Global Review of Islamic Economics and Business, Vol. 13, No. 1 (2025) 1-19
Published by Faculty of Islamic Economics and Business, State Islamic University Sunan Kalijaga Yogyakarta
e-ISSN: 2338-7920, p-ISSN: 2338-2619

Examining the Significant Factors Inhibiting Agricultural Sector Growth during COVID-19 Pandemic in Indonesia

Dimas Bagus Wiranatakusuma [a] Rafif Fairuztama [a] , Jumadil Saputra [b]
[a] *Universitas Muhammadiyah Yogyakarta*
[b] *Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia*

Keywords:
Agriculture growth, Islamic bank, Multiple Regression, Macroeconomic, Indonesia.

JEL Classification: O1; I38; Z30

Article History:
Received: 10 June, 2023
Revised: 19 February 2025
Accepted: 21 February 2025
Published: 15 March 2025

Citation:
Wiranatakususma, D.B., Fairuztama, R., & Saputra. J. (2025). *Examining the Significant Factors Inhibiting Agricultural Sector Growth during COVID-19 Pandemic in Indonesia. Global Review of Islamic Economics and Business, 13* (1), 1-19. https://doi.org/10.14421/grieb.2025.131-01

Abstract: The agricultural sector has emerged as a critical economic pillar in Indonesia. Limited research has been conducted on Indonesia's agricultural development. However, there exists a body of literature that thoroughly integrates the agricultural sector with banking and the macroeconomic environment, especially in the context of the period preceding and during the covid-19 pandemic. This study seeks to explore various factors that hinder the growth of the agricultural sector by examining specific banking and macroeconomic variables. This research employs quarterly data from 2010 to 2024 and analyzes it utilizing a multiple regression methodology. In pursuit of this objective, the analysis incorporates the growth of agriculture's GDP share relative to total GDP, the financing of agriculture alongside total time deposits in Islamic banks, the margin of Islamic banks within the agricultural sector, the relationship between agriculture's financing and GDP, as well as considerations of inflation and food prices. Empirical evidence indicates that only financial deepening (GCPGDPP) and banking intermediation (GFinPDT) have a significant impact on agricultural growth (GGDPRGDPT). An increase in financial deepening adversely affects growth. This discovery suggests that the agricultural sector in Indonesia requires enhancements in productivity, necessitating the advancement of professional managerial skills and the adoption of technology among farmers. Furthermore, considering the considerable influence of banking intermediation on agricultural growth, it is essential that financial deepening is aligned with entrepreneurial skills capable of producing high-value-added products. The study presents a significant contribution to the growth of the agricultural sector in Indonesia by highlighting the importance of enhancing banking sector financing alongside the development of improved professional managerial skills within the agricultural industry.

*Corresponding author.
dimas_kusuma@umy.ac.id (Wiranatakusuma, Dimas Bagus)
https://doi.org/10.14421/grieb.2025.131-01

Introduction

The agricultural sector has emerged as a crucial economic pillar in Indonesia. The agriculture sector is crucial in labor force absorption, employment for small families, and essential food production. Indonesia's Statistical Central Board (BPS) reported that economic growth in the first quarter 2022 engaged 4.55 million jobs. Agriculture, industry, and commerce are the three sectors employing the highest number of individuals, with 1.86 million, 850,000, and 640,000 workers, respectively. In Indonesia, merely 8% of young farmers are aged between 20 and 39, representing 2.7 million individuals managing 7,463,948 hectares of uncultivated rice fields. This state presents a significant challenge, especially for advancing sustainable agricultural development.

Another difficulty confronting the agricultural sector is maintaining price stability, as it impacts the need for funding in the banking sector. The instability is chiefly attributed to uncontrollable external shocks, such as natural disasters, climate change, and the COVID-19 pandemic, which are inherently unpredictable. Dethier et al. (2012) assert that economists and policymakers have failed to discover effective policy instruments to mitigate food price volatility; thus, macroeconomic strategies are necessary to stabilize prices in national markets. Social safety nets, designed to aid the impoverished in managing economic shocks, can alleviate negative impacts and avert households from descending into chronic poverty; nonetheless, they necessitate efficient targeting mechanisms and a solid institutional framework. Due to increased monetary costs, inflation variability in Indonesia may adversely impact the agriculture sector by diminishing farmers' incomes and capacity for financing.

The majority of farmers in Indonesia are small-scale and traditional. Small and marginal farmers cannot typically accumulate adequate money for fixed capital investment. Consequently, they must depend on institutional finance for investments in land expansion, minor irrigation, agricultural implements and machinery, ancillary operations, and the acquisition of agricultural commodities. Moreover, the diverse financial circumstances of farmers would influence the margin (MARGIN) level due to varying degrees of risk exposure. Thus, the margin would influence credit distribution, ultimately improving finance access for small and marginal farmers (Samal, 2002). The margin rate typically elevates financing demand since it signifies a diminished income level within the agricultural industry. This circumstance may diminish the need for funding among Indonesian farmers. Kocturk et al. (2013) assert that the loan requirements for farmers affect banks' inclination to lend to the agricultural industry.

Concerning capital formation, De Roy (2017) identified that a reduction in agricultural capital formation, insufficient investment in irrigation and extension services in rural regions, and a scarcity of affordable institutional credit led to a deceleration in agricultural growth and heightened livelihood insecurity for a substantial segment of the agricultural population. Consequently, the precarious condition in the agricultural sector will impact the ratio of financing to gross domestic product (GDP) formation, which will likely decline. The agricultural sector's productivity appears to be gradually declining, potentially attributable to climate change and internal management challenges.

Magazzino et al. (2021) found that the impact of loan access is more pronounced in industrialized countries and less so in nations with lower economic development levels. Our work elucidates the distinct benefits of credit in fostering the growth of the agricultural sector, especially in developing nations. The availability of financial access would substantially influence production, but it would mostly affect productivity in industrialized nations. Consequently, banking intermediation is a crucial element in enhancing production within the agricultural sector by facilitating accessible finance. The rising trend of proportional increase between financing and funding in Islamic banks for the agricultural sector is significant, reflecting a heightened commitment by banks to foster the development of this sector.

Hayat et al. (2019) noted that institutional credit is essential for attaining agricultural prosperity in the country. Agro-based industries, livestock, automated inputs, and agricultural exports positively influence agricultural expansion and, consequently, the GDP growth of the economy. The nation's economy will expand due to the advancement of the agricultural sector. Increased access to finance in the agricultural sector will lead to a rise in the country's GDP, hence facilitating economic growth (Hartarska et al., 2015). The trend of GDP growth concerning total GDP (GGDPRGDPT) in Indonesia seems to be a pertinent indicator for assessing the agriculture sector's contribution to economic growth.

Notably, the agriculture sector's contribution to the economy is minimal and necessitates additional examination.

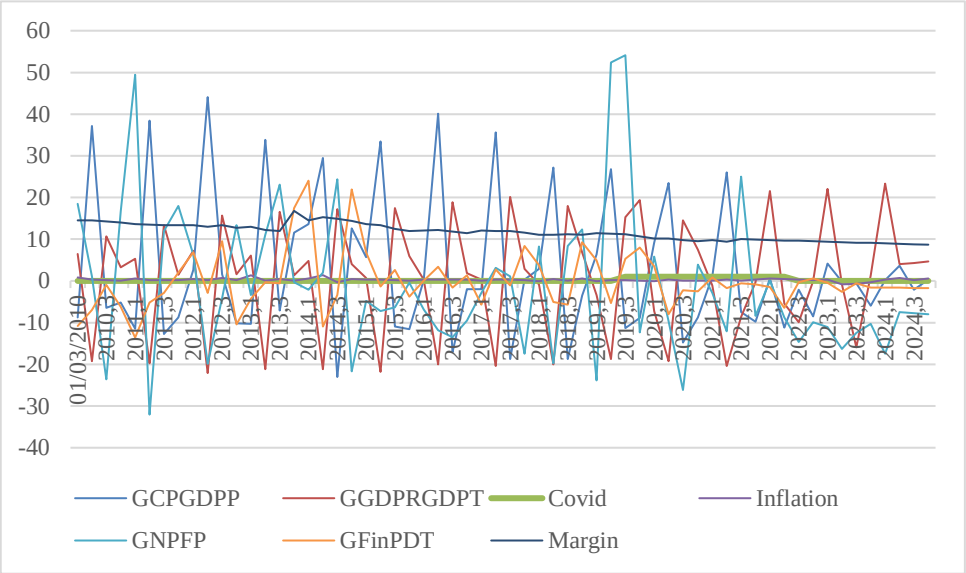

Figure 1. Dynamics of various economic indicators from 2010 to 2024
Source : *Otoritas jasa keuangan & Badan Pusat Statistik, 2024*

Figure 1 depicts the fluctuations of multiple economic indices from 2010 to 2024, highlighting substantial alterations in macroeconomic factors. The financing ratio to GDP formation (GCPGDPP) has significant volatility characterized by pronounced oscillations, particularly before 2020, with a marked peak in 2019. In the meantime, GDP growth concerning total GDP (GGDPPRGDPT) has a more consistent fluctuation pattern than GCPGDPP. The Covid indicator exhibits a more subdued trend, potentially indicating the effects of the pandemic in 2020. Inflation has been steady, suggesting that monetary policies have effectively managed price levels. Conversely, non-performance financing in agriculture (GNPFP) exhibits considerable volatility with an erratic pattern, whereas the proportionate increase between financing and funding (GFinPDT) reveals a more stable trend with mild variations. Margin, while typically more steady, nonetheless experiences significant fluctuations. The significant volatility noted before 2020 diminishes post-pandemic, indicating external influences on multiple economic variables. The significant increases in 2019-2020 presumably indicate substantial changes from the epidemic or specific economic strategies.

An examination of these figures indicates that growth in the agriculture sector has exhibited a downward trajectory, notwithstanding the comparatively stable inflation rate. Despite constant inflation, non-performing financing (NPF) in the agriculture sector has decreased, suggesting potential enhancements in credit risk management. Nonetheless, financial deepening in agriculture has declined, indicating that access to credit and investment in the industry may not have sufficiently increased to facilitate enhanced growth. Despite these constraints, support from Islamic banks seems to rise, as evidenced by the proportional growth of agricultural financing relative to total time deposits. This development indicates that Islamic banking institutions are essential in closing the financing gap in the agriculture sector. Nevertheless, other challenges persist, especially with loan accessibility for smallholder farmers. Numerous sources indicate that farmers' challenge in obtaining bank financing is a primary obstacle to agricultural expansion. A more significant proportion of intermediation funds is anticipated to improve access to financing; nonetheless, numerous marginal farmers continue to face challenges due to inadequate managerial competence, insufficient collateral, and an elevated risk profile.

The COVID-19 pandemic has profoundly influenced worldwide agricultural growth, impacting multiple facets of agricultural systems, including output, marketing, and input supply. In the United States, agricultural output decreased by 1.18% to 7.14% across counties, with small-scale, non-white, and female-operated farms being the most susceptible (Haqiqi and Horeh, 2021). In India, logistical

challenges and personnel shortages hindered production and marketing, resulting in elevated food prices and modified consumption patterns (Cariappa et al., 2021). In Burkina Faso, diminished access to markets and transportation resulted in heightened post-harvest losses and diminished agricultural income (Middendorf, et al., 2022). The pandemic profoundly impacted all livelihood assets in Bangladesh, encompassing financial, social, and environmental resources (Salma et al., 2024). Nevertheless, there are times when the agricultural industry has demonstrated resilience and even positive growth. Notwithstanding the interruptions induced by COVID-19, the Indian agricultural sector exhibited resilience. The sole sector exhibited positive growth, achieving a 3.4% increase in the first quarter of the financial year 2020-21. This expansion is ascribed to the sector's intrinsic resilience and the government's execution of strategic initiatives (Cariappa et al., 2021). The Indian government implemented numerous reforms and assistance initiatives to alleviate the effects of the pandemic. These encompassed social safety nets, family farming projects, and phased procurement methods.

Thus, a definitive agreement on the principal obstacles impeding agricultural sector expansion is lacking, especially in Indonesia, where structural and financial difficulties endure. The economic disturbances induced by the Covid-19 pandemic have intensified these challenges, necessitating an analysis of the interaction between banking, macroeconomic conditions, and external adverse shocks (COVID) in influencing agricultural sector growth. This study examines the impediments to agricultural sector expansion in Indonesia, explicitly emphasizing the influence of Islamic bank funding, macroeconomic stability, and pandemic-related disruptions. This research aims to identify the primary restrictions on agricultural growth, particularly during crises, to offer vital insights for policymakers and financial institutions in formulating more effective ways to promote sustainable agricultural development in Indonesia.

Literature Review and Hypothesis Development

Previous Studies

Several studies (Aggarwal et al., 2000; Brooks & Gardner, 2004; Carvalho, 1991; Elhiraika, 1996; Samal, 2002) indicate that bank lending is a crucial element in promoting the growth of the agricultural sector. Moreover, stable inflation and increased agricultural production seem to be the macroeconomic factors facilitating agricultural expansion (Alexandratos, 1999). Education, information, and empowerment initiatives provided by the government and financial sector are crucial in ensuring agricultural growth (Reardon et al., 1997; Singh, 2000). Nevertheless, limited research investigates the impacts of macroeconomic factors, financial assistance, and pandemic-related shocks on agricultural growth within a singular analysis, especially in Indonesia.

Carvalho (1991) noted that the agricultural industry has grown more swiftly than the industrial sector, especially in developing nations, due to its labor-intensive characteristics. Elhiraika (1996) found that agrarian finance institutions provide superior returns compared to non-agricultural loans, notwithstanding the yield and price volatility associated with agricultural production. Reardon et al. (1997) identified multiple strategies for enhancing agricultural sectors: (1) augmenting access to inputs and decreasing their unit costs for farmers via infrastructure investment; (2) boosting the efficacy of fertilizers and enhanced seeds by promoting complementary investments at the farm level; (3) refining the coordination of input and output marketing systems and enhancing incentives for private sector participation; and (4) empowering farmers to procure inputs at competitive prices. Alexandratos (1999) posits that agricultural growth is the fundamental initial step towards comprehensive development, alleviation of poverty and food insecurity, and ultimate autonomy from excessive economic dependency on inadequate agricultural productivity. Singh (2000) asserted that agricultural productivity is predominantly influenced by the extent of technology adoption, which is significantly affected by the education of individuals and society. This relationship is facilitated by the alignment of information sources and quality, particularly within the rural agricultural graduate community, thereby enhancing technology's effectiveness, reliability, and quality.

Aggarwal (2000) identified that the most suitable financial instruments for banks, particularly Islamic banks, functioning in contexts marked by agency issues and incomplete contracts, are a collection of financial derivatives. Samal (2002) discovered that small and marginal farmers could not save for fixed capital creation, thus depending on institutional finance for investments in land

expansion, minor irrigation, agricultural tools and machinery, ancillary operations, and the acquisition of agricultural supplies. Brooks & Gardner (2004) asserted that credit market limits are widely recognized, potentially accounting for a segment of the observable underutilization of acquired inputs. Farmers in Russia are generally impoverished, necessitating credit to get both purchased supplies like fertilizer and capital goods. Subsidized credit has been intermittently allocated to agricultural firms (formerly collective farms). To ensure that borrowers may consistently secure commercial credit at equitable actual interest rates, lenders require guarantees against default. In the Russian setting, utilizing people's shares in their previous collective farms as collateral would be most effective.

Kumar & Singh (2007) found that the influence of agricultural cooperative financing on agricultural inputs, land enhancement, productivity, and marketing across different holding groups is crucial for assessing credit use. The correlation coefficient between agricultural inputs and production levels demonstrates a positive link but is restricted to marginal farmers. Kumar & Singh (2007) delineate the significance of agriculture to the economy in three aspects: firstly, it supplies consumers with food and fibers for domestic industries; secondly, it generates essential foreign exchange profits; and thirdly, it creates a market for industrial goods. The study examines the premise that numerous public sector credit institutions are poorly managed and cannot fulfill the requirements of farmers and rural households. As a result, farmers depend more on non-institutional credit networks than institutional credit systems. The elevated markup rates and stringent terms imposed by noninstitutional sources perpetuate the cycle of poverty, engender forced labor, diminish the socioeconomic liberties and investment potential of growers, and condemn subsequent generations to perpetual debt.

Utama et al. (2019) identify several critical loan delivery and demand parameters. Initially, employing the 7 Cs as a framework effectively distinguished the various institutional and cultural aspects affecting rural lending in China. In the section titled "Character," the authors examine the cultural traits of Chinese farmers regarding informal lending and borrowing; in "Capacity," they address the difficulties of providing credit to resource-constrained farms; in "Condition," they explore group guarantees, creditworthy villages, credit rationing, insurance, and incomplete markets; and in "Capability," they analyze income inequality and the challenges associated with economies of scale.

According to Rada & Buccola (2012), financing, education, and road construction policies mitigate this disparity. Credit and infrastructure initiatives enhance efficiency in the South, where productivity losses have been most pronounced. Dethier & Effenberger (2012) determined that economists should prioritize critical concerns in agricultural development, including property rights, agricultural extension, rural infrastructure, and food price stabilization. The current priority is enhancing food security and developing efficient coping strategies for the impoverished. Economists and policymakers have failed to discover effective policy instruments to regulate food price volatility. Macroeconomic strategies for stabilizing prices in national markets are unpromising. Social safety nets, designed to aid the impoverished in managing income shocks, possess the capacity to alleviate negative impacts and avert households from descending into chronic poverty; nonetheless, they necessitate efficient targeting mechanisms and a solid institutional framework. Beggar-thy-neighbour trade policies intended to stabilize prices and guarantee national food security have been counterproductive, adversely affecting underprivileged populations and negating previous advancements. Enhancing agricultural productivity is the most effective means of safeguarding small farmers against income fluctuations; nonetheless, it presents the most formidable challenge from both scientific and institutional perspectives.

Mijiyawa (2013) asserts that the growth determinants have either marginally declined or stayed stable. Growth regression results for 1995–2005 demonstrate a substantial correlation between investment, private sector credit access, government effectiveness, exports, and agricultural value-added to GDP ratio with economic growth. Kocturk et al. (2013) identify multiple aspects that affect farmers' banking preferences, including reliability, service quality, loan conditions, loan expenses, accessibility, and personal credibility. The results indicated that farmers' choices of banks were affected by the banks' reliability and availability. Farmers who preferred private sector banks for agricultural loans perceived higher levels of reliability and accessibility compared to those who favored public banks. Farmers saw local capital banks as more reliable, offering superior service quality, advantageous loan terms, and reduced loan costs compared to foreign capital banks. Farmers who disapproved of Islamic banking procedures cited diminished service quality and reliability. The study's findings indicate that banks had to enhance their trustworthiness and accessibility to attract and retain clientele.

Foreign capital banks should lower their lending costs and improve their loan conditions, reliability, and service quality to persuade farmers to use their services. Islamic banks must improve the caliber of their client care and augment their reliability.

According to Rada & Buccola (2012), the yearly growth rate of total institutional credit for agricultural and allied businesses was markedly greater throughout the reform than in the pre-reform period. Throughout the reform regime, the average institutional credit per hectare and its contribution to agricultural GDP have risen markedly. The growth patterns of production and investment credits displayed a "U-shaped" trajectory. It indicates that a significant portion of the rise in institutional credit for agriculture and other businesses during the reform era may be ascribed to the banking sector changes enacted in the early 1990s. Asafu's (2014) modeling results suggest that Africa will experience the most significant economic growth drop and welfare losses due to climate change. Concerted adaptation efforts are necessary, encompassing the introduction of temperature-sensitive varieties, diversification of production systems and livelihoods, transition to sustainable agricultural intensification, adoption of irrigation agriculture, and the resolution of institutional challenges such as insufficient physical and social infrastructure, market imperfections, limited access to credit, and absence of crop insurance. A sustained focus should be directed at transitioning from agriculture to industry and services.

Hartarska et al. (2015) identify a positive correlation between agricultural lending and agricultural GDP growth per rural inhabitant, noting that an additional billion in loans (approximately one-third of the actual average) correlates with a 7-10% increase in state growth rate, with this correlation being more pronounced during the 1990s. Agricultural producers must have financial resources. It can be achieved either through Islamic banks, as Islamic banking and finance are the primary focus of Islamic economics discourse, which offers particular financing plans for farmers, or by creating Islamic trusts (waqf) specifically intended for this purpose. Utilizing waqf as a potential mechanism for activating dormant agricultural land necessitates emphasizing two primary aspects: firstly, the endowment of waqf to mitigate the issue of idle land, and secondly, the management of waqf for agricultural advancement. Saqib et al. (2015) assert that riba-free finance is crucial for impoverished Muslim farmers who cannot utilize interest-based financing due to the prohibition of riba. The research indicates that the Qard Hassan (benevolent loan) instrument is feasible for addressing this demand and benefits farmers and Islamic banks or financial organizations.

De Roy (2017) contended that economic liberalization would lead to a beneficial alteration in trade for agriculture in India, enabling producers to reinvest excess from cultivation to enhance long-term land improvements and augment agricultural output and growth. Unexpectedly, the reform phase did not yield any noticeable enhancement in the agricultural terms of trade. The decline in agricultural capital formation, insufficient investment in irrigation and extension services in rural regions, and a lack of affordable institutional credit have resulted in a deceleration of agricultural growth and heightened livelihood insecurity for many individuals reliant on agriculture. Pramudya et al. (2017) contended that evolving roles illustrate Indonesia's persistent priorities of attaining economic growth via palm oil expansion, with some consideration for social fairness and only recently for environmental sustainability. Saqib (2014) found that most farmers are from lower social groups, particularly in emerging and underdeveloped countries. This circumstance disadvantaged them considerably in all facets of life, including their agricultural pursuits. They continually have difficulties fulfilling their agricultural requirements for crop and non-crop operations, which is hindering their ability to optimize returns on their efforts. Pakistani farmers, as inhabitants of a developing nation, encounter similar challenges. Consequently, as Muslims, they ought to refrain from acquiring interest-bearing loans from financial entities. The Islamic financial system provides alternatives to interest-based agreements through various funding options. Among these, Istisna' (manufacturing) is the most prominent and can be utilized efficiently to address diverse agricultural requirements. Nonetheless, its significance is more pronounced in fulfilling non-crop agricultural endeavors, including manufacturing heavy agricultural machinery and equipment, installing tube wells and irrigation channels, and constructing modest residences for farmers on their properties.

Pramudya (2017) concludes that various variables positively influence agricultural diversification, including the gross added value of agriculture, average total household income, and the economically active population. Conversely, the total gross added value of each province, education level, unemployment rate, and credit volume exerts a negative impact. Wang (2018) indicated that farmers

encounter various financing limitations attributable to their differing productivity levels, which may intensify internal income disparity. Our research substantiates that rural inhabitants encounter credit limitations overall and that there are notable stratified disparities in the impact of agricultural credit on farmer income. Farmers with higher incomes are more inclined to secure bank credit and augment their income, whereas those with lower incomes are more susceptible to a "vicious cycle of poverty" resulting from their incapacity to amass capital. Enhancing access to financing is imperative to foster a more equal and sustained rise in farmers' earnings. Moreover, promoting healthy competition among county financial institutions and accelerating the establishment of inclusive financial systems is crucial. It can ultimately foster the sustainable development of agricultural and rural economies.

Gökçekus et al. (2019) contended that the agricultural sector is an integral component of the economy that cannot be underestimated, considering the significance of agricultural output to economic activity in Nigeria. The nation's economy is expanding due to the advancement of agriculture. Access to financing for the agricultural industry will enhance the country's GDP, leading to economic growth. Hayat (2019) illustrated that institutional credit significantly contributes to the nation's agricultural development. The model's additional variables, including agro-based industries, livestock, automated inputs, and agricultural exports, positively influence agricultural growth and, consequently, the GDP growth of the economy. To attain the paramount goal of agricultural advancement in Pakistan, the government must increase funding for institutional credit, foster agro-based industries and the adoption of modern technology in agriculture, offer advanced methodologies to livestock farmers, and enhance agricultural exports to generate foreign exchange earnings. Anwar (2019) contended that the Salam contract was specifically designed to meet the needs of the fishing community, aiming to emancipate it from the constraints imposed by moneylenders and wholesalers, involving Islamic microfinance institutions (MFIs), farmers, fishers, buyers, Islamic banks, and Islamic insurance as participants. Agriculturalists and fishers might establish a community to support each other with financial requirements. This community is administered by Islamic microfinance institutions that partner with fisheries and agricultural enterprises, with an integrated contract application system known as Salam for Islamic microfinance institutions.

Utama et al. (2019) found that Islamic banking distributes under 10 percent of overall credit to the agriculture sector. The outcome aligns with the farmer's dilemma. The interview indicates that the principal challenge confronting the agriculture sector is limited access to financial resources. The second result pertains to the absence of Islamic banking's involvement in agricultural finance, attributed to a perception of elevated risk and insufficient skilled personnel to manage agricultural financing. Mamatzakis (2020) found that agricultural income has declined due to adverse impacts on direct payments and solvency. Our data do not corroborate the premise that an escalation in direct payments would increase agricultural income. Furthermore, solvency adversely affects agricultural revenue, whereas investment positively influences agricultural income. Ahmed and Fida (2020) illustrated that operational expenses, profitability, and risk mitigation techniques are the primary considerations for banks while funding the agricultural industry through Bay' Salam.

Onyiriuba et al. (2020) contended that the government should customize its financial policies to enhance agricultural production as a strategy for ensuring food security. It must tackle lenders' risk aversion and the inadequacy of credit guarantees, subsidies, and agricultural budget allocations. It will guarantee the lenders' dedication to agriculture and bolster agricultural insurance. A robust direct association exists between agricultural development and increased farm productivity and production. The rural population's dependence on land for subsistence is substantial throughout nearly all states, with few regional discrepancies; nevertheless, agricultural development shows significant regional heterogeneity, leading to a minimal correlation between the two. Filianti et al. (2020) established that financing factors within the agricultural, forestry, and agricultural facilities sectors, trade, restaurants, and hotels strongly negatively influence non-performing financing. Rajagukguk (2021) contended that elevated economic growth correlated with increased total agricultural credit, a larger workforce in agriculture, forestry, and fishery, augmented agricultural functional expenditure, a higher percentage of households with access to safe water, and an improved literacy rate among the 15-year-old demographic. Bulut & Celik (2022) contended that age, educational attainment, income level, non-agricultural income, savings capacity, tenure in agriculture, land area, and geographical region strongly correlate with farmers' inclination to utilize Islamic banks. The level of knowledge, the impression of

religious conformity, saving capacity, and cost concerns are statistically important factors influencing the chance of utilizing Islamic banks.

Kantoroeva & Toktomamatova (2021) discovered that examining the proportion of gross value added in the Gross Domestic Product of agricultural entities indicated a decline in agriculture's share within the Kyrgyz Republic. Furthermore, there is a marginal enhancement in the lending procedures of commercial banks and credit institutions. Yazid et al. (2021) revealed that the agriculture sector was regarded as highly risky, leading to diminished funding commitments from financial institutions. The outcomes of credit schemes employing the interest system are inadequate. As a result, this may lead to additional problems, including heightened debt and deteriorating credit among farmers. The research suggests that Sharia financing can enhance capital within the agricultural sector. Magazzino et al. (2021) contended that. Credit availability is more crucial in Organisation for Economic Co-operation and Development (OECD) countries than in nations with lower economic development levels. The investigation elucidates the distinct consequences of credit on the advancement of the agricultural sector: in developing nations, access to credit significantly influences production, while in developed nations, it additionally impacts productivity.

The COVID-19 pandemic presented considerable obstacles to the worldwide agricultural economy, yet specific regions and industries exhibited resilience and saw positive growth. Strategic governmental initiatives, technical advancements, and focused assistance for at-risk populations were pivotal in maintaining and augmenting agricultural productivity during the epidemic. The Indian government implemented numerous reforms and assistance initiatives to alleviate the effects of the pandemic. These encompassed social safety nets, family farming efforts, and phased procurement processes (Cariappa et al., 2021).

Research Framework

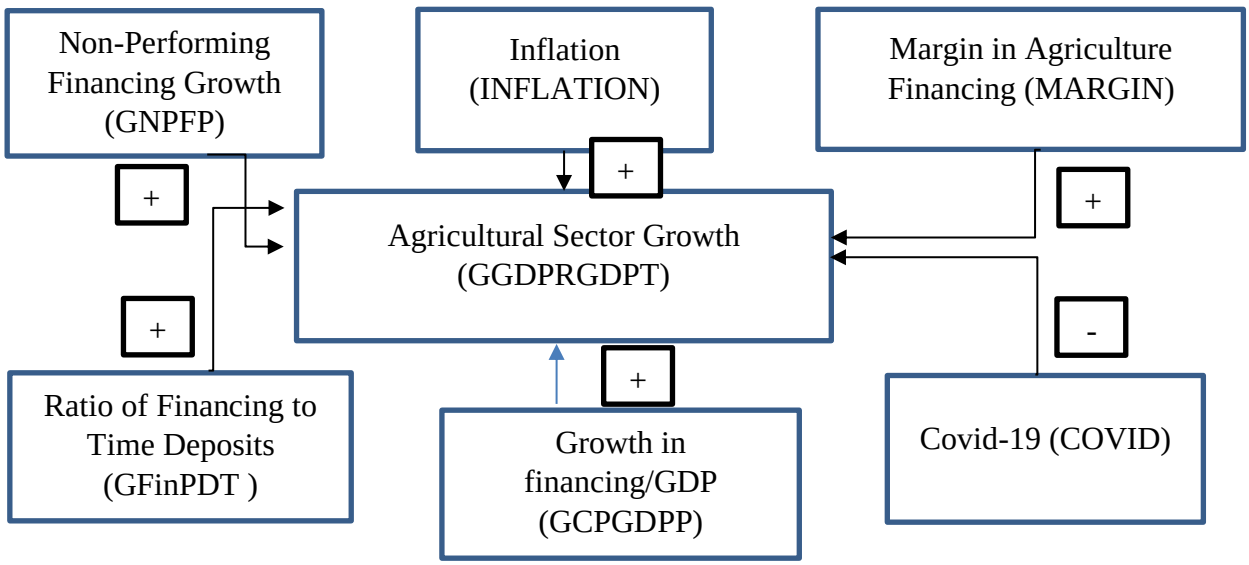

Figure 2: Research Framework

Figure 2 illustrates that the growth of the agricultural sector in Indonesia is theoretically influenced by various indicators, primarily transmitted through Islamic banking, macroeconomic factors, and pandemic-related shocks. Banking conditions are characterized by the rise of non-performing financing (GNPFP), financing margin (MARGIN), financing-to-deposit ratio (GFinPDT), and financial inclusion (GCPGDPP). The inflation rate (INFLATION) indicates the macroeconomic state, while the Covid-19 pandemic (COVID) reflects the pandemic. This article analyzes the critical reasons hindering agricultural sector growth in Indonesia during the COVID-19 pandemic by observing the specified indicators.

Hypothesis Development

This study presents the following hypotheses to ascertain the correlations between the chosen independent factors and the dependent variable:

Hypothesis 1 (H_1): The expansion of Non-Performance Financing in Agriculture (GNPFP) positively and significantly influences the proportional growth of the agricultural sector due to banking assistance and the banking industry's stability. Consequently, despite the heightened risks inherent in the agriculture industry, financial assistance continues to be strong to enhance the sector's productivity and economic contribution to agricultural development. This variable serves as a proxy to assess the presence of banking support for the agricultural sector in Indonesia.

Hypothesis 2 (H_2): The expansion phase of economic cycles results in a positive and considerable impact of inflation (INFLATION) on the proportional growth of the agricultural sector. In the expansion phase of the business cycle, despite rising inflation rates, demand for goods remains robust as purchasing power can mitigate this increase. This condition will continue until the business cycle transitions from the growth phase to the contraction phase. This variable serves as a proxy to illustrate the economic cycle and its correlation with agricultural sector development in Indonesia.

Hypothesis 3 (H_3): Margin in Agriculture Financing (MARGIN) exerts a considerable and beneficial influence on the proportional expansion of agriculture, attributable to enhanced agricultural profitability. Thus, although elevated margins result in increased costs, a positive correlation exists between the financing expenses borne by the banking sector and the returns on agricultural products as profits continue to be generated. This variable signifies the presence of productivity in the agricultural sector, which connects with banking sector activity in Indonesia.

Hypothesis 4 (H_4): An increase in agricultural financing relative to GDP (GCPGDPP) positively and significantly influences the expansion of agriculture's share. It signifies a financial expansion occurring in the agricultural industry. Financial expansion allows farmers to utilize bank funding to enhance their agricultural methods and scales, thus augmenting their income. This variable signifies the financial depth of agriculture via bank financing relative to the gross domestic product in Indonesia.

Hypothesis 5 (H_5): The ratio of finance to time deposits (GFinPDT) exerts a considerable and favorable influence on the proportionate expansion of agriculture. It exists due to banking support and dedication to the advancement of agricultural sector development, as this sector necessitates financial aid to enhance its productivity and output. This variable signifies a banking middleman derived explicitly from long-term funding.

Hypothesis 6 (H_6): COVID-19 (COVID) exerts a negative and considerable influence on the expansion of agricultural percentage. It signifies fundamental economic transformation that limits human mobility and ultimately reduces productivity. This variable signifies an unforeseen external adverse shock significantly impacting agricultural consumption and production.

Research Method

Data

This study analyzes the impact of several variables on the proportionate growth of agriculture (GGDPRGDPT) in Indonesia, utilizing quarterly data from the third quarter of 2010 to the fourth quarter of 2024. The data is sourced from the Statistical Central Board (BPS), Bank Indonesia (BI), and the Covid Centre of the Ministry of Health Indonesia. The data intervals encompass non-pandemic and pandemic periods, whereas this study seeks to examine several business cycle phases to analyze agricultural growth conditions.

Table 1. Definition of Operational Variables

No	Variable(s)	Definition(s)	Unit analysis	Source(s)
1	GGDPRGDPT - dependent variable	Proportion Growth of GDP Share in Agriculture over Total GDP	Percentage	BPS
2	GFinPDT – Independent variable	Proportion of Growth between Financing in Agriculture and Total Time Deposit in Islamic Banks	Percentage	BPS

3	MARGIN – Independent variable	Rate of return provided by Islamic banks in the agriculture sector financing	Percentage	BI
4	GCPGDPP – Independent variable	Growth Proportion between Agriculture Financing and Agriculture GDP	Percentage	BPS
5	INFLATION - Independent variable	Increase of general price of food and beverages in 44 cities in Indonesia	Percentage	BPS
6	GNPFP - independent variable	Growth of Non-Performing Financing in the Agriculture Sector	Percentage	BPS
7	COVID - Independent variable	Binary data (0 and 1) 0 and 1. The binary data represents the period of COVID-19 in Indonesia, where the period of 2010:3 to 2019:4 and 2023:1 to 2024:4 is set to 0 (no pandemic), and the period of 2020:1 to 2022:4 is set to 1 (pandemic)	Binary	Covid Centre

Table 1 presents the chosen operational variables that reflect influences from banking, macroeconomic conditions, and pandemic factors. The Growth Proportion of Agricultural Financing to Total Time Deposits in Islamic Banks (GFinPDT) assesses the growth of agricultural financing relative to time deposits. Accelerated expansion in agricultural finance indicates bank endorsement of the industry, whereas increased deposit growth emphasizes liquidity management or risk mitigation (Ogbuabor & Nwosu, 2017). MARGIN denotes the return rate in agricultural financing, affecting its appeal for funding endeavors. Competitive margins enhance financing demand (Anton et al., 2023) and reflect growth in agricultural productivity. The Growth Proportion between Agricultural Finance and Agricultural GDP (GCPGDPP) assesses the correlation between the growth of agricultural finance and the sector's GDP (Toby & Peterside, 2014). A significant proportion signifies enhanced banking support for developing the agricultural industry. Inflation signifies increasing food and beverage prices throughout 44 Indonesian cities, affecting purchasing power, production expenses, and finance requirements. Elevated inflation heightens credit risk (Ashraf et al., 2024) while simultaneously signaling strong growth in the agricultural sector from the demand perspective. The Growth of Non-Performing Financing in the Agriculture Sector (GNPFP) monitors the escalation of Non-Performing Financing (NPF) within agriculture, signifying an increased credit risk. An increase in NPF indicates an elevated default risk, influencing finance strategies (Olorogun, 2020). The COVID-19 pandemic, induced by SARS-CoV-2, impacted global health, economics, and financial sectors. It hindered economic growth, modified banking policies, and affected agricultural finance due to economic and social upheaval.

Method

Ordinary least squares is the employed approach, accompanied by various classical assumption tests, including multicollinearity, heteroscedasticity, autocorrelation, normality, and linearity tests. The fundamental assumptions of linear regression encompass a linear relationship. Multivariate normality, minimal or absent multicollinearity, lack of autocorrelation, and homoscedasticity. This study used Ordinary Least Squares (OLS) regression due to its simplicity and efficacy in assessing correlations among agricultural development, banking, and macroeconomic factors. Ordinary Least Squares (OLS) is suitable for the quarterly data from 2010 to 2024, as it effectively manage continuous dependent variables and facilitates a clear understanding of coefficient estimates. Furthermore, OLS presupposes linearity, rendering it appropriate for analyzing economic patterns across time.

The model's specifications are as follows:

$$GGDPRGDPT_t = a_0 + a_1GFinPDT_t + a_2MARGIN_t + a_3GGDPRGDPT_t + a_4GCPGDPP_t + a_5INFLATION_t + a_6GNPFP_t + a_7COVID_t + e_t$$

Where:

GGDPRGDPT = Proportional growth (G) of agriculture's Gross Domestic Product (GDPR) share over total GDP (GDPT).

GFinPDT = Proportional Growth (G) between Agriculture Financing (Fin) and Total Time Deposits (PDT) in Islamic Banks
MARGIN = Margin in Agriculture for Islamic Banks
GGDPRGDPT = Proportional Growth (G) of Agriculture's Share of GDP (GDPR) over Total GDP (GDPT)
GCPGDPP = Proportional growth (G) between Agricultural Financing (CP) and Agricultural GDP (GDPP)
INFLATION = Inflation Rate
GNPFP = Growth (G) of Non-Performing Agriculture Financing (NPFP)
COVID = the pandemic covid-19 virus
a0,…7 = estimator
t = time
e = Error Term

Analysis and Discussion

Descriptive Statistic

Table 2 presents the mean (central tendency) and standard deviation (volatility). This description can evaluate the stability and variability of each variable. According to Table 2, GGDPRGDPT, GNPFP, and GFINPDT exhibit significant volatility, signifying economic instability. Concurrently, inflation is stable, indicating a favorable condition for the advancement of the agricultural sector. Furthermore, margins are robust and stable, indicating resilience within the Islamic banking sector. According to the analysis of the mean and standard deviation, the following are significant implications for the development of the agricultural industry in Indonesia: (1) Regarding GGDPRGDPT, fluctuations in economic growth can engender uncertainty in agricultural economic development, as businesses, farmers, and investors encounter difficulties in formulating long-term projections; (2) Concerning INFLATION, stable inflation facilitates predictable costs, which is advantageous for financial management, savings, and fixed-income investments, especially for small farmers who are susceptible to economic volatility; (3) On GFINPDT, financial institutions may experience challenges with efficiency, adversely affecting credit availability and banking stability. Unstable GFINPDT might diminish confidence and credibility in Islamic banking; (4) regarding GCPGDPP, Islamic banks encounter demand swings, complicating income forecasting. Furthermore, households may undergo phases of heightened consumption succeeded by declines; (5) regarding MARGIN, Islamic banking continues to be lucrative despite macroeconomic fluctuations. Stable financial margins signify resilience, facilitating long-term lending; yet, regarding GNPFP, Islamic banking encounters credit risk that impacts its capacity to withstand vulnerabilities and diminishes its ability to provide further finance to the agricultural sector.

Table 2. Descriptive Statistic

Variable	Mean	Std. Dev.	Interpretation
GGDPRGDPT (Proportion Growth of GDP share in Agriculture over Total GDP)	0.804	13.464	Small average growth but high volatility, meaning economic growth fluctuates significantly.
GNPFP (Growth of Non-Performing Financing in the Agriculture Sector)	-0.958	17.756	Negative average growth with very high volatility, suggesting instability in the private sector.
INFLATION (Rate of Inflation)	0.257	0.354	Low average inflation and low volatility indicating stable inflation rates.
GFINPDT (Proportion of Growth between Financing in	-0.028	6.960	Near-zero average growth but high volatility, meaning financial sector productivity fluctuates.

Agriculture and Total Time Deposit in Islamic Banks)			
GCPGDPP (Growth Proportion between Agriculture Financing and Agriculture GDP**)**	3.203	16.995	Positive average growth but with very high fluctuations, showing unstable private consumption patterns.
COVID (Dummy variable for COVID period)	0.200	0.403	Only 20% of the periods correspond to COVID, with a binary nature leading to low variation.
MARGIN (Islamic banks' Margin)	11.699	1.959	High and stable financial margins, as indicated by the relatively low standard deviation.

Source: Eviews (Data Proceed)

Alongside data analysis, Table 3 presents classical assumption tests, including normality, autocorrelation, multicollinearity, and heteroscedasticity. These tests provide certain information, including:

1. In the absence of autocorrelation, residuals exhibit independence. In time series data, consecutive residuals have no association.

No multicollinearity indicates a linear relationship between the independent and dependent variables.

3. Absence of heteroscedasticity indicates that the residual variance remains uniform across all independent variable levels.

4. Normality signifies that the residuals of a model have a normal distribution.

The summary demonstrates that the developed model adheres to the OLS linear regression framework, confirming the estimators' validity. Equation 1 illustrates the estimated model for the estimators represented by C, encompassing the sign (positive or negative). Meanwhile, equation 2 illustrates the signs and values of the estimator for each variable. R2 signifies that the fluctuations of all independent variables may explain 68% of the dependent variable's volatility, while the remaining 32% is attributed to other factors.

Table 3. Classical Assumption Tests Summary

No	Classical Assumption Test	Measurement	Conclusion
1	Autocorrelation	Prob. Chi-Square (1), 0.7912 > 0,10	No Autocorrelation
2	Multicollinearity	Correlation < 0,85	No Multicollinearity
3	Heteroscedasticity	Prob. Chi-Square (26), 0.6435 > 0,10	No Heteroscedasticity
4	Normality	Prob. Jarque – Bera 0,40 > 0,10	Normal

Source: E-Views 7

Estimation Equation:

GGDPRGDPT = C(1)*GNPFP + C(2)*INFLATION + C(3)*GFINPDT + C(4)*GCPGDPP + C(5)*COVID + C(6)*MARGIN + C(7) …….....(1)

Substituted Estimators:

GGDPRGDPT = -0.029*GNPFP + 0.598*INFLATION + 0.438*GFINPDT*** - 0.672*GCPGDPP*** - 1,147*COVID + 0.008*MARGIN – 1.826

Adjusted R^2 0,68……..…….……(2)

***Significant at 1%

** Significant at 5%

*Significant at 10%

Equation 2 illustrates the extent of variations between independent factors and the dependent variable. The results reveal significant numerical data, including:

1. 1% variation in the GFinPDT (Islamic banking intermediation) variable positively influences the GGDPRGDPT (agricultural sector growth) variable by 0.4%.
2. 1% change in the MARGIN variable (rate of return on the agricultural sector) positively influences the GGDPRGDPT variable (agricultural sector growth) by 0.008%.
3. 1% change in the GCPGDPP (agricultural financial inclusion) variable adversely affects the GGDPRGDPT (farm sector growth) variable by 0.6%.
4. 1% increase in the inflation variable favorably impacts the GGDPRGDPT variable, resulting in a 0.5% growth in the agriculture sector.
5. 1% change in the GNPFP (non-performing financing) variable adversely impacts the GGDPRGDPT (agricultural sector growth) variable by 0.02%.
6. 1% COVID (pandemic) change adversely impacts the GGDPRGDPT (agricultural sector growth) variable.

Furthermore, based on equation 2, we may deduce the subsequent link among the variables presented in table 4:

Table 4. Comparing Variables Relationship between Results and Hypothetical Relations

No	Variables	Results Relationship	Hypothetical Relationship	Implication
1	GFinPDT	Positive and Significant	Positive and Significant	As expected
2	MARGIN	Positive and Insignificant	Positive and Significant	Not expected
3	INFLATION	Positive and Insignificant	Positive and Significant	Not expected
4	GCPGDPP	Negative and Significant	Positive and Significant	Not as expected
5	COVID	Negative and insignificant	Negative and Significant	Not as expected
6	GNPFP	Negative and insignificant	Positive and Significant	Not as expected

Source: Eviews 7

Discussion

1. Correlation between the Growth Rate of Non-Performing Financing (GNPFP) and the Growth Rate of Agricultural Gross Domestic Product (GDP) as a Proportion of Total GDP (GGDPRGDPT).

Since banks depend on external finance, GDP per capita is correlated with the banks' sustainability. Consequently, a bank's capacity to create income and profit would be adversely affected if the financing is underperforming or defaults. According to several studies, the strength of the association may be either positive or negative. If the variable is positive and substantial, it suggests that Islamic banks are unconcerned by the rise in non-performing financing (NPF). Consequently, under these circumstances, Islamic banks can withstand potential shocks from increased Non-Performing finance (NPF) while maintaining their commitment to finance the agricultural sector.

Conversely, a negative and substantial sign of the variable suggests that Islamic banks are susceptible to defaults within the agricultural sector, especially regarding financing money. As access to funding emerges as the principal method for farmers to enhance production, a higher NPF reduces their likelihood of seeking more financial support. Consequently, diminished funding resources would impair their operational capabilities to enhance the quality of agricultural products. Equation 2 indicates that the variable possesses a negative coefficient, although it lacks statistical significance. It suggests that while the variable generally exhibits a negative correlation with the dependent variable (agricultural sector development), its impact is not robust nor consistent enough to be deemed statistically significant. The correlation identified in the model may be coincidental or affected by unconsidered variables. The absence of significance may indicate considerable variability in the data or constraints in the sample size. Consequently, more analysis is required, including model modifications, incorporating control variables, or expanding the sample size to achieve more robust and reliable outcomes (Olorogun, 2020). The findings also imply that Islamic banking is susceptible to default rates, which may diminish its

resilience. Scenario-based finance could be established by categorizing farmers into distinct scenarios, such as optimistic, moderate, and pessimistic, as a diversification technique to sustain high funding levels in the agricultural industry while consistently upholding prudential regulation.

2. Correlation between Inflation (INFLATION) and the growth share of Gross Domestic Product (GDP) in agriculture compared to overall GDP growth (GGDPRGDPT).
The inflation rate correlates with customers' purchasing power concerning products and services. A positive and significant inflation rate compared to GGDPRGDPT signifies demand-pull inflation, characterized by robust consumer demand or purchasing power due to an expansionary phase in the business cycle. Meanwhile, if cost-push inflation were negative and substantial, individuals' purchasing power would diminish.

According to the second equation, the variable's sign is positive yet unimportant. The data suggests that inflation exhibits moderate volatility while positively influencing the proportional growth of agricultural GDP and the development of the agricultural sector. As it is categorized as a fundamental necessity, it suggests that consumers will persist in acquiring agricultural items despite escalating inflation. Moreover, the conventional management structure contributes to low output, notwithstanding the favorable impact of inflation on GDP, especially from the demand perspective. It corresponds with the conclusions of Hamidi et al. (2023), which suggest that inflation exerts a marginal beneficial influence on agricultural sector funding; nevertheless, its effect is ultimately negligible due to its inherent volatility.

3. Margin (MARGIN) and the proportionate increase of Gross Domestic Product (GDP) share in agriculture concerning total GDP (GGDPRGDPT).
Margin pertains to the return on financing for agriculture under Islamic banking institutions. It also signifies the capital cost linked to the production level of the agriculture sector. An elevated margin signifies that this industry yields a superior return from a banking perspective, notwithstanding macroeconomic volatility. A positive indicator signifies that agricultural sector productivity has peaked, fostering the industry's expansion. A negative indication signifies that GDP reacts adversely to an increased margin. Multiple factors contribute, including diminished productivity resulting from climate change and the susceptibility of Islamic finance.

In alignment with the findings of Ogunlokun & Liasu (2021), which demonstrate that banking margins influence the agricultural sector, this suggests that although an increase in banking and microfinance margins may enhance financing capacity for agriculture, its effect is contingent upon structural and regulatory factors. In summary, while an expansion of the deposit base and banking margins is expected to enhance the volume of loanable funds, practical impediments such as credit accessibility, elevated interest rates, the risk aversion of financial institutions, and inefficiencies in fund allocation may obstruct the actual effect of banking sector liquidity on agricultural performance. Moreover, these findings confirm that although a positive correlation exists between banking margins and agriculture sector growth, this association lacks statistical significance. It underscores the necessity for more efficacious policies to augment access to agricultural financing, including credit policy reforms, incentives for financial institutions to allocate funds to agriculture, and enhanced efficiency in credit distribution to guarantee that the advantages of financial intermediation are genuinely attained by agricultural stakeholders, alongside the advancement of skill capacity among farmers.

4. Correlation between the proportional growth of agricultural financing and gross domestic product (GCPGDPP) and agriculture's contribution to total GDP (GGDPRGDPT).
GCPGDPP denotes the financial deepening of the agriculture sector in Indonesia. Financial deepening denotes the enhancement of the accessibility of financial services. It may denote an expanded array of services and enhanced access to bank finance for farmers. A positive and substantial sign shows that increased financing in the agriculture sector promotes its expansion. As financing for the agricultural

sector expands, the demand for agricultural products concurrently rises. Conversely, if a negative correlation and importance exist, the financial sector does not facilitate the growth of the agriculture sector, and while agriculture increases, the finance sector remains largely uninvolved in this expansion. The expansion of the agricultural industry is not dependent on financial deepening. It occurs due to unpredictable harvests in the agricultural sector, complicating revenue forecasts for Islamic banks. Farmers may encounter phases of substantial earnings during peak harvesting times, succeeded by declines during suboptimal harvesting periods. These volatile circumstances deter banks from increasing their funding due to risk-averse behavior, which is integral to their prudential and risk management strategies.

The second equation indicates that the sign is substantial and negative. It indicates that the agricultural industry in Indonesia exhibits a contrasting link with the expansion of agricultural products supported by banks. This research indicates that farmers may utilize bank finance inefficiently. This conclusion suggests that the expansion of Indonesia's agricultural industry requires management through the integration of practical managerial skills, such as fintech adoption and the promotion of personal financial education, to stabilize consumer behavior. This data corroborates Murungi et al. (2023), which similarly revealed a substantial negative correlation, suggesting that funding in the agricultural sector adversely affects its growth. As agricultural activities proliferate, farmers create an increased need for financial services, hence fostering the development of the financial sector, yet without enhancing their agricultural enterprise competencies. This finding aligns with the research conducted by Orji et al. (2020), which underscores a substantial and adverse correlation between the agriculture and banking sectors.

5. Correlation between the growth proportion of financing in agriculture and total time deposits in Islamic banks (GFINDT) and the growth percentage of gross domestic product (GDP) share in agriculture relative to total GDP (GGDPRGDPT).

GFINDT denotes the degree of intermediation of deposited funds (time deposits) for financing in the agricultural sector. The good index reflects Islamic banks' dedication to enhancing the financial infrastructure of agriculture. Conversely, the negative sign signifies that a minimal fraction of banks' financing is derived from deposited cash.

The second equation indicates that the variable's sign is important and exhibits a positive relationship. It demonstrates the banking sector's dedication to the provision of financial assistance. Asuquo and Ibiyingibo (2021) assert that robust financial intermediation guarantees that productive sectors, such as agriculture, obtain essential funding. If a financial intermediary dominates the agriculture sector, its proportional GDP growth will rise, underscoring its pivotal role in economic expansion. Kajola et al. (2018) substantiate this by demonstrating that time deposits positively influence agriculture. Augmented-term savings improve financial intermediation, allowing banks to offer sustainable loans, alleviate liquidity restrictions, and promote agricultural productivity. It is especially crucial in underdeveloped nations when farmers have financial obstacles due to elevated risks and insufficient collateral. Enhancing financial intermediation via time deposits can substantially aid GDP expansion if agriculture propels economic growth. It establishes a reinforcing cycle in which the expansion of financial intermediation enhances the agricultural industry. Policies that advocate for time deposits and enhance funding accessibility for farmers can further bolster sustainable agricultural development and resilience.

6. Correlation between COVID-19 (COVID) and the proportional increase of agriculture's contribution to total Gross Domestic Product (GDP) (GGDPRGDPT).

The Covid-19 pandemic has transformed Indonesia's economic framework. This alteration may diminish either agriculture or overall income. From a macroeconomic perspective, COVID-19 may transform business cycles from expansion to contraction or contraction to expansion (procyclical behavior). A positive variable suggests that COVID-19 does not adversely affect the agriculture sector,

which continues to function correctly or demonstrates resilience. A negative indicator signifies that COVID-19 adversely affected the agricultural sector or its vulnerability status.

Notwithstanding these obstacles, the overall impact on agricultural performance is statistically small, as demonstrated by Equation 2. It may be ascribed to various sources, including governmental involvement via stimulus packages, agricultural subsidies, and food stock stability initiatives that alleviated significant disturbances. Moreover, local production may have modified in response to changing market demands, with farmers altering their production and distribution tactics to mitigate losses. The brief use of specific restrictive measures in select places may have mitigated extended adverse impacts on the sector. These findings correspond with Hermawan et al. (2021), who noted analogous tendencies, indicating that despite disturbances in the agricultural sector, its resilience and adaptive capabilities helped mitigate the statistical significance of the adverse effects.

Conclusion

The ratio of agricultural GDP to overall GDP indicates that the agriculture sector continues to undergo periodic swings. This fluctuation will be affected by the agricultural sector's resilience to various shocks, including internal factors like managerial and banking support, as well as external conditions such as macroeconomic factors and unforeseen adverse shocks (e.g., pandemic-related disruptions). As a sector with a minor contribution to national GDP, these shocks affect the growth of Indonesia's agriculture industry. The ratio of agriculture sector income to total income is assessed utilizing quarterly data and multiple regression methods. The findings demonstrate that the agricultural sector undergoes significant volatility due to economic uncertainty. Nonetheless, inflation is constant, indicating a favorable outlook for economic projections. The margins of Islamic banks are robust and stable, indicating resilience within the banking system. Empirically, the study identifies that agricultural financing (GCPGDPP) and banking intermediation (GFINDT) are factors hindering the expansion of the agricultural sector in Indonesia. Statistically, agricultural financing adversely impacts agricultural growth (GGDPRGDPT), suggesting that as agricultural activities increase, farmers create greater demand for financial services, hence promoting the development of the financial sector, yet failing to enhance their agricultural enterprise competencies. Moreover, banking intermediation favorably influences agricultural growth, signifying that banking support is essential in enhancing the agricultural sector's income share. Consequently, the government's role in establishing a learning center for skill development and agricultural enterprise skills for farmers is crucial in cultivating professional agricultural entrepreneurs, enabling the banking sector's agricultural financing programs to produce high-value-added products. Integrating pertinent artificial intelligence platforms into the agricultural sector is urgently required to enhance farmers' production and bolster agriculture's contribution to Indonesia's economic growth.

References

Aggarwal, R. K., & Yousef, T. (2000). Islamic Banks and Investment Financing. *Journal of Money, Credit and Banking*, *32*(1), 93. https://doi.org/10.2307/2601094

Ahmed, U., & Fida, B. A. (2020). Investigating determinants of bay' salam financing product for agricultural sector in the Sultanate of Oman. *International Journal of Islamic Thought*, *18*, 121–130. https://doi.org/10.24035/IJIT.18.2020.187

Alexandratos, N. (1999). World food and agriculture: