers is that too many farm subsidies and long-lasting protectionist policies for paddy farmers have led to bad farming practices and low-quality paddy. Consequently, rice millers are susceptible to handling substandard paddy, which exacerbates the rice recovery ratio. It is important to reiterate that rice millers infrequently implement the standard payment deduction due to the potential for contentious farmers to withhold paddy sales in subsequent harvest seasons. Therefore, buying paddy at a comparatively higher price, processing bad-quality paddy that results in a low recovery ratio, and selling rice at a ceiling price can easily cause rice millers to lose money or operate at a breakeven point. Figure 2 illustrates the rice milling process in Malaysia.

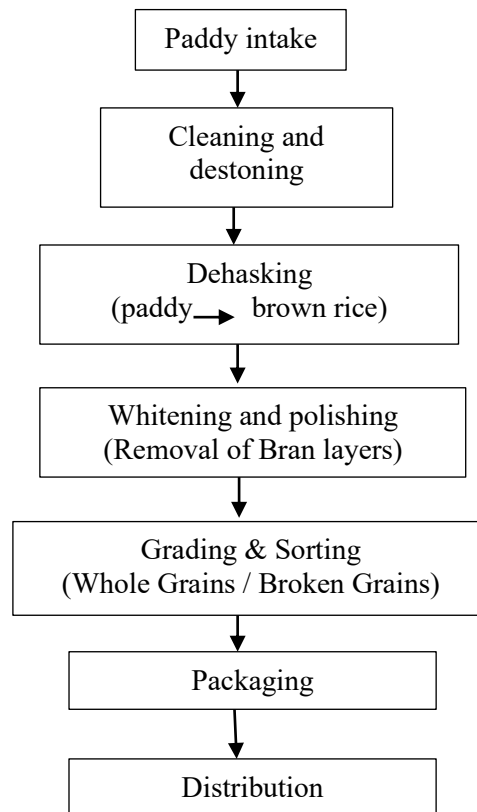


Figure 2: Rice milling process in Malaysia

The following challenges face the rice mills:

- The absence of contemporary farming machinery, such as rice harvesters and transplanters, as well as equipment for processing rice, such as milling machines and rice-by-products.
- The rice firm does not fully utilise the current by-products from rice mills; reprocessing facilities, such as husk processing machines, flat die wood pellet mills, and biomass briquettes, to utilise them at their full economic potential. The rice mills generate a substantial volume of by-products, including broken rice, rice bran, and rice husk. Nevertheless, merely a limited fraction of such by-products is completely utilised. At a fixed price, the majority of the by-products are sold straight to the downstream sectors. The restricted paddy drying capacity of rice mills constitutes a hurdle for the rice industry in Malaysia.

3. Development of the Waqf Based Transformative Mechanism in Malaysia's Rice Sector

3.1 Components of *Waqf* Framework

A sustainable rice ecosystem requires an institutional structure that can support farmers, stabilise supply chains, and ensure equitable access to vital foods. The integrated waqf-based, crowdfunded, and Green Sukuk model proposed in this study aims to address long-standing structural problems in Malaysia's rice industry, particularly farmers' dependence on traditional intermediaries, price volatility, restricted access to Shariah-compliant financing, and poor post-harvest infrastructure. By combining the long-term capital stability offered by Green Sukuk, the liquidity-generating potential of crowdfunding, and the dual commercial-charitable nature of waqf, this strategy seeks to create a rice value chain that is ethically sound, economically feasible, and environmentally robust. To guarantee that paddy procurement is governed by

equitable pricing, transparent contracts, and risk-sharing mechanisms consistent with Islamic economic principles, it is essential to restructure upstream engagement with farmers.

1) Involvement of Farmers and Procurement of Paddy

Malaysian farmers sell their paddy (unmilled rice) directly to the waqf using three main pricing strategies:

- Contract price, which is determined by Wasil Salam agreements that provide pre-season financing and guaranteed sales;
- Government guaranteed minimum price, which is set by Padiberas Nasional Berhad (BERNAS) under the Ministry of Agriculture and Food Security (MAFS); and
- Market price, which represents the condition of the local market.

