



Enhancing the Development of the Agricultural Sector through Waqf: Evidence from West Java, Indonesia

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Abstract

West Java's agricultural sector faces severe challenges, including limited institutional support, lack of technical expertise, environmental degradation, and market inefficiencies. This study evaluates how productive *waqf* can be integrated into agricultural financing to address these constraints. Utilising a mixed-methods design, the study combines qualitative expert interviews with an Analytic Network Process–Strengths, Weaknesses, Opportunities, and Threats (ANP-SWOT) framework. ANP prioritises critical challenges (RO1) and evaluates a *waqf*-based funding framework (RO2), while IFAS-EFAS matrices determine strategic positioning (RO3). The ANP analysis identifies unproductive *waqf* land as the most significant individual structural constraint (limiting weight: 0.1521). However, the support and expertise dimension scores highest overall when its constituent factors are aggregated (0.3862), indicating that stakeholders prioritise capacity building and knowledge transfer over immediate land reform. Experts prioritise systemic solutions such as *waqf-zakat* institutional integration (0.1239) and *salam-muzara'ah* contract implementation (0.1156). These priorities yield a Strength-Threat (S-T) strategic posture, leveraging *waqf*'s long-term stability against market volatility and climate risks. Ultimately, this study offers an empirically grounded framework that operationalises agricultural *waqf* as interest-free patient capital for land rehabilitation, technology adoption, and farmer empowerment in West Java, providing a potentially scalable model for broader regional implementation across Indonesia.

Keywords: Productive Waqf, Agricultural Financing, ANP-SWOT Analysis, West Java Agriculture

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1. Introduction

The agricultural sector plays a crucial role in Indonesia's economy by contributing significantly to national gross domestic product (GDP) and employing a substantial proportion of the population (Perdana et al., 2023; Husman & Sakti, 2021). Agriculture accounts for approximately 13% of national GDP and provides employment for about 32% of the labour force, while also supplying essential raw materials for domestic industry and export commodities (Bashir & Susetyo, 2018). Beyond its economic significance, the sector is vital for ensuring national food security, meeting the needs of a growing population, and supporting social stability and public health (Adam & Abdulai, 2023). Sustainable farming practices are therefore essential for

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enhancing productivity, ensuring access to nutritious food, reducing poverty, and protecting the environment. These objectives align closely with the United Nations Sustainable Development Goals (SDGs), which provide an internationally recognised framework for sustainable development, including sustainable land use, agriculture, and agroforestry (Odagiri et al., 2020; van Noordwijk et al., 2018).

West Java offers an important empirical setting for examining these issues. Agriculture remains a major source of livelihood in Indonesia, employing approximately 29.96% of the national workforce as of February 2022, according to the Central Statistics Agency (BPS). Given its fertile soils, high population density, and substantial contribution to national food production, West Java has been a major focus of agricultural development and grant initiatives implemented by various government institutions (Sabirin et al., 2022). However, the province's agricultural sector continues to face structural constraints that hinder productivity and long-term sustainability. Rural youth out-migration has reduced the available agricultural workforce, while smallholder farmers face low yields, poor product quality, environmental degradation, social tensions, and restricted access to formal capital. Approximately 30% of Indonesia's cropland is managed by smallholder farmers, who are particularly vulnerable to climate change and extreme weather conditions (Usman et al., 2025). Market constraints, inadequate post-harvest infrastructure, fragmented supply chains, weak stakeholder coordination, and low levels of technological adoption further constrain agricultural performance (Perdana et al., 2023; Usman et al., 2025).

Financing is a particularly critical constraint. Smallholder farmers often face difficulties accessing formal credit because of high perceived risks, stringent collateral requirements, and cumbersome administrative procedures (Mutisya & Kumar, 2025). Consequently, many depend on informal intermediaries and predatory lenders, weakening their bargaining position and increasing their economic vulnerability (Witt, 2021). Restricted financial access also limits farmers' ability to adopt modern technologies, improve productivity, and strengthen their resilience to climate- and market-related risks (Mutisya & Kumar, 2025; Witt, 2021). These interconnected challenges highlight the need for financing mechanisms that are accessible, sustainable, and capable of supporting both productive activities and long-term agricultural resilience. In this context, Islamic social finance, particularly *waqf*, offers a potential mechanism for supporting productive agricultural activities and generating sustainable social benefits (Othman et al., 2023; Agusti et al., 2025). Productive *waqf* can mobilise agricultural land and plantation assets to generate recurring returns while preserving the underlying endowment. Such returns can support farmer incomes and contribute to broader social investments in education, healthcare, and local infrastructure (Agusti et al., 2025). Thus, *waqf* can extend beyond its traditional philanthropic function to serve as a long-term, interest-free financing mechanism for agricultural development.

The relevance of this approach is particularly evident in Subang Regency, West Java, a major agricultural region experiencing increasing land-conversion pressures arising from national strategic projects and industrial expansion (Rizaldi et al., 2019; Gunawan et al., 2019; Pratama & Mandela, 2024). Empirical evidence demonstrates the feasibility of productive agricultural *waqf* in the region. For example, the Dompét Dhuafa Foundation manages approximately 10 hectares of productive *waqf* land in Cirangkong Village, Subang Regency, integrating crop cultivation and livestock production in collaboration with local farmers. The initiative has contributed to employment generation and food security. Nevertheless, Subang, which encompasses approximately 80,000 hectares of agricultural land supporting more than 176,073 rice farmers, remains exposed to land-conversion risks associated with large-scale infrastructure and industrial development, including the Patimban Port project (Rizaldi et al., 2019; Gunawan et al., 2019). These pressures reinforce the importance of farmland preservation and climate-smart agricultural practices in sustaining long-term regional food security (Pratama & Mandela, 2024). Despite these promising developments, significant research gaps remain concerning how agricultural challenges can be systematically prioritised and how structured *waqf*-based financing can be operationalised to address them. Existing initiatives demonstrate the potential of agricultural *waqf*, but further research is needed to identify the most critical constraints, translate these priorities into appropriate Islamic financing mechanisms, and determine strategic pathways for scaling such models. These gaps are examined further in the literature review (Section 2.7).

To address these gaps, this study pursues three primary research objectives. First, it aims to prioritise the socio-economic and financing challenges facing the agricultural sector in West Java using an integrated ANP-SWOT approach (RO1). Second, it seeks to develop a dedicated *waqf*-based agricultural funding framework grounded in the empirical findings of RO1 and incorporating appropriate Islamic contractual structures (*shariah*

contracts) (RO2). Third, it aims to formulate strategic recommendations for scaling up and replicating the West Java agricultural *waqf* framework across other agricultural regions in Indonesia (RO3).

2. Literature Review

2.1 The Condition of the Agricultural Sector in West Java

The agricultural sector plays a pivotal role in Indonesia's economy, contributing significantly to national output and employment while supplying critical industrial raw materials and export commodities (Perdana et al., 2023; Husman & Sakti, 2021; Bashir & Susetyo, 2018). Beyond its macroeconomic contribution, agriculture is essential for food security, rural livelihoods, and social stability (Adam & Abdulai, 2023). Within this national context, West Java represents one of Indonesia's strategically important agricultural regions because of its fertile land, high population density, and substantial contribution to national food production. Despite its strategic importance, the agricultural sector in West Java faces persistent structural and socio-economic constraints. Smallholder farmers, who manage approximately 30% of Indonesia's cropland, experience low productivity, poor crop quality, environmental degradation, and severely limited access to financial resources (Usman et al., 2025). Demographic changes, particularly the migration of rural youth to urban centres, further reduce agricultural labour availability and undermine the sector's long-term sustainability. Market and institutional inefficiencies also constrain agricultural performance through fragmented supply chains, weak stakeholder coordination, and over-reliance on intermediaries, which can diminish farmers' bargaining power and contribute to inefficient price formation (Perdana et al., 2023; Witt, 2021).

Limited access to formal financing represents a primary barrier to agricultural development. Smallholders often face stringent collateral requirements, high perceived credit risks, and complex administrative procedures that restrict their access to formal financial institutions (Mutisya & Kumar, 2025). Consequently, many depend on informal intermediaries and lenders, which can exacerbate their economic vulnerability and limit their capacity to invest in modern technologies and sustainable production systems (Witt, 2021). These challenges are further compounded by climate variability, water scarcity, land degradation, inadequate post-harvest infrastructure, and rapid land conversion driven by industrialisation and infrastructure development, particularly in Subang Regency (Rizaldi et al., 2019; Gunawan et al., 2019; Pratama & Mandela, 2024). Although existing studies document these challenges, they generally examine individual constraints rather than systematically assessing their relative importance and interdependencies. Consequently, policymakers and other stakeholders have limited empirical guidance regarding which constraints should be prioritised when designing targeted agricultural interventions. This gap highlights the need for a structured, multi-criteria decision-making approach, such as the Analytic Network Process (ANP), to identify and prioritise the most critical constraints within the agricultural sector.

2.2 The Development of Productive *Waqf* in Indonesia

Waqf is an important instrument of Islamic social finance that can support sustainable wealth redistribution and socio-economic development. Its defining feature is the preservation of the principal asset while generating continuous benefits for designated beneficiaries, thereby distinguishing it from purely consumptive forms of charity (Salam & Sutisna, 2024; Habibah et al., 2019). In Indonesia, *waqf* has gradually expanded beyond its traditional applications in mosques, schools, and burial grounds towards more productive uses, including commercial real estate and agriculture. Productive *waqf* involves the strategic management of endowed assets to generate income that can be reinvested or distributed for social welfare (Agusti et al., 2025; Othman et al., 2023). Its applications include agricultural land, commercial properties, and cash *waqf*, thereby shifting the focus from passive asset preservation towards productive value creation. In agriculture, this approach enables endowed land and financial resources to support productive activities while preserving the underlying *waqf* corpus.

The development of productive *waqf* in Indonesia is supported by a formal legal and institutional framework, anchored by Law No. 41 of 2004 on Waqf. The Indonesian Waqf Board (BWI) and various *nazhir* (*waqf* trustee) institutions play important roles in administering and developing *waqf* assets in accordance with *Sharia* principles. Financial innovations, including cash *waqf*, *waqf*-linked *sukuk*, and digital fundraising platforms, have also expanded opportunities for resource mobilisation and public participation (Ainol-Basirah & Siti-Nabiha, 2020; Kunhibava et al., 2023). Empirical initiatives further demonstrate the operational potential

of productive *waqf* for community empowerment. Agricultural projects implemented by institutions such as Dompet Dhuafa illustrate how *waqf* assets can be utilised for crop cultivation and livestock production while generating economic benefits for local communities. Such initiatives demonstrate the potential of *waqf* to function as long-term, patient capital for productive activities. Nevertheless, limitations in managerial capacity, underutilised assets, inadequate funding, and weak institutional coordination continue to constrain the broader development and scalability of productive *waqf* in Indonesia (Othman et al., 2023; Agusti et al., 2025). While the literature establishes the broader developmental potential of productive *waqf*, it provides limited operational guidance on how to structure sector-specific financing models tailored to smallholder agriculture. This limitation is particularly relevant when *waqf* is intended to address localised production, market, financing, and institutional constraints.

2.3 Application of *Waqf* in Agricultural Development

The application of *waqf* to agricultural development offers a potential mechanism for addressing structural constraints while generating sustained socio-economic benefits. Agricultural *waqf* involves the productive management of endowed land, financial resources, and infrastructure to support farming activities, food security, and rural livelihoods (Latifah, 2019; Ishak et al., 2025a). Because the principal asset is preserved while generating benefits over time, productive *waqf* is well aligned with the long-term nature of agricultural investment. One important application is the productive use of *waqf* land for crop cultivation, livestock farming, and agroforestry. The resulting outputs or revenues can support farmers and beneficiaries while preserving the underlying endowed asset (Agusti et al., 2025). Productive *waqf* can also facilitate the rehabilitation of idle or underutilised agricultural land, thereby improve land productivity and promote sustainable land management (Odagiri et al., 2020; van Noordwijk et al., 2018). This land-based function is particularly relevant in regions where agricultural land is increasingly threatened by competing commercial and infrastructural uses.

In addition to land-based assets, cash *waqf* can provide non-debt financing for agricultural inputs, technology, infrastructure, and other production requirements (Othman et al., 2023). Islamic contractual mechanisms such as *salam* (forward sales) and *muzara'ah* (sharecropping) can complement *waqf* funding by structuring financing, production, and risk-sharing relationships between smallholders and *waqf* institutions. Such arrangements may provide alternatives for smallholders who face difficulties accessing conventional formal credit markets (Mutisya & Kumar, 2025). However, effective agricultural *waqf* requires robust governance and professional management. *Nazhir* institutions must possess adequate technical and financial capacity to manage physical assets, coordinate stakeholders, administer contractual arrangements, and maintain *Sharia* compliance (Habibah et al., 2019). Digitalisation, corporate *waqf* frameworks, and integration with other Islamic social finance instruments may further strengthen resource mobilisation, transparency, and operational efficiency (Ainol-Basirah & Siti-Nabiha, 2020; Kunhibava et al., 2023).

Although existing literature demonstrates the potential of *waqf* in agriculture, limited attention has been given to aligning specific Islamic financial contracts with empirically prioritised agricultural constraints. In particular, the operational integration of *salam* and *muzara'ah* within a unified *waqf* framework based on identified smallholder needs remains insufficiently explored.

2.4 Potential and Challenges of Agricultural *Waqf* in West Java

West Java presents a favourable context for agricultural *waqf* because of its extensive agricultural base, fertile land, and important role in national food production. Integrating *waqf* into regional agricultural development is consistent with broader objectives concerning food security, poverty reduction, and environmental sustainability (Odagiri et al., 2020; van Noordwijk et al., 2018). Productive *waqf* can mobilise long-term, interest-free capital while facilitating the productive use of idle or underutilised agricultural land (Othman et al., 2023; Agusti et al., 2025). Nevertheless, the development of agricultural *waqf* in West Java is constrained by several interrelated challenges. Market and distribution constraints include fragmented supply chains, uncertain market absorption, over-reliance on middlemen, and weak coordination between farmers and end markets. These conditions can restrict profit margins, weaken farmers' bargaining positions, and limit the benefits generated from increased agricultural production (Perdana et al., 2023; Witt, 2021). Accordingly, financial capital alone may not be sufficient to generate sustainable improvements unless market access and distribution mechanisms are addressed simultaneously.

Support and expertise represent another important dimension. Low rates of technology adoption, inadequate extension services, insufficient technical training, and weak institutional support can hinder farmers' productivity and their ability to adopt improved production practices (Perdana et al., 2023; Pratama & Mandela, 2024). Limited collaboration between agricultural organisations and *waqf* institutions may further constrain the development of agricultural *waqf* initiatives. These conditions suggest that financial intervention should be accompanied by capacity building, knowledge transfer, and institutional coordination. Environmental and resource-management pressures also threaten the sustainability of agricultural activities. Climate variability, water scarcity, land degradation, and land conversion associated with industrialisation and infrastructure development can reduce agricultural land availability and undermine long-term production. These pressures are particularly relevant in areas such as Subang Regency, where competing land uses may threaten agricultural sustainability and regional food security (Rizaldi et al., 2019; Gunawan et al., 2019; Pratama & Mandela, 2024). While the literature identifies challenges across market, technical, institutional, and environmental dimensions, these issues are generally examined separately. A systematic assessment of their relative importance and interdependencies is therefore necessary to inform the design of an effective and targeted *waqf*-based agricultural financing strategy.

2.5 Governance and Institutional Capacity of *Waqf*

Effective governance is fundamental to the sustainability of *waqf* institutions, particularly as endowed assets are transformed from passive charitable holdings into productive socio-economic resources. *Waqf* governance encompasses the regulatory frameworks, institutional mechanisms, and managerial practices required to safeguard and develop endowed assets in accordance with *Sharia* principles (Habibah et al., 2019; Salam & Sutisna, 2024). Within this framework, the *nazhir* is responsible for managing and developing *waqf* assets without assuming individual ownership of the endowed property. Institutional capacity encompasses the managerial competence, technical expertise, financial capability, organisational infrastructure, and strategic planning required to develop and scale *waqf* initiatives (Ainol-Basirah & Siti-Nabiha, 2020; Kunhibava et al., 2023). Indonesia's Law No. 41 of 2004 provides the legal foundation for *waqf* governance, while BWI performs important supervisory and coordinating functions. However, persistent limitations in human capital, technology adoption, professional management, and strategic planning can hinder the productive utilisation and development of *waqf* assets. Institutional integration and managerial innovation are therefore important for strengthening agricultural *waqf*. Digital platforms, corporate governance practices, and integration with other Islamic social finance instruments, such as *zakat* and cash *waqf*, can enhance transparency, resource mobilisation, and operational efficiency (Ainol-Basirah & Siti-Nabiha, 2020; Kunhibava et al., 2023). In agricultural *waqf*, these capabilities are particularly important because effective land and financial management require coordination among *nazhir*, smallholders, financial institutions, government agencies, and market actors (Othman et al., 2023; Agusti et al., 2025). Rather than treating governance as an isolated administrative issue, this study considers institutional capacity as an interconnected element within the broader ecosystem of agricultural constraints. This perspective is consistent with the study's use of ANP to assess the relative importance and interrelationships among the challenges affecting agricultural *waqf* development.

2.6 Integrative Theoretical Framework

This study adopts an integrative theoretical framework combining normative Islamic principles with economic, behavioural, market, and institutional perspectives to examine agricultural development and the role of *waqf* in West Java. The normative foundation is provided by *Maqasid al-Shariah*, which emphasises the protection of essential human interests, including life, property, and socio-economic welfare (Chapra, 2016). From this perspective, agricultural *waqf* is not merely a charitable mechanism but a socially embedded financial instrument that can promote economic justice, support vulnerable smallholders, and contribute to sustainable community welfare (Salam & Sutisna, 2024; Habibah et al., 2019). This normative foundation is complemented by Agribusiness Systems Theory, which conceptualises agriculture as an interconnected system involving production, processing, distribution, and marketing. This perspective is relevant because agricultural challenges in West Java extend beyond farm-level production to include supply-chain inefficiencies, market absorption barriers, and coordination problems (Perdana et al., 2023). Imperfect Market Theory provides a complementary explanation of how information asymmetry and unequal market power can disadvantage smallholders and

contribute to inefficient market outcomes (Witt, 2021). Behavioural Economics offers a micro-level perspective on smallholder decision-making under conditions of risk, uncertainty, and financial pressure. Finally, Dynamic Capabilities Theory highlights the importance of organisational adaptation, learning, and innovation in enabling *nazhir* institutions to respond to changing technological, market, and environmental conditions (Ainol-Basirah & Siti-Nabiha, 2020).

Productive *waqf* serves as the unifying instrument linking these normative, economic, behavioural, and institutional perspectives. By mobilising endowed land, interest-free financial resources, and appropriate governance mechanisms, *waqf* can help address financing constraints while supporting productive investment, institutional capacity, and sustainable agricultural development (Othman et al., 2023; Agusti et al., 2025). Taken together, these perspectives provide a conceptual basis for examining agricultural *waqf* as an interconnected system rather than as a standalone financing mechanism.

2.7 Existing Research Gaps

Despite the expanding literature on Islamic social finance and agricultural development in Indonesia, several important research gaps remain. First, previous studies identify agricultural constraints such as climate vulnerability, infrastructure deficits, market fragmentation, and limited financing, but have generally not systematically ranked these constraints according to their relative importance and interdependencies (Perdana et al., 2023; Usman et al., 2025). Consequently, there remains limited empirical evidence regarding which constraints should receive priority within a regional context such as West Java. Second, although the developmental potential of productive *waqf* has been widely recognised, existing literature provides limited operational guidance on financing models specifically tailored to smallholder agriculture. In particular, insufficient attention has been given to integrating Islamic contractual mechanisms, such as *salam* and *muzara'ah*, with empirically prioritised agricultural needs (Othman et al., 2023; Agusti et al., 2025). This limits the practical translation of the broader *waqf* concept into context-specific agricultural financing arrangements. Third, existing research rarely integrates agricultural constraint identification, *waqf*-based financing design, and strategic implementation within a single analytical framework. Studies applying multi-criteria decision-making approaches such as ANP to *waqf* have generally focused on broader governance priorities rather than agricultural sector constraints. For example, Huda et al. (2017) applied ANP to prioritise key challenges in *waqf* management in Indonesia, but their analysis was not specifically focused on agricultural *waqf*. Similarly, the *Salam–Muzara'ah* Linked Waqf (SMW) model proposed by Majid (2021) provides a conceptual financing structure integrating *salam*, *muzara'ah*, and cash *waqf*, but does not employ an empirical prioritisation procedure to determine which agricultural constraints should be addressed first.

These limitations indicate the need for an integrated empirical and strategic approach. Accordingly, this study combines ANP to prioritise the relative importance and interdependencies of agricultural constraints with IFAS-EFAS analysis to determine the strategic position of agricultural *waqf*. The resulting priorities then inform the development of a context-specific *waqf*-based agricultural financing framework for West Java, including appropriate Islamic contractual mechanisms. In this way, the study connects empirical constraint prioritisation with financing design and strategic recommendations, while providing a framework with potential for replication in other agricultural regions of Indonesia.

3. Conceptual Framework

The conceptual framework of this study illustrates the logical relationship between the theoretical foundations, empirical investigation, analytical stages, and expected research outputs. Figure 1 illustrates the overall conceptual framework, which begins with the identification of key agricultural challenges and the potential of productive *waqf* in West Java through a literature review, document analysis, and expert interviews. These sources provide the empirical basis for understanding agricultural underdevelopment as a complex and interconnected problem involving financing constraints, market inefficiencies, institutional weaknesses, limited technical support, and environmental pressures.

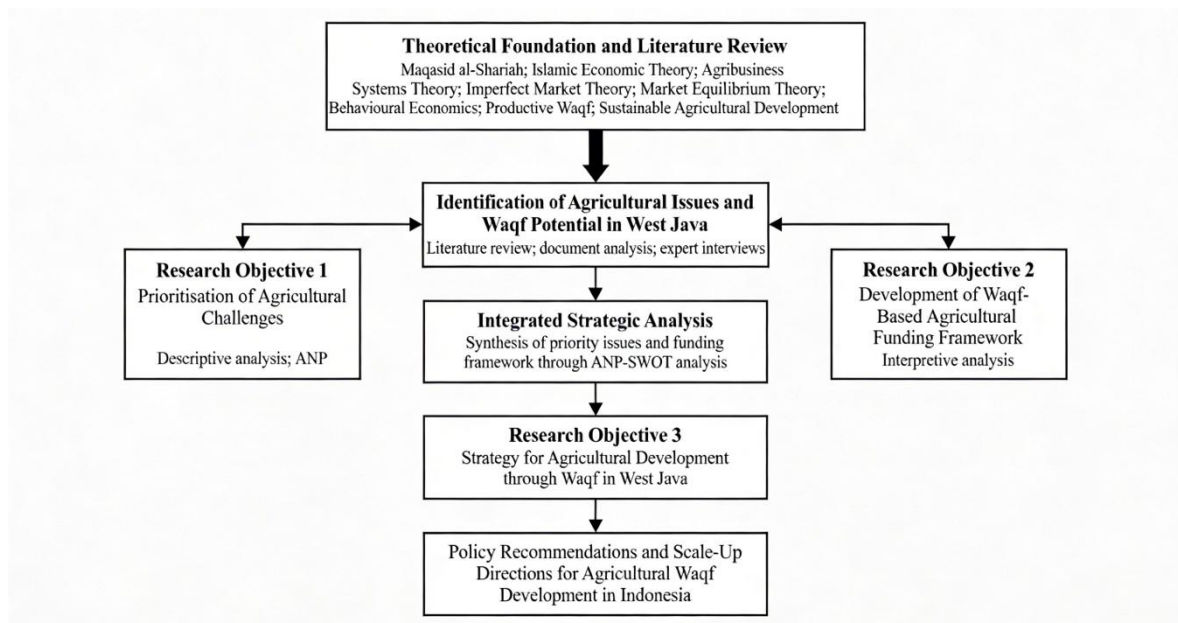


Figure 1: Conceptual Framework

The framework is grounded in an integrative theoretical foundation, including *Maqasid al-Shariah*, Islamic economic thought, agribusiness systems theory, imperfect market theory, market equilibrium theory, behavioural economics, and productive *waqf* principles within sustainable development. Rather than functioning as independent causal theories, these perspectives collectively provide the normative foundation and analytical lens for the identification, interpretation, and integration of the factors examined in this study.

Building on this foundation, the framework proceeds through two complementary analytical stages aligned with the research objectives. The first stage identifies and prioritises agricultural challenges using descriptive analysis and the Analytic Network Process (ANP), establishing their relative importance and network interdependencies to determine which constraints should receive priority intervention. The second stage develops a *waqf*-based agricultural financing framework using descriptive and interpretive analysis, incorporating empirically identified smallholder needs, relevant *Shariah*-compliant financial mechanisms such as *salam* and *muzara'ah*, and appropriate institutional arrangements.

As illustrated in Figure 1, the outputs of these analytical stages are subsequently integrated through ANP-SWOT analysis and IFAS-EFAS matrices to establish the strategic position of agricultural *waqf* and formulate appropriate development strategies. In this process, the ANP results provide empirically prioritised inputs for assessing internal and external factors, while the financing framework provides potential financing and contractual mechanisms for addressing the identified constraints. Ultimately, the conceptual framework establishes a sequential progression from theoretical foundations and empirical investigation to analytical prioritisation, framework design, and strategic recommendations for advancing productive agricultural *waqf* in West Java and across Indonesia.

4. Research Methodology

This study adopts a sequential mixed-methods design integrating qualitative exploration, multi-criteria decision analysis, and strategic evaluation to develop a *waqf*-based agricultural financing framework for West Java. The methodology is structured to ensure a logical progression from problem identification and prioritisation to framework design and strategic analysis. Given the inherent complexity of agricultural systems—characterised by structural interdependencies among market, institutional, environmental, and financial factors—the study

combines qualitative and quantitative analytical techniques to enhance analytical robustness and contextual relevance.

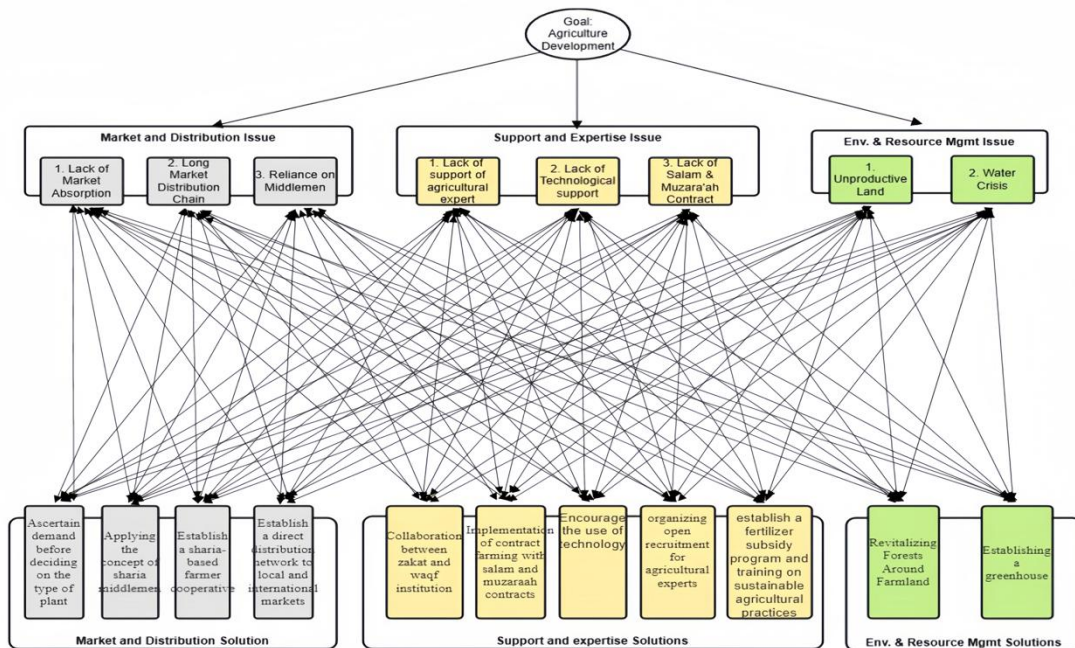
In the first stage, qualitative exploratory methods are employed to identify key variables underlying agricultural challenges and the operational potential of *waqf*. This involves a comprehensive literature review, document analysis, and semi-structured interviews with six purposively selected experts, comprising two academics, two practitioners, and two policymakers (see Table 1 for expert profiles). Expert selection was guided by three explicit criteria: first, a minimum of five years of professional experience in agriculture, Islamic finance, or *waqf* management; second, direct involvement in, or strategic oversight of, productive *waqf* and agricultural development initiatives in West Java, representing institutional (Indonesian Waqf Board/BWI), regional government (Bappeda), academic, and field-implementation perspectives; and third, equal representation across academic, practitioner, and policy domains to minimise single-perspective bias during the pairwise comparison process. This expert panel composition aligns with the methodological requirements of the Analytic Network Process (ANP), wherein the relevance, depth of experience, and domain diversity of expert judgements are important for deriving reliable priority weights (Saaty, 2008).

Table 1. Justifications of Informant Selection

Code	Category	Position / Affiliation	Years of Experience	Specific Involvement in Agricultural Waqf / Subang
E1	Academic	Dean, Faculty of Economics, YARSI University; Chair of the Professional Certification Unit, Indonesian Waqf Board (BWI)	5+ years	Strategic role in national waqf development and professional standard-setting through the Indonesian Waqf Board (BWI), with expertise in Islamic economics and finance.
E2	Academic	Lecturer and Head of Administration and Finance, Department of Islamic Banking and Economics; Deputy Secretary, Indonesian Waqf Board (BWI)	5+ years	Extensive experience in financial management and waqf development within the higher education sector, supported by expertise in Islamic economics and waqf governance.
E3	Policymaker	Head of Planning, Research and Development Division, Regional Development Planning Agency (Bappeda), West Java	5+ years	Responsible for regional development planning relevant to agricultural development, including the integration of waqf into regional economic development strategies.
E4	Policymaker	Head of Industrial Development Planning for Trade, Cooperatives, and SMEs, Regional Development Planning Agency (Bappeda), West Java	5+ years	Involved in policy formulation for industrial and regional economic development, including programmes supporting productive waqf and local economic initiatives.
E5	Practitioner	Head of the Department of Sharia Economics, IPB University; Founder of Hutan Waqf Bogor	5+ years	Direct experience in implementing forestry- and environment-based productive waqf, combined with academic expertise in Islamic economics and sustainable resource management.
E6	Practitioner	Founder of Trubus Agricultural Waqf	5+ years	Extensive field experience in the management of productive agricultural waqf land and the

The results of this stage are synthesised into a structured ANP model comprising clusters and elements that represent the major agricultural challenges, including market and distribution, environmental and resource management, and support and expertise, together with potential solutions within the agricultural *waqf* ecosystem.

Figure 2. Analytic Network Process (ANP) Framework



The second stage utilises the Analytic Network Process (ANP) to prioritise the identified variables through pairwise comparison analysis. In this procedure, experts evaluate the relative importance of each element within and across clusters using Saaty's 1–9 fundamental scale, allowing both direct and indirect interdependencies among factors to be captured. The resulting pairwise comparison matrices are processed to derive priority weights (eigenvectors), while consistency ratios (CR) are calculated for each matrix using Super Decisions software to assess the logical consistency of expert judgements, adhering to Saaty's standard threshold of $CR \leq 0.10$. Across all six experts, the CR values for the pairwise comparisons ranged from 0.00394 to 0.00932 (mean = 0.0071), falling well below the acceptable threshold. These consistently low inconsistency levels demonstrate a high degree of logical coherence in the expert evaluations, thereby supporting the reliability of the derived priority weights used in the subsequent ANP and ANP-SWOT analyses (see Table 2).

Table 2. Inconsistency (CR) Table

No	Expert	Inconsistency (CR)
1	Expert 1	0.00932
2	Expert 2	0.00932
3	Expert 3	0.00394
4	Expert 4	0.00755

5	Expert 5	0.00494
6	Expert 6	0.00755

In the third stage, the study applies interpretive and descriptive analysis to translate the ANP results into a *waqf*-based agricultural financing framework. The prioritised variables provide the foundation for designing the framework architecture, including forms of *waqf* capital (such as cash *waqf* and land *waqf*), contractual mechanisms (such as *salam* and *muzara'ah*), institutional roles (involving *nazhir* institutions, smallholders, and financial intermediaries), and operational workflows. This stage ensures that the proposed framework is empirically grounded while remaining aligned with *Shariah* principles and the practical agricultural needs of West Java.

Finally, the study employs an integrated ANP-SWOT approach incorporating Internal Factor Analysis Summary (IFAS) and External Factor Analysis Summary (EFAS) matrices to evaluate the strategic positioning of the proposed framework. The IFAS matrix assesses internal strengths and weaknesses, while the EFAS matrix evaluates external opportunities and threats. Each factor is assigned a weight and rating based on its relative significance, informed by the ANP priority results and expert evaluations. The weighted scores are then aggregated to determine the framework's overall strategic position within the SWOT matrix.

The ANP results determine which factors are mapped into the IFAS and EFAS matrices as strengths, weaknesses, opportunities, and threats. Following the initial ANP analysis, a second round of expert interviews is conducted to evaluate the relative significance of each identified SWOT factor. Each factor is assigned a significance level using a three-point scale: 3 for highly significant, 2 for moderately significant, and 1 for less significant. The overall significance score for each factor is derived by calculating the mean rating across the six experts and rounding to the nearest integer. These significance levels are subsequently normalised by dividing each score by the total sum of significance ratings to establish the respective IFAS and EFAS weights, ensuring that the weights sum to 1.00.

This integrative analysis enables the formulation of targeted strategies that align internal capabilities with external conditions, thereby supporting the operational feasibility, sustainability, and scalability of agricultural *waqf* implementation in West Java and across Indonesia.

5. Results and Discussion

5.1 RO1: Examining Socio-Economic and Financing Challenges in West Java's Agricultural Sector Using an ANP-SWOT Approach

Before evaluating the priority weights, it is essential to establish the logical consistency of the pairwise comparison process. As presented in Table 2, all pairwise comparison matrices satisfy Saaty's recommended consistency threshold ($CR \leq 0.10$). The consistency ratios across the six experts ranged from 0.00394 to 0.00932, with a mean value of 0.0071, indicating a high level of logical coherence in the expert judgements. The corresponding outputs generated using Super Decisions software are provided in Appendix 1. These results support the consistency of the expert evaluations underlying the priority weights presented in the subsequent analysis. West Java's agricultural sector is characterised by persistent structural inefficiencies that can be interpreted through the integration of Imperfect Market Theory, Agribusiness Systems Theory, and Behavioural Economics. These theoretical perspectives indicate that information asymmetry, supply-chain fragmentation, and behavioural constraints collectively contribute to market failures that disadvantage smallholder farmers. The dominance of informal intermediaries reflects imperfect market conditions in which middlemen exert substantial influence over price formation, potentially resulting in lower farm-gate prices and reduced farmer welfare. From an agribusiness systems perspective, elongated distribution chains represent structural bottlenecks that constrain market responsiveness and operational efficiency. Furthermore, behavioural economics provides insight into farmers' tendency towards distress selling under liquidity constraints and post-harvest loss risks, which may reinforce suboptimal economic outcomes.

A critical manifestation of these structural vulnerabilities is the uncertainty surrounding market absorption, which may discourage smallholders from investing in high-quality inputs such as certified seeds and advanced fertilisers. This market absorption risk is compounded by demand volatility, asymmetric market information, and poor supply-chain coordination. Infrastructure deficits further aggravate these conditions by increasing smallholder reliance on intermediaries for market access. The prioritisation analysis of market and distribution

challenges, presented in Figure 3, demonstrates moderate inter-rater agreement among experts, with a Kendall's coefficient of concordance (W) of approximately 0.44. This indicates a moderate degree of agreement across academic, policy, and practitioner domains regarding the relative importance of the identified market and distribution bottlenecks.

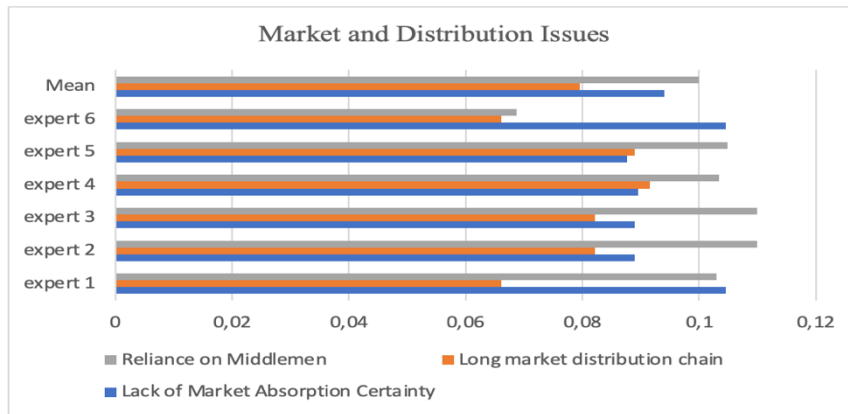


Figure 3. Prioritization of Market and Distribution Issues Based on Experts' Opinions

The ranking of market and distribution issues shows that reliance on middlemen is the most critical constraint, followed by the lack of market absorption certainty and long distribution chains. Specifically, reliance on middlemen recorded priority weights of 0.1065 among academics, 0.0940 among policymakers, and 0.1049 among practitioners, placing it at rank 1. The lack of market absorption certainty followed, with weights of 0.0968, 0.0943, and 0.0876, while long distribution chains ranked third, with values of 0.0742, 0.0800, and 0.0890, respectively. The combined priority weights further confirm that reliance on middlemen (0.3054) and lack of market absorption certainty (0.2787) are the two dominant issues within this cluster. Dependence on middlemen creates a systemic imbalance that may perpetuate inequality within the agricultural sector, a condition that can be interpreted through Imperfect Market Theory and information asymmetry frameworks. In such markets, unequal access to information may enable intermediaries to exercise disproportionate influence over pricing and distribution, creating conditions resembling monopsony at the farm-gate level (Geromichalos & Herrenbrueck, 2025). Smallholders, particularly in remote rural areas, occupy structurally weak bargaining positions because of limited access to real-time market information and alternative off-takers. Consequently, farm-gate prices may deviate from competitive market outcomes, reflecting structural power asymmetries rather than underlying supply-and-demand conditions.

Furthermore, behavioural economics provides key insights into why this structural dependency may persist despite its adverse economic consequences. Smallholders frequently face immediate liquidity constraints and post-harvest risks, prompting them to accept lower prices from intermediaries in exchange for immediate cash flow. This behaviour can be interpreted through concepts such as loss aversion and bounded rationality, whereby economic decisions under severe financial pressure may prioritise risk mitigation over long-term profit maximisation (Thaler, 2016). Consequently, even when alternative distribution channels exist, smallholders may opt for the perceived certainty provided by middlemen and informal lenders, particularly where these roles overlap, thereby reinforcing economic dependency and constraining longer-term growth. These theoretical insights are consistent with empirical literature on developing-country agricultural economies. Evidence demonstrates that reliance on informal intermediaries may restrict farm income, reduce capital investment, and impede technology adoption (Fabregas et al., 2019). In Indonesia, this dynamic may be further reinforced because middlemen frequently also provide informal credit. Their dual role as commercial buyers and informal credit providers embeds them more deeply within rural economic relationships, thereby linking market absorption uncertainty with intermediary control over distribution channels.

The second major cluster encompasses support and expertise constraints, which can be examined using

Dynamic Capabilities Theory, the Technology Acceptance Model (TAM), and the Diffusion of Innovation framework. These perspectives highlight those agricultural bottlenecks stem not only from individual smallholder limitations but also from systemic deficits in institutional support, extension services, and knowledge transfer. As presented in Figure 4, the prioritisation analysis for this cluster demonstrates a moderate level of agreement among experts, with a Kendall's coefficient of concordance (W) of approximately 0.36.

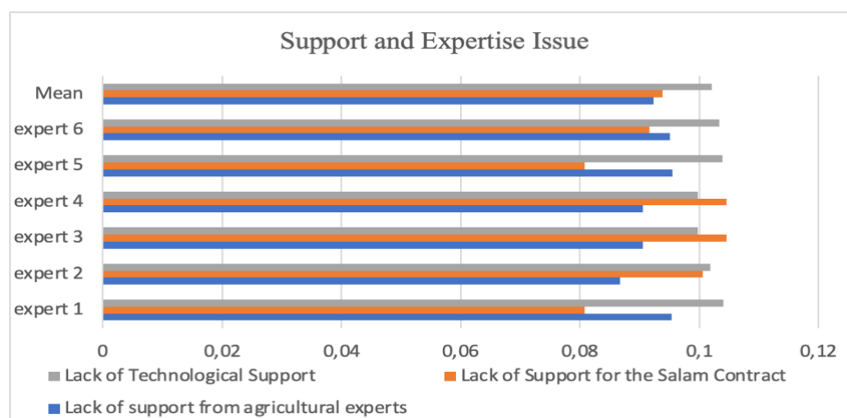


Figure 4. Prioritization of Support and Expertise Issues Based on Experts' Opinions

The prioritisation of support and expertise issues is presented in Table 5.3, where lack of technological support is identified as the primary constraint, followed by weak implementation support for *salam* contracts and lack of support from agricultural experts. The priority weights for lack of technological support are 0.1029 among academics, 0.1012 among policymakers, and 0.1034 among practitioners, placing it at rank 1. Weak implementation support for *salam* contracts follows, with weights of 0.0907, 0.1033, and 0.0917, while lack of support from agricultural experts ranks third, with values of 0.0911, 0.0921, and 0.0951, respectively. The combined priority weights further confirm that lack of technological support (0.3074) and weak *salam* contract implementation (0.2856) are the two most critical bottlenecks within this cluster.

The structural and technological constraints in Indonesia's agricultural sector can be interpreted through the *Maqasid al-Shariah* framework, particularly its emphasis on the preservation of wealth (*hifz al-mal*) and promotion of human welfare (*maslahah*). Restricted access to technology, unequal market structures, and weak bargaining power among smallholders may undermine distributive justice when economic returns are inequitably distributed across value-chain actors. In this regard, *Maqasid al-Shariah* provides a moral and economic foundation for inclusive agricultural transformation by emphasising fair access to resources, knowledge, and market opportunities. Chapra (2016) and Dusuki and Abdullah (2007) argue that Islamic economic principles support socio-economic equity and poverty alleviation through appropriate institutional arrangements. In the agricultural context, Hasan et al. (2024) further highlight that strengthening *waqf*-based financing and digital inclusion is consistent with *maqasid* objectives by enhancing smallholder productivity, income stability, and long-term welfare.

From a mainstream economic perspective, these structural inefficiencies can be further evaluated through Market Equilibrium Theory. Under competitive market conditions, prices reflect the interaction of supply and demand to facilitate efficient resource allocation. However, information asymmetry, market fragmentation, and intermediary dominance can distort agricultural market outcomes. Smallholders' limited access to real-time market data and digital platforms may weaken their price-negotiation capacity, potentially resulting in market outcomes that favour informal intermediaries. Empirical findings by Bellemare and Bloem (2018) and Li and Jiang (2023) indicate that improved access to information technology can reduce transaction frictions and enhance market efficiency. Accordingly, integrating technological innovation within an institutional framework guided by *maqasid* and sustainability principles may help reduce market distortions, expand smallholder market access, and foster a more equitable agricultural ecosystem. This synthesis aligns closely

with the core principles of Sustainable Agricultural Development, which emphasise economic viability, social equity, and environmental stewardship. Low rates of technology adoption constrain productivity and restrict smallholders' capacity to implement modern sustainable practices, such as precision agriculture and efficient resource management. [Pretty et al. \(2018\)](#) and [FAO \(2021\)](#) emphasise that sustainable agricultural transformation requires integrated support systems incorporating digital innovation, technical capacity building, and institutional strengthening. In the absence of such systems, smallholders may remain in low-productivity cycles that exacerbate rural poverty and environmental pressures. Thus, *maqasid* objectives and sustainable development principles converge on the necessity of equitable access to technology and institutional support to build resilient agricultural systems.

The third major cluster encompasses environmental and resource management constraints, which are critical for long-term agricultural sustainability. As presented in Figure 5, the expert evaluations demonstrate complete consensus, with a Kendall's coefficient of concordance (W) of 1.00. The prioritisation results in Table 5.4 identify unproductive land as the primary environmental and resource-management issue, followed by water scarcity. Unproductive land records mean priority weights of 0.1133 among academics, 0.1122 among policymakers, and 0.1170 among practitioners, generating a combined priority weight of 0.3425. Water scarcity records mean values of 0.0623, 0.0666, and 0.0673, respectively, yielding a combined priority weight of 0.1961.

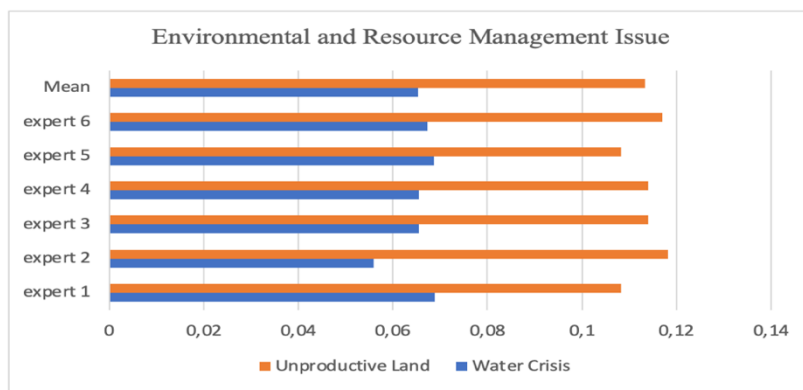


Figure 5. Prioritization of Environmental and Resource Management Issues Based on Experts' Opinions

Empirical data demonstrate a significant decline in agricultural land area and overall crop production. According to Statistics Indonesia (BPS, 2024), the harvested area in West Java contracted from 1,707,253 hectares in 2018 to 1,470,616 hectares in 2024, representing a loss of 236,637 hectares (13.86%). Similarly, agricultural output fluctuated over the same period, peaking at 9,433,723 tonnes in 2022 before falling to 8,514,667 tonnes in 2024. These trends reflect persistent structural and environmental bottlenecks, including agricultural land conversion, climate variability, and socio-economic pressures. These environmental and structural challenges can be interpreted through a productive *waqf* framework, which emphasises the optimal and sustainable utilisation of endowed assets to generate continuous socio-economic benefits. From this perspective, the conversion of agricultural land and degradation of water resources represent not only economic inefficiencies but also potential tensions with the *maqasid*-oriented objective of preserving productive assets for public welfare (*maslahah*). Productive *waqf* can provide an institutional mechanism for safeguarding endowed agricultural land by maintaining its productive use while generating benefits for smallholders and local communities. Historical analyses by [Kahf \(2003\)](#) and [Cizakca \(2011\)](#) highlight the role of *waqf* institutions in supporting agricultural land, irrigation infrastructure, and rural livelihoods. Furthermore, recent studies by [Parveez et al. \(2020\)](#) and [Haneef et al. \(2021\)](#) indicate that integrating *waqf* with modern agricultural financing mechanisms, such as cash *waqf*-linked farming initiatives, can strengthen investment capacity and contribute to rural socio-economic development. In this context, productive *waqf* can help address agricultural constraints by mobilising underutilised assets and directing resources towards climate-resilient infrastructure and community-based farming systems.

Simultaneously, these resource bottlenecks align closely with the principles of Sustainable Agricultural

Development, particularly regarding environmental resilience and efficient resource stewardship. Increasing drought risks, water scarcity, and reliance on rain-fed agriculture indicate gaps in sustainable water governance and climate-adaptive farming. [Pretty et al. \(2018\)](#) and [FAO \(2021\)](#) emphasise that sustainable agricultural transformation requires integrated water-resource management, investment in irrigation infrastructure, and the adoption of climate-smart technologies to improve productivity while conserving natural capital. The framework of common-pool resource management, as discussed by [Dipierri et al. \(2020\)](#), further explains how weak institutional governance can contribute to the depletion of shared water resources, thereby exacerbating scarcity and compromising long-term agricultural viability. Empirical evidence from [Rockström et al. \(2017\)](#) and [Burney et al. \(2013\)](#) indicates that improved water management and targeted technological interventions can enhance land productivity and climate resilience in drought-prone regions. Consequently, sustainable agricultural development and productive *waqf* converge on institutional innovation, resource efficiency, and long-term asset stewardship as complementary approaches to addressing land conversion, water scarcity, and declining agricultural productivity.

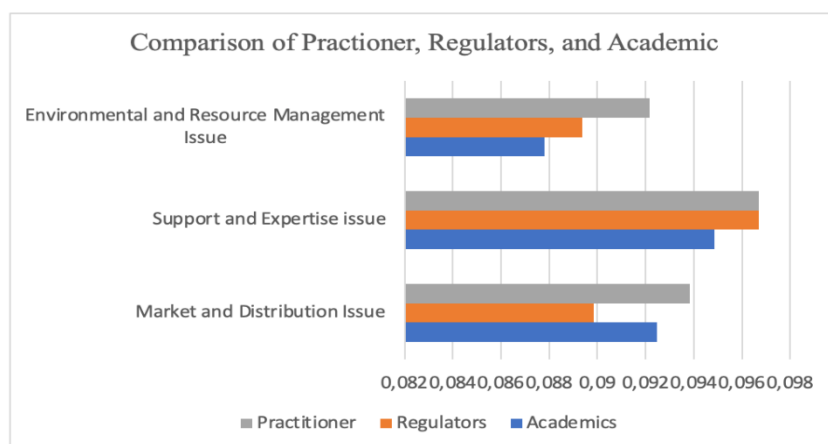


Figure 6. Mean Values for All Aspects of Agricultural Issues

Based on the mean values across the three informant groups—academics, policymakers, and practitioners—presented in Figure 6, the support and expertise dimension (0.0960) emerges as the most highly prioritised cluster from the stakeholders' perspective. This finding indicates that capacity-related constraints, particularly technological support, *salam-muzara'ah* contract implementation, and training and expert support, represent the most immediate operational bottlenecks facing smallholder farmers. While these groups mean values capture stakeholders' direct perceptions of the relative importance of individual issues, they do not fully account for their structural influence within the overall decision-making network. The ANP limiting weights, by contrast, incorporate the underlying network structure and feedback interdependencies among the identified factors, thereby providing a more comprehensive measure of systemic priority (see Figure 7).

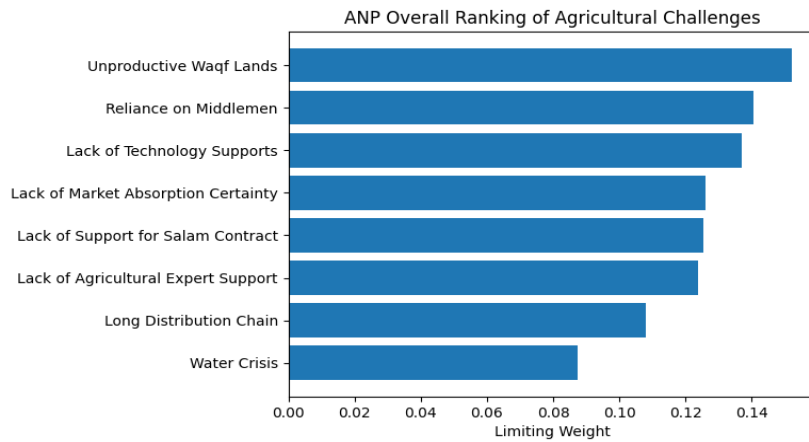


Figure 7. ANP Overall Ranking

Figure 7 presents the comprehensive ANP-based ranking, depicting the relative priority of agricultural challenges in West Java across multiple interrelated dimensions. The results indicate that unproductive *waqf* land constitutes the most critical individual structural constraint, recording the highest limiting weight (0.1521). This finding indicates that land inefficiency and asset underutilisation represent a major structural bottleneck within the regional agricultural system, with potential implications for crop productivity, yield stability, and long-term sector sustainability. The second-ranked constraint, reliance on middlemen (0.1405), highlights persistent structural challenges within the agricultural market network. This dependency reflects power asymmetries along the value chain; wherein informal intermediaries may exert substantial influence over price discovery and distribution channels. Consequently, smallholders may occupy structurally weaker bargaining positions and capture a smaller share of final market value, potentially reinforcing rural income disparities and systemic inefficiencies. Closely following, lack of technological support (0.1371) emerges as the third major constraint, indicating that low rates of technology adoption and underdeveloped digital infrastructure may constrain smallholder productivity. This result suggests that regional agricultural inefficiencies stem not only from market conditions but also from technological and capability gaps that may impede efficient production and post-harvest management.

Lack of market absorption certainty (0.1260) ranks fourth, reflecting demand uncertainty and weak supply-chain integration. This uncertainty may restrict smallholders' ability to plan cultivation cycles effectively and contribute to suboptimal economic decisions, including premature selling at unfavourable prices. Similarly, weak implementation support for *salam* contracts (0.1253) underscores a gap between the theoretical potential of Islamic social finance and its operational application. Despite the suitability of *salam* (forward sales) for agricultural financing, its limited implementation may reflect deficiencies in institutional support, financial literacy, and risk-management frameworks. Furthermore, lack of support from agricultural experts (0.1238) highlights deficits in agricultural extension services and technical knowledge transfer, which are important for strengthening smallholder capacity and facilitating technology adoption. Long distribution chains (0.1079) further contribute to market inefficiencies by increasing transaction costs and potentially reducing farm-gate margins, although their relative priority is lower than that of the constraints discussed above. Finally, water scarcity (0.0874) records the lowest limiting weight among the evaluated constraints, indicating that, within the ANP network, environmental pressures receive lower immediate priority than institutional, market, and technological factors.

At the cluster level, the support and expertise dimension achieves the highest overall systemic priority, with a combined limiting weight of 0.3862. This aggregate metric encompasses three interconnected constraints: inadequate technological support (0.1371), limited institutional support for *salam* contract implementation (0.1253), and insufficient expert support (0.1238). Although unproductive *waqf* land (0.1521) represents the single largest individual constraint, the cluster-level results indicate that capability- and institution-related

deficits exert the greatest aggregate influence within the agricultural *waqf* ecosystem. While the ANP limiting weights identify land underutilisation and intermediary reliance as the primary individual bottlenecks, stakeholders consistently prioritise support and expertise as a critical entry point for intervention. This suggests that technical capacity and institutional support may serve as strategic leverage points through which progress can be made in addressing broader structural constraints. From a dynamic capabilities' perspective, technical deficits and weak institutional support may limit smallholders' capacity to optimise resource allocation and adopt modern agricultural practices. Unlike land conversion and environmental pressures, which may require longer-term structural reforms and substantial investment, capability-related constraints may be addressed more readily through targeted training programmes, expanded extension services, and multi-institutional collaboration. Enhancing stakeholder capabilities and institutional support may therefore provide an operational pathway for improving market responsiveness, supporting more efficient land use, and narrowing the gap between policy design and field implementation.

5.2 RO2: Development of a *Waqf*-Based Agricultural Funding Framework

To address the second research objective (RO2), the study translates the ANP-derived priority findings from RO1 into a structured, *waqf*-based agricultural funding framework designed to address the identified systemic constraints.

The selection of a *waqf*-based funding framework is directly informed by the empirical ANP findings from RO1, which demonstrate that West Java's agricultural challenges stem from interconnected structural, market, institutional, and capability bottlenecks. Although these constraints manifest in diverse forms—such as unproductive land, reliance on informal intermediaries, and limited technological adoption—they share an important cross-cutting dimension: restricted access to appropriate, affordable, and sustainable non-debt financing mechanisms. From an analytical perspective, the ANP results indicate that the identified constraints operate as an interdependent network rather than as isolated problems, with financial and institutional limitations interacting with other structural conditions. For example, unproductive agricultural land may persist not only because of physical or environmental limitations but also because of insufficient capital for land development, soil rehabilitation, and modern infrastructure. Similarly, smallholders' dependence on middlemen may be reinforced by their reliance on informal credit for operational needs, which can restrict their ability to access formal off-takers and negotiate favourable prices. Likewise, low rates of technology adoption may be associated with capital barriers, including high upfront investment costs and limited access to affordable financing. These interrelationships suggest that financing represents an important cross-cutting constraint within the interconnected network of issues identified through the ANP analysis.

The choice of *waqf* as the primary source of capital is further justified by its alignment with *Maqasid al-Shariah*, particularly the preservation and productive utilisation of wealth (*hifz al-mal*). Unlike conventional debt-based financing, productive *waqf* can provide patient and socially oriented capital in which the endowed principal asset (*asl*) is preserved while its benefits (*manfa'ah*) are generated and potentially reinvested over time. This characteristic makes *waqf* particularly suitable for addressing longer-term structural challenges in agricultural productivity and rural development. Furthermore, integrating *waqf* with classical Islamic financial contracts such as *salam* and *muzara'ah* can link capital deployment to tangible real-sector production while incorporating principles of risk sharing and asset-based economic activity (Iqbal & Mirakhor, 2011). Beyond these general Islamic finance principles, the *salam* contract incorporated into the framework is grounded in AAOIFI *Shari'ah* Standard No. 10 on *Salam* and Parallel *Salam*, which addresses requirements relating to advance payment, precise commodity specification, including quantity and quality, and defined delivery terms. These principles inform the proposed upfront working-capital mechanism for smallholders. Meanwhile, the *muzara'ah* arrangement is based on classical *fiqh al-mu'amalat* principles whereby land and agricultural labour are contributed by separate parties, with the resulting crop yield distributed according to a pre-agreed sharing ratio. This arrangement is consistent with the relevant International Islamic Fiqh Academy rulings (IIFA-OIC Resolution No. 110 [4/12] on *Muzara'ah* and *Musaqah*) and classical treatments of agricultural partnership in *Al-Muwafaqat* (Al-Shatibi, 2004). Explicitly anchoring these contractual mechanisms in recognised *Shari'ah* standards and classical jurisprudential sources strengthens the normative foundation of the proposed framework and supports its alignment with established *fiqh al-mu'amalat* principles.

Operationalising *salam* contracts directly addresses the liquidity constraints identified in RO1 by providing

upfront working capital for agricultural inputs and potentially reducing smallholders' dependence on informal intermediary credit. Simultaneously, *muzara'ah* structures can facilitate the productive utilisation of underutilised *waqf* land by linking endowed agricultural assets with farming activities and shared production outcomes. This dual integration demonstrates that the proposed framework extends beyond simple fund allocation by linking specific *Shari'ah* contracts with the empirically prioritised needs identified through the ANP analysis.

Furthermore, the funding framework incorporates governance and capacity-building mechanisms, recognising that capital deployment alone may be insufficient to overcome institutional and capability deficits. The integration of specialised *nazhir* institutions, agricultural extension experts, technology providers, and market off-takers is intended to ensure that financial resources are supported by the technical, institutional, and market capabilities required for productive implementation. These non-financial components directly correspond to the support and expertise constraints highlighted in RO1. Consequently, agricultural *waqf* functions not only as a potential source of capital but also as an institutional coordinating mechanism that connects financial resources, technical expertise, and market access within an integrated and potentially more resilient agricultural ecosystem.

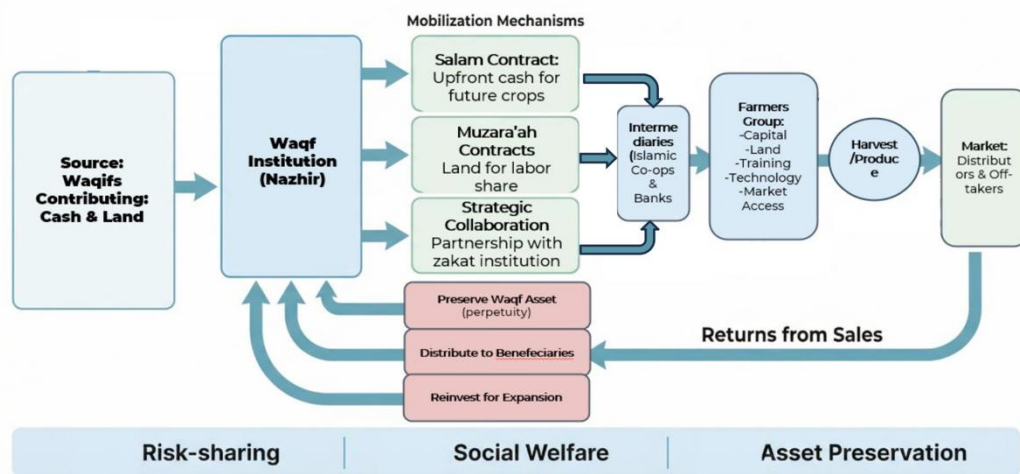


Figure 8. Funding Framework for Agricultural Development (developed by authors)

According to Figure 8, the proposed framework begins with the mobilisation of *waqf* resources, comprising both cash *waqf* capital and land *waqf* contributions from donors (*waqifs*). These resources are administered by a designated *waqf* institution (*nazhir*), which assumes a central coordinating role in ensuring that endowed assets are deployed productively. Consistent with the priority constraints identified in RO1, the *nazhir* is conceived not merely as a passive fund manager but as an active institutional coordinator linking financial and land resources with local smallholder needs, particularly those associated with unproductive land and financial exclusion.

To operationalise this funding architecture, the framework incorporates *salam* contracts to provide upfront working capital to smallholders prior to the harvest period. This mechanism is designed to address liquidity constraints and reduce farmers' dependence on informal intermediaries for operational credit. In parallel, *muzara'ah* arrangements facilitate the productive cultivation of *waqf* land through pre-agreed crop-sharing structures between the *nazhir* and smallholders, thereby directly addressing the issue of unproductive agricultural assets identified in RO1. Furthermore, the framework integrates strategic collaboration with *zakat* institutions, strengthening institutional coordination within the broader Islamic social finance ecosystem and potentially expanding access to complementary social support. The operationalisation process is facilitated by key intermediary institutions, including Islamic microfinance institutions and cooperatives, which serve as operational bridges between *nazhir* organisations and farmer groups. These intermediaries can provide financial

services alongside technical training, technological support, and market linkages, thereby responding to the support and expertise gaps highlighted in RO1. Smallholders, organised into agricultural groups, receive integrated support encompassing access to capital, productive agricultural land, technology, expert extension services, and market connections, thereby strengthening their production capacity and operational efficiency. The ultimate output of this integrated process is agricultural production linked to commercial off-takers and institutional distributors, with the aim of improving market absorption and reducing excessive dependence on informal intermediaries. Importantly, the framework incorporates a circular return mechanism whereby operational surpluses generated from agricultural activities are allocated across three primary components: first, the maintenance and preservation of endowed *waqf* assets to safeguard the perpetual corpus (*asl*); second, the distribution of benefits to designated beneficiaries (*mawquf 'alayh*); and third, reinvestment to expand agricultural activities and strengthen technological capabilities. This circular mechanism is intended to support the simultaneous preservation of *waqf* assets, generation of social benefits, and continued productive reinvestment.

Overall, the proposed framework embodies a risk-sharing, socially oriented, and sustainability-driven approach anchored in *Maqasid al-Shariah*, particularly the preservation of wealth (*hifz al-mal*) and the enhancement of public welfare (*maslahah*). By integrating capital mobilisation, institutional coordination, technical support, off-taker linkages, and productive land management, the framework responds to the interconnected constraints identified in RO1 through an integrated ecosystem approach. Consequently, the *waqf*-based funding framework provides a structured and empirically grounded model for supporting more inclusive, efficient, and sustainable agricultural development in West Java, while offering a basis for potential replication and adaptation across other agricultural regions of Indonesia.

5.3 RO3: Formulating Strategic Recommendations for Scaling and Replicating the Agricultural Waqf Model Across Indonesia

To operationalise the third research objective (RO3), this study employs the Internal Factor Analysis Summary (IFAS) and External Factor Analysis Summary (EFAS) matrices, following a quantitative strategic management approach (David, 2011). While the Analytic Network Process (ANP) provides a robust multi-criteria framework for identifying and prioritising key systemic constraints and solution nodes, it does not directly formulate strategic alternatives. Instead, ANP functions primarily as a diagnostic tool that captures relative priority weights as well as network feedback and interdependencies among variables within the system.

To translate these prioritised nodes into actionable strategies, the study integrates the ANP diagnostic results into a strategic evaluation framework operationalised through the IFAS and EFAS matrices. This hybrid ANP–SWOT approach reduces the subjective bias commonly associated with conventional SWOT analysis by anchoring strategy formulation in empirically derived priorities. Specifically, the factors included in each matrix are systematically identified from the highest-ranked factors based on their ANP limiting weights, while their relative IFAS and EFAS weights are established through a structured expert validation process.

Within this matrix framework, internal factors (strengths and weaknesses) are mapped directly from the most influential nodes identified in the ANP supermatrix. Strengths are derived from high-priority solution nodes, reflecting the operational capabilities of the ecosystem. For instance, institutional synergy between *waqf* and *zakat* entities (limiting weight = 0.1239) and the implementation of *salam–muzara'ah* contract farming (limiting weight = 0.1156) represent core structural and financial strengths of the model. Conversely, weaknesses stem from the most critical constraint nodes, including unproductive *waqf* lands (0.1521) and reliance on informal intermediaries (0.1405), which constitute the primary internal bottlenecks restricting value distribution and smallholder welfare. External factors (opportunities and threats) synthesise macro-environmental conditions identified in the literature with broader systemic insights derived from the ANP network. Opportunities encompass supportive institutional policy frameworks and the increasing adoption of *Shariah*-compliant financial instruments, both of which foster a conducive ecosystem for scaling agricultural *waqf* initiatives. In contrast, threats represent exogenous risks, such as climate variability, extreme weather events, and demographic shifts—particularly youth out-migration from agriculture—that jeopardize long-term sector sustainability.

To ensure analytical consistency, the factors included in the IFAS and EFAS matrices are assigned normalised weights summing to 1.00 for each matrix. Performance ratings, ranging from 1 (poor response) to

4 (superior response), evaluate the current responsiveness of the system to each factor. Through this procedure, the hybrid ANP–SWOT framework transforms multi-criteria priorities into structured strategic options, enabling a systematic evaluation of internal capabilities and external conditions. The integration of ANP and SWOT does not represent methodological redundancy, but rather a complementary analytical progression wherein ANP provides empirical diagnosis and SWOT facilitates strategy formulation. Crucially, this hybrid approach bridges the gap between diagnostic evaluation and strategic action. By anchoring recommendations in empirical evidence, the resulting strategies are specifically designed to address binding constraints while leveraging promising opportunities, thereby providing a robust, data-driven basis for scaling agricultural *waqf* initiatives across different regional contexts in Indonesia.

To clarify the conversion mechanism between the ANP supermatrix and the IFAS/EFAS matrices, the ANP limiting weights are not transferred directly as matrix weights. Instead, the ANP results are used to identify and prioritise the most critical factors for inclusion. A follow-up expert consultation was then conducted to evaluate the strategic importance of each selected factor within its respective SWOT category. During this stage, experts assigned a strategic significance rating ranging from 1 (low significance) to 3 (high significance). Following standard strategic management procedures (David, 2011), the final weight for each factor was derived by dividing its individual significance score by the total cumulative significance score within the respective category. For example, within the Strengths category (total significance score = 8), institutional synergy between *zakat* and *waqf* entities (ANP limiting weight = 0.1239; significance score = 3) received a normalised weight of $\frac{3}{8} = 0.38$. Conversely, the implementation of *salam–muzara'ah* contracts (ANP limiting weight = 0.1156; significance score = 1) received a weight of $\frac{1}{8} = 0.13$. Consequently, ANP limiting weights are used to identify and prioritise the factors included in the strategic matrices, whereas the final IFAS and EFAS weights are derived from the normalised significance scores obtained through expert strategic validation.

Table 3. Internal Factor Analysis Summary (IFAS)

STRENGTHS	sig. level	Weight	Rating	Score
Abundant natural resource potential.	3	0.38	4	1.50
The implementation of <i>salam</i> and <i>muzaraah</i> contract systems.	1	0.13	4	0.50
The synergy between <i>zakat</i> and <i>waqf</i> institutions in agriculture.	3	0.38	3	1.1313
Existence of agricultural labour.	1	0.13	3	0.38
TOTAL	8	1.0		3.50
WEAKNESS	sig. level	Weight	Rating	Score
Lack of technological support.	3	0.30	4	1.2
Lack of understanding of <i>salam</i> and <i>muzaraah</i> contracts	3	0.3	3	0.9
Low access to capital and investment.	2	0.20	4	0.8
Lack of synergy between Islamic financial institutions and farmers.	2	0.20	2	0.4
TOTAL	10	1.0		3.3
Strengths - Weaknesses				0.20

Table 4. External Factor Analysis Summary (EFAS)

OPPORTUNITIES	sig. level	Weight	Rating	Score
Agricultural technology development	3	0.43	4	1.71
Government support in the agricultural sector.	2	0.29	4	1.14

Growing interest in <i>sharia</i> transactions.	2	0.29	3	0.86
TOTAL	7	1		3.71
THREATS	sig. level	Weight	Rating	Score
Climate change and natural disasters.	3	0.3	4	1.2
Lack of regulations that support <i>salam</i> and <i>muzaraah</i> contracts.	2	0.2	3	0.6
Competition with imported products.	3	0.3	4	1.2
Lack of interest from the younger generation in agriculture.	2	0.2	4	0.8
TOTAL	10	1		3.8
Opportunities - Threats				-0.09

The IFAS and EFAS factors were identified and validated through in-depth interviews with key stakeholders, including academics, policymakers, and practitioners involved in the agricultural and Islamic finance sectors. These qualitative insights were subsequently quantified using the hybrid ANP–SWOT approach, ensuring that both internal and external factors reflect real-world operational conditions rather than purely theoretical assumptions. The IFAS results demonstrate that the system's internal strengths (total score = 3.50) slightly outweigh its weaknesses (3.30), indicating a relatively solid internal foundation. These strengths are primarily derived from abundant natural resource potential, strong institutional synergy between *waqf* and *zakat* institutions, and the availability of *Shariah*-compliant contractual mechanisms such as *salam* and *muzara'ah*. However, the EFAS results reveal that external threats (3.80) marginally exceed opportunities (3.71), indicating that the macro-environment is characterised by greater risk exposure than growth potential.

Based on the IFAS and EFAS matrix analysis, the agricultural *waqf* system in West Java is positioned in the Strength–Threat (ST) quadrant, as indicated by a positive internal differential ($S - W = +0.20$) and a slightly negative external differential ($O - T = -0.09$). This strategic positioning suggests that, while the system possesses relatively strong internal capabilities, it operates within a challenging and increasingly volatile external environment. Accordingly, the most appropriate strategic orientation is an ST strategy, which emphasises leveraging internal capabilities to mitigate external threats.

Given this strategic positioning, the core strategic direction should focus on strengthening systemic resilience through *waqf*-based institutional and contractual mechanisms. In particular, *salam* (forward purchase) and *muzara'ah* (sharecropping) contracts can function as risk-sharing instruments to stabilise smallholder incomes and reduce vulnerability to price volatility and yield uncertainty. Simultaneously, institutional synergy between *waqf* and *zakat* organisations can be strengthened to support local production inputs and improve resource allocation efficiency. These measures can enhance the ecosystem's capacity to absorb external shocks, including climate variability, market competition, and regulatory constraints.

More specifically, the proposed ST strategy addresses several key external threats identified in the EFAS evaluation. Climate change and natural disasters, which represent significant external threats, can be addressed through risk-sharing contractual structures and climate-adaptive farming practices. Similarly, competition from imported agricultural commodities can be mitigated by strengthening domestic production capacity and enhancing supply-chain efficiency through multi-institutional collaboration. Regulatory gaps surrounding the implementation of *salam* and *muzara'ah* can be partially addressed by establishing standardised institutional frameworks and operational guidelines. Furthermore, declining interest in agriculture among rural youth can be addressed by integrating modern agricultural technologies and digital platforms into the *waqf*-based ecosystem.

Although market opportunities remain relatively high (3.71), the presence of stronger external threats (3.80) indicates that an aggressive, growth-oriented (SO) strategy may not be appropriate as the primary strategic posture. Instead, expansion initiatives should be pursued selectively, particularly by leveraging technological adoption and growing interest in *Shariah*-compliant financial instruments. Concurrently, complementary Weakness–Opportunity (WO) strategies are necessary to address internal constraints, such as limited technical capabilities and low financial literacy regarding Islamic contracts, through targeted extension and capacity-

building programmes. Finally, defensive Weakness–Threat (WT) measures should be maintained to reinforce institutional governance and minimise operational risk exposure under adverse macro-environmental conditions.

In conclusion, the IFAS–EFAS analysis establishes that the agricultural *waqf* system in West Java occupies the Strength–Threat (ST) quadrant, demonstrating that, while the ecosystem possesses strong internal capabilities, it operates within a challenging external environment. Consequently, the primary strategic orientation should remain resilience-focused, deploying internal strengths to mitigate external risks rather than pursuing unconstrained expansion. Optimising *waqf*-based institutional and contractual mechanisms—particularly through *salam–muzara'ah* integration and *waqf–zakat* collaboration—can enhance ecosystem stability and adaptive capacity across climate, market, and regulatory domains.

Ultimately, this resilience-oriented ST strategy, supported by selective growth (SO), targeted capacity enhancement (WO), and defensive governance (WT) measures, provides a balanced and sustainable development pathway. By anchoring strategic formulation in empirical ANP weights and expert validation, the proposed model offers a context-sensitive and analytically grounded basis for strategic development. This integrated approach positions *waqf* not merely as a funding mechanism but also as a stabilising institutional framework for long-term agricultural transformation across Indonesia.

5.4 Implementation Challenges and Governance Considerations

Translating the proposed ANP–SWOT strategic framework into practice requires addressing several implementation challenges that extend beyond the immediate scope of the proposed model.

One of the most significant barriers concerns the legal status of *waqf* land. Many agricultural *waqf* assets in Indonesia—including those outside the pilot sites managed by Dompot Dhuafa in Subang—remain legally uncertified. This lack of formal registration creates legal uncertainty, heightens the risk of land disputes, and restricts the capacity of *waqf* assets to function as productive resources within formal financing arrangements. In addition, although this study proposes the structured integration of *salam* and *muzara'ah* contracts, specific *fatwa*-level guidance addressing their combined operational application within *waqf*-based agricultural financing remains limited. The absence of explicit regulatory guidance creates operational uncertainty for *waqf* institutions and financial intermediaries seeking to scale the proposed model nationally. Institutional governance represents a second critical challenge. Although Law No. 41 of 2004 establishes the regulatory framework for the Indonesian Waqf Board (BWI) and provides for its role in the governance of *waqf* assets, the technical competence and managerial capacity of *nazhir* institutions vary considerably across regions. Likewise, standardised governance practices—including transparent financial reporting, independent auditing, and formal safeguards against conflicts of interest—are inconsistently implemented. Consequently, expanding the proposed framework beyond West Java requires more than simply replicating its financing mechanisms; it necessitates the establishment of institutional governance standards and the enhancement of *nazhir* professional capacity to ensure that productive *waqf* assets are managed transparently, efficiently, and accountably.

Another fundamental consideration concerns balancing the preservation of *waqf* assets with meeting smallholders' immediate working-capital requirements. The core principle of *waqf* governance requires preservation of the corpus (*asl*) of the endowed asset, whereas *salam* financing requires upfront liquidity to be provided to farmers prior to harvest. Reconciling these objectives requires robust financing structures that utilise operational surpluses generated by productive assets or systematically combine *waqf* resources with complementary Islamic social finance instruments, such as *zakat* and *sadaqah*, to absorb yield and market risks without eroding the underlying endowment corpus.

6. Limitations of the Study

This study is subject to several methodological and empirical limitations. First, the expert panel comprised six informants (two academics, two practitioners, and two policymakers), which represents a relatively small sample for both the ANP pairwise comparisons and the IFAS/EFAS factor weighting and rating processes. Although this panel size aligns with standard ANP methodology—where the depth, domain relevance, and diversity of expert judgement take precedence over statistical sample size (Saaty, 2008)—the findings should be interpreted as reflecting the informed judgements of this specific panel rather than a statistically generalisable view of the broader stakeholder population. Second, the same six experts provided both the

qualitative interview data (Stage 1) and the quantitative pairwise comparison evaluations (Stage 2). While this dual participation strengthens internal consistency across the qualitative and quantitative analytical stages, it also means that the two data sources are not fully independent, thereby introducing a potential risk of common-source bias.

Third, the expert panel did not include smallholder farmers, who constitute the primary intended beneficiaries of the proposed *waqf*-based funding framework. While the panel's institutional and technical expertise is well suited to identifying and prioritising macro-structural constraints, farmers' direct perceptions regarding the operational practicality, socio-cultural acceptability, and alignment of the framework with field realities were not empirically captured. Consequently, the on-the-ground feasibility of the model—particularly smallholders' willingness to adopt *salam* and *muzara'ah* contractual arrangements—requires further empirical validation.

To build upon this study, future research should extend the proposed analytical framework by engaging a larger and more geographically diverse expert panel across different provinces in Indonesia. Furthermore, subsequent empirical studies should incorporate direct farmer-level assessments to evaluate contractual acceptability and triangulate the findings with an independent respondent group to assess the robustness of the priority weights reported in this study.

7. Conclusion and Recommendations

This study demonstrates that the socio-economic and financing challenges facing West Java's agricultural sector are systemic and highly interdependent, spanning structural, market, and capability dimensions. The ANP empirical results identify unproductive *waqf* land, reliance on informal intermediaries, and limited technological support as the primary individual constraints. These findings indicate that while land underutilisation and market distortions represent the most binding structural bottlenecks, capability deficits function as enabling constraints that impede productivity and technology adoption. Crucially, the network analysis reveals that these barriers operate interdependently, underscoring that effective intervention requires a unified, system-level strategy rather than isolated, piecemeal measures. Building on these empirical priorities, the study develops a structured *waqf*-based agricultural funding framework that operationalises *salam* (forward purchase) and *muzara'ah* (sharecropping) contracts as core mechanisms. The model positions *waqf* not merely as a passive source of non-debt capital but as an active institutional platform that coordinates land, capital, technical expertise, and market access. By providing upfront working capital through *salam*, enabling productive land utilisation through *muzara'ah*, and enhancing institutional governance through *nazhir* organisations and financial intermediaries, the framework directly addresses the priority constraints identified under RO1. Consequently, the proposed model offers an empirically grounded and potentially scalable approach to improving productivity, reducing smallholders' dependence on intermediary credit, and enhancing overall value-chain efficiency.

To support broader implementation across Indonesia, the study formulates strategic recommendations using a hybrid ANP–SWOT evaluation. The IFAS–EFAS results position the agricultural *waqf* ecosystem in the Strength–Threat (ST) quadrant, indicating that strategic priorities should focus on deploying internal institutional strengths to mitigate external risks. Accordingly, the core strategic orientation emphasises systemic resilience by optimising *waqf*-based contractual mechanisms and strengthening *waqf*–*zakat* synergies, complemented by selective growth (SO), targeted capacity enhancement (WO), and defensive governance (WT) measures. By anchoring these recommendations in empirical ANP weights and expert validation, the study provides a robust analytical foundation for policy formulation. However, because the empirical scope is centred on West Java and based on a focused expert panel, national-level scalability should be treated as a strategic proposition requiring further empirical validation across diverse regional and institutional contexts in Indonesia. Finally, based on the conclusions outlined above, the strategic recommendations are presented as follows:

Table 5. Strategic Recommendations

Dimension	Strategic Focus	Key Actions	Link to ROI Findings	Expected Impact	Implementation Risk / Barrier
Policy	Regulatory support for waqf agriculture	Develop national guidelines for productive waqf in agriculture; integrate waqf into agricultural and rural development policies	Addresses institutional gaps and weak coordination	Improved policy alignment and nationwide scalability	Slow inter-ministerial coordination; absence of DSN-MUI fatwa specific to waqf-based <i>salam-muzara'ah</i>
Institution	Strengthening <i>nazhir</i> capacity	Professionalise waqf management; establish partnerships with Islamic financial institutions, cooperatives, and zakat bodies	Responds to lack of support and expertise	Enhanced governance and implementation effectiveness	Uneven <i>nazhir</i> capacity across regions; limited independent oversight
Finance	Expansion of waqf-based funding mechanisms	Scale up cash waqf mobilisation; implement <i>salam</i> and <i>muzara'ah</i> contracts; create blended finance models	Targets capital constraints and middlemen dependency	Increased access to funding and reduced financial vulnerability	Tension between waqf principal preservation and <i>salam</i> 's upfront capital needs
Technology	Enhancing agricultural capabilities	Provide training, digital agriculture tools, and extension services; integrate smart farming technologies	Addresses lack of technological support	Higher productivity and improved efficiency	High upfront training cost; limited digital infrastructure in rural areas
Market	Market integration and access	Develop direct-to-market platforms; strengthen farmer cooperatives; connect farmers with off-takers	Reduces reliance on middlemen and market uncertainty	Fairer pricing and improved market stability	Resistance from existing middlemen networks; cooperative formation takes time

8. Theoretical, Practical, and Policy Implications

This study contributes across three key domains. Theoretically, it advances the Islamic social finance literature by demonstrating an integrative framework that combines empirically derived ANP prioritisation with SWOT-based strategic formulation through IFAS–EFAS matrices. This extends prior conceptual research on *salam-muzara'ah*–

linked *waqf* models (e.g., Majid, 2021) into an empirically weighted decision framework. Methodologically, it addresses theoretical fragmentation by integrating *Maqasid al-Shariah*, Agribusiness Systems Theory, Imperfect Market Theory, and Behavioural Economics within a single analytical model of agricultural *waqf*. Practically, the findings offer actionable operational guidance for *waqf* institutions (*nazhir*), such as Dompot Dhuafa and the Indonesian Waqf Board (BWI). Specifically, the findings provide a structured basis for organising *salam*-based upfront liquidity disbursements and *muzara'ah*-based land utilisation while prioritising capacity-building investments in areas with potentially greater structural impact, including digital technology adoption, contract literacy, and agricultural extension services.

At the policy level, the results outline strategic priorities for national and regional stakeholders, including bodies such as Bappeda. Key recommendations include integrating productive *waqf* into regional development plans, addressing regulatory ambiguities surrounding the application of *salam-muzara'ah* arrangements through appropriate DSN–MUI *fatwa* guidance, and formalising multi-institutional collaboration across *waqf*, *zakat*, and Islamic financial institutions. Building on these contributions and acknowledging the limitations outlined in Section 6, future research should empirically validate the operational feasibility and socio-cultural acceptability of the framework through direct field-based assessments with smallholder farmer beneficiaries. Further research should also examine the model's applicability and scalability across diverse agricultural regions within Indonesia, as well as in other Islamic finance jurisdictions, such as Malaysia. In addition, longitudinal assessments should be conducted to evaluate long-term socio-economic outcomes once the framework is operationalised.

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