A significant connection may be made with the Wasil Foundation's salam project, known for its Shari'ah-compliant framework and operational efficiency. In Pakistan, Wasil bears complete responsibility for storage, pricing, and crop-loss risks (El-Zoghbi and Alvarez, 2015), enabling farmers to focus on production rather than post-harvest uncertainties. According to Ahmed et al. (2018), the salam approach used by Wasil fully complies with Shari'ah principles. Although Malaysia lacks a large-scale counterpart, numerous Islamic finance scholars contend that a Wasil-style salam model, underpinned by waqf assets, managed storage facilities, and efficient inventory systems, could markedly enhance supply-chain reliability and income stability in the rice and broader agro-food sectors of Malaysia. This structure distributes waqf and Green Sukuk funds to profitable agricultural projects, guarantees income stability, and lessens farmers' vulnerability to market fluctuations. In a waqf-based agricultural system, Malaysian rice farmers may sell their paddy directly to the waqf institution via a contract price determined under a Wasil Salam agreement. Salam is a traditional Islamic finance mechanism wherein payment is rendered in advance for agricultural products to be delivered at a later date. In this concept, the waqf acts as the lender, acquiring the farmer's anticipated yield prior to the planting season. Farmers are less dependent on interest-based loans, unofficial lenders, or middlemen as the price is predetermined, providing them with the necessary liquidity for seeds, fertiliser, and initial operating expenses. The pre-season funding from the waqf organisation mitigates cash-flow constraints and protects farmers from predatory lending practices prevalent in fragmented agricultural markets. The contract price is generally established based on clear criteria such as:

- projected yield per hectare
- production cost benchmarks from agencies such as MADA/KADA
- prevailing government floor prices or purchase prices
- quality indicators (moisture content, impurity rate, expected ST-grade classification)
- risk-sharing parameters agreed upon by both farmer and waqf

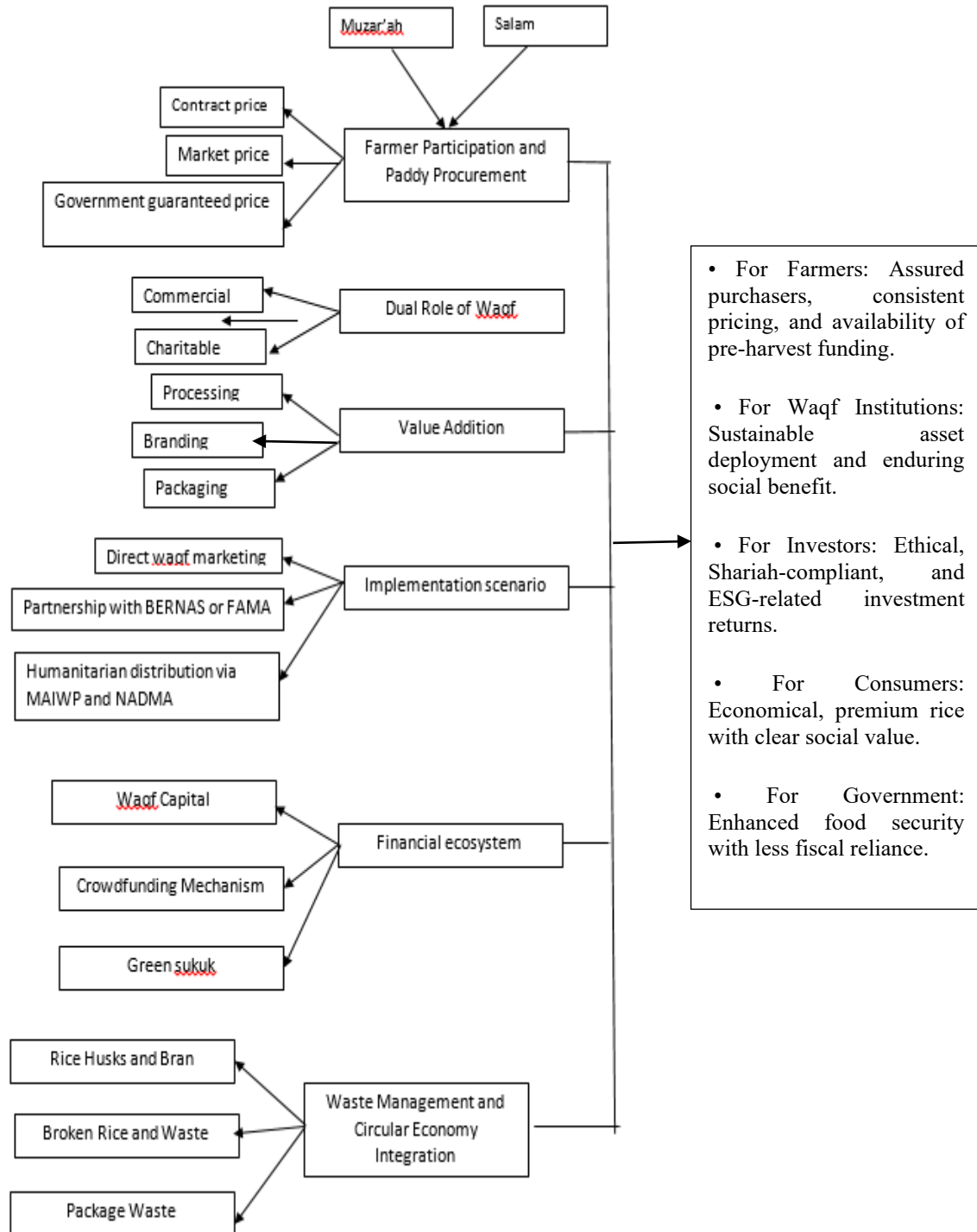


Figure 1: Waqf based Transformative Mechanism in Malaysia's Rice Sector

In years when post-harvest oversupply or trader-driven price suppression lower farmgate prices, farmers are protected from market volatility because the price is fixed before planting. The waqf institution benefits from ensuring consistent supply volumes for its social welfare rice initiatives, zakat distribution efforts, and milling operations. Risk is allocated more fairly in the Wasil Salam framework than in conventional procurement methods. Farmers obtain a secured income and evade debt accumulation, while the waqf undertakes a portion of the market risk, including price fluctuations post-harvest. The contract also ensures that farmers will supply the quantity and quality of paddy that has been agreed upon, which helps with

operational planning for storage facilities, distribution channels at the community level, or mills run by the waqf.

2) The Dual Role of the Waqf Institution

The waqf institution integrates corporate profitability with social welfare within the rice value chain. This mixed status allows waqf to operate simultaneously with existing stores while generating advantageous externalities for the broader rice market.

a) *Commercial Function: Waqf as a Value Chain Enabler*

By buying paddy from farmers through Wasil Salam contracts or market-linked pricing, processing rice through contracted millers or waqf-managed mills, packaging and branding waqf rice, and distributing it to retailers, cooperatives, community stores, and e-commerce platforms, the waqf institution functions as an integrated value chain operator in its commercial capacity. Waqf is a new provider that will diminish reliance on imports by providing a steady supply of locally produced rice rather than displacing retailers. Since waqf does not pursue profit maximisation, it provides competitive pricing. It offers Halal-certified, ethically sourced rice for Muslim and socially conscious clients. Retailers thus obtain a dependable, ethical supply, while waqf achieves market access.

b) *Charitable Function: Waqf as a Purveyor of Social Welfare*

As a nonprofit, the waqf organisation provides free or drastically discounted rice to low-income households, communities affected by natural disasters, orphanages, mosques, welfare homes, school feeding programmes, and asnaf (qualified zakat recipients). In the end, waqf proves to be an ally rather than a rival, strengthening market stability, enhancing supply chain ethics, and supporting national goals for rice self-sufficiency.

3) Value Enhancement (Processing, Packaging, and Branding)

The waqf's commercial section engages in processing, grading, packing, and branding under labels like "Beras Waqf Malaysia" or "Beras Sejahtera Ummah". This value-added process enhances product quality and market competitiveness, fosters consumer trust through ethical branding, allows the waqf to sell rice at a slight premium or below market pricing to stabilise supply. The enhanced value guarantees that agricultural endeavours remain lucrative and socially just.

4) Execution Scenarios

First, the waqf establishes digital platforms and retail networks, including cooperative stalls and Waqf Agro Hubs. All proceeds are reinvested into waqf activities, ensuring that benefits are returned to farmers and the community.

Second, the waqf can access national distribution networks, storage facilities, and marketing platforms by working with BERNAS or FAMA. Both parties equitably allocate profit margins, prioritising price stability and national food security.

Finally, the waqf allocates a portion of rice production for humanitarian distribution during floods, droughts, or other disasters in collaboration with MAIWP and NADMA. The waqf provides rice free of charge or at discounted prices, while state agencies manage logistics.

5) Financial Ecosystem - Integration of Waqf, Crowdfunding, and Green Sukuk

This phase is the financial foundation of the model, where Islamic social finance converges with sustainable investment techniques.

a) *Endowment Fund*

Waqf capital offers long-term, non-repayable financial resources for infrastructure, including processing plants, mills, and storage facilities. Furthermore, it guarantees that asset ownership is maintained within a permanent beneficent trust. Ultimately, it produces dependable returns for investments in agricultural and social initiatives.

b) *Crowdfunding Structure*

Through online platforms, crowdfunding allows both people and organisations to participate in agricultural financing. Furthermore, it fosters ethical and transparent engagement in food production for small-scale investors. Ultimately, it can be organised as either Musharakah (equity participation) or Qard Hasan (benevolent loan) formats.

c) *Green Sukuk Financing*

Green sukuk finance supports ecologically friendly agricultural infrastructure by securing capital from both institutional and private investors. The funding is allocated for the integration of renewable energy sources (solar dryers, bioenergy mills), sustainable packaging, and waste management systems. It offers investors dependable returns linked to confirmed ESG results. This approach amalgamates waqf, crowdfunding, and green sukuk into a unified Islamic financing framework that sustains, finances, and advances Malaysia's rice sector.

Waqf fulfils a multidimensional duty, acting as both an asset owner and a financial institution, while ethically aggregating farmers' produce through Salam contracts. In addition to ensuring that infrastructure is dedicated to food security rather than commercial exploitation, the Waqf capital establishes a stable asset base for mills, dryers, storage facilities, and distribution centres. Besides infrastructure, waqf provides pre-season financing to farmers through a Wasil Salam arrangement. Salam is a customary Islamic financial arrangement in which agricultural products are paid for in advance and delivered subsequently. The waqf institution functions as the financier by purchasing the expected paddy output from farmers before to cultivation. The fixed Salam price offers farmers immediate funding for seeds, fertiliser, land preparation, and labour, thus reducing dependence on interest-based loans, informal lenders, or intermediaries. In addition to reducing cash-flow issues, this pre-season aid protects farmers from unscrupulous financing schemes that sometimes surface in fragmented agricultural supply chains. The Salam contract price is typically determined by transparent criteria, including:

- regional production cost benchmarks (MADA/KADA/ESP data);
- projected yield based on field conditions and technological implementation;
- historical trends in paddy prices;
- mutually agreed risk-sharing margins between farmers and waqf administrators.

Producers deliver the predetermined amount to the waqf-owned mill or collection centre after harvest. The waqf, currently operating as a socially responsible aggregator, can process, package, and distribute rice to wholesalers, retailers, B40 households, school feeding programmes, Islamic micro-entrepreneurs, or its own retail outlets. Reinvesting profits back into the waqf fund completes the cycle of social and economic gain. Crowdfunding improves this system by providing additional seasonal working capital using Musharakah (equity-sharing) or Qard Hasan (benevolent loan) structures. It promotes public involvement in food security, distributes risk across the community, and enhances transparency in the funding of agricultural inputs.

6) Integration of Waste Management and Circular Economy

The plan integrates circular economy principles by reusing agricultural by-products. Rice husks and bran are converted into biomass energy or employed as animal feed.

- Defective rice and its byproducts are utilised for compost and organic fertilisers.
- Packaging waste → replaced with biodegradable or recyclable materials.

This plan is consistent with Malaysia's National Circular Economy Roadmap (2026) and supports the attainment of carbon reduction goals specified in the Green Technology Master Plan.

7) Expected Outcomes and Policy Implications

The Integrated Waqf–Crowdfunding–Green Sukuk Model offers numerous socio-economic and environmental benefits.

- For Farmers: Guaranteed buyers, stable pricing, and access to pre-harvest financing.
- For Waqf Institutions: Sustainable asset utilisation and lasting social advantage.
- For Investors: Returns from ethical, Shariah-compliant, and ESG-focused investments.
- For Consumers: Cost-effective, high-quality rice with evident social significance.
- For Government: Improved food security with reduced fiscal dependence.

This concept actualizes Malaysia's Shared Prosperity Vision 2030 and Islamic Finance Blueprint, integrating faith-based social finance with modern sustainable investment to achieve agricultural resilience and national food sovereignty.

3.2 Justification of the *Waqf* Framework

The existing Malaysian framework for food security is largely the responsibility of the government. In practice, the state often allows market forces to determine rice prices during normal times and intervenes primarily in periods of stress by injecting supply from BERNAS or increasing imports when prices spike. Consequently, structural vulnerabilities in production, distribution, and price formation may persist if they are not addressed through more proactive, institution-based mechanisms. The major goal of the proposed waqf framework is to strengthen Malaysia's food security by supporting higher domestic rice self-sufficiency, improving access to affordable, good-quality rice for low-income households, and complementing policy directions outlined in the National Agro-Food Policy 2021–2030 (NAP 2.0). In this sense, waqf is conceptualised not as a substitute for state intervention, but as a strategic partner that can mobilise long-term social capital, crowd-in ethical investment, and provide counter-cyclical support to vulnerable farmers and consumers.

The waqf can help farmers by giving them money, information, equipment, and other essentials. It is thought that this will lower the cost of production for cultivating rice, increasing the income of farmer households. The waqf offers financial support in the form of capital aid to facilitate paddy cultivation, as most farmers in Malaysia operate on leased land and experience inadequate capital resources. Simultaneously, the waqf encourages farmers to enhance the quality of their yields by using better seeds, better technology, and advanced techniques that are supplied by the waqf's research and development division. The resulting rice yield is anticipated to provide Malaysian consumers with better nutrition. The waqf aims to establish agricultural operations to enhance employment by utilising its land potential and transforming it into productive, income-generating activities (Amuda et al., 2014; Puspitasari, 2017; Shafiam et al., Ahmad, 2015). Significantly, the waqf can alleviate poverty by generating

employment through agricultural operations, thereby providing revenue from the new jobs and enhancing the welfare of farmers and impoverished communities in Malaysia.

Furthermore, because of the budgetary and regulatory provisions, the waqf has greater latitude to interfere in the rice market than BERNAS. If the waqf reserve is adequate to intervene, the waqf is permitted to help and partially relieve the government's burden of supplying rice to the market to prevent uncontrollable price increases. Ultimately, the waqf reserves can be regarded as a national store of rice, constituting a significant enhancement to the food security policy. By sending a good signal to the market that the rice stock is stable, the waqf's stock or reserve in its depository may assist the government in curbing market speculation. This technique is essential given that rice is a staple grain in Malaysia; hence, any supply constraint can incite significant speculation, leading to price increases (Prastowo et al., 2008). Moreover, it is crucial to convey a good signal to stabilise the market, ensuring that prices remain sufficiently steady for the benefit of both farmers and consumers, given that over 60% of the stock is held by households. Since the purpose of waqf is to enhance community welfare, the community may also be encouraged to donate more. Furthermore, the community's contribution to waqf will give waqf a plentiful source of capital to use, and the profits from the operations are given back to the community through the provision of public goods, religious and community empowerment, and other development strategies aimed at enhancing the community's welfare and well-being.

3.3 Possible Obstacles of the Waqf Framework

It is important to recognise several obstacles that may hinder the efficient performance of waqf institutions and the broader integrated framework involving crowdfunding and Green Sukuk. Hassan and Shahid, 2010 argue that many waqf institutions experience mismanagement, causing inefficiency and neglect of assets under their control. This issue is often linked to weak internal governance structures and insufficient capacity among waqf managers. Furthermore, agency problems between waqf management and the board of trustees may reduce organisational effectiveness. To safeguard community interests, strong checks and balances—along with transparent reporting—are necessary to ensure that income generated from waqf asset investment is properly managed and disbursed. Another major challenge concerns the investment methods employed by waqf managers. Baskan, 2002 emphasises that waqf must be managed independently of government influence to maintain professionalism and avoid political interference. Saad et al., 2020 further explains that professional management allows waqf institutions to innovate through *ijtihad* and expand development opportunities. In the context of the integrated model, this becomes even more critical because waqf institutions will also be handling Green Sukuk proceeds, which require more sophisticated financial planning, monitoring, and reporting than traditional waqf donations. Incorporating Green Sukuk introduces new governance risks that must be addressed:

a) *Shariah and Ethical Compliance Risks*

Green Sukuk must meet both Shariah requirements and international green-finance standards (e.g., ICMA Green Bond Principles). Any failure in Shariah compliance, misuse of proceeds, or deviation from environmental targets could undermine investor trust and jeopardise future issuances.

b) *Reporting and Transparency Risks*

Green Sukuk requires ongoing impact reporting, sustainability audits, and environmental performance measurement. Waqf institutions may face capacity constraints in producing consistent, verifiable reports. Weak reporting increases reputational risk and may discourage institutional investors.

c) *Governance and Oversight Risks*

The dual structure—waqf governance plus sukuk trustee governance—creates complex oversight requirements. Misalignment between waqf managers, sukuk trustees, and Shariah advisors may lead to delays, inefficiencies, or legal disputes.

d) *Fiduciary and Investor Protection Risks*

Green Sukuk investors expect clear use-of-proceeds mechanisms, asset-backing evidence, and transparent cash-flow structures. Inadequate documentation or weak internal controls may expose the waqf institution to legal liabilities and loss of investor confidence.

3.4 Project Implementation and Operational Risks

Funds raised through Green Sukuk must be channelled into qualifying sustainable agricultural projects. Any delay in project execution, cost overruns, or inability to meet projected yields may compromise sukuk performance and harm the credibility of waqf-based financing. Legal frameworks also remain an obstacle. Waqf institutions require strong legal provisions to justify their dual role as both charity and enterprise. Malaysia's regulatory architecture for sukuk is well developed, but the legal framework for waqf-sukuk hybrids is still emerging and may lack clarity regarding ownership, asset protection, dispute resolution, and accountability. Finally, Billah et al., 2022 note that the rice supply chain is rigid and resistant to structural change. Waqf institutions must therefore develop innovative strategies to penetrate complex distribution channels, reduce supply chain inefficiencies, and offer competitive pricing at the retail level. At the same time, they must compete with financially strong rice traders while ensuring that governance standards for both waqf and sukuk components remain uncompromised.

4. Conclusion

As rice is widely recognised as Malaysia's staple food, it remains a strategic commodity for both economic policy and social welfare. Because of this, the Malaysian government has substantial leverage over its price and supply, for example by allowing BERNAS to release stock into the market or to import specified quantities to stabilise prices. However, the core challenges lie within the rice production and distribution system itself. Inefficient production structures, climate-related disruptions, and an extended, intermediary-heavy supply chain collectively contribute to rising prices and persistent farmer vulnerability.

The waqf-based framework proposed in this paper seeks to utilise Malaysia's waqf potential more fully to address both production- and distribution-side constraints. On the production side, waqf can support farmers through land-development partnerships and salam-based pre-harvest financing, thereby elevating farmers' bargaining position and income while lowering unit costs of production. On the processing side, waqf participation in milling and packaging can help enforce quality standards and support more competitive pricing. On the distribution side, structured collaboration between waqf institutions, BERNAS, cooperatives, and retailer networks can shorten the supply chain and reduce margins captured by intermediaries. **Taken together, the integrated waqf-salam-crowdfunding-green sukuk model advanced in this study offers a coherent Islamic social-finance architecture for a more resilient and equitable rice ecosystem in Malaysia.**

5. Recommendations

Since rice is largely regarded as Malaysia's staple food, it is a valuable commodity in Malaysia. To influence its supply, the Malaysian government allows BERNAS to release its stock to the

market or imports a specific amount to meet demand and adjust the price. This is because the government views rice as a valuable commodity. However, it should be mentioned that the rice production and distribution chain itself is the source of the issue. Inefficient production and an extended distribution supply chain contribute to the rising price of rice. By making the most of waqf's potential in Malaysia, the suggested waqf framework seeks to address issues with both production and distribution. In production, waqf can support farmers by establishing partnerships for cultivating land to grow paddy. Therefore, by providing the required funds and expertise to assist and boost rice production while lowering production costs, this enables farmers to gain greater recognition and make more money. In addition, waqf participates in the processing phase, when the rice is ground and packaged based on quality so that the rice's quality is assured and its cost is greatly reduced. In the distribution sector, waqfs can collaborate with BERNAS by leveraging its extensive statewide network to provide rice to rural areas in Malaysia. Since there are fewer parties in the chain that have the tendency to soak up margin and raise prices, it is anticipated that the price will be reduced in this instance due to the shorter distribution chain. The establishment of alliances between waqfs and farmers will boost employment in the agricultural industry, allowing farmers to enhance their socioeconomic status and well-being through appropriate management and adequate expertise. To discourage speculation, the government must also communicate to the market that there is a plentiful supply of rice. Meanwhile, the waqf framework serves to guarantee the stability of the production and distribution lines. Additionally, this will mitigate the disparity between demand and supply, which induces volatility, particularly during the biannual harvest and post-harvest periods in Malaysia. Consequently, a more stable and reasonably priced price of rice in the market will eventually result from sufficient stock, a steady supply of rice, and an effective distribution system. Regarding the results of the present study, there are several limitations that must be recognised. The current study was constrained by the archival technique in its analysis of pertinent literature on the chosen issue, as it relied exclusively on a theoretical framework. Because of the difficulties in gathering and analysing data, no empirical research has been done to verify if the framework will function with Malaysia's food security plan, its applicability, or its impact measurement. Therefore, more research on the waqf institution's internal price factor calculation is needed to strengthen the waqf framework and increase its impact on Malaysians' socioeconomic wellbeing.

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Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this study.

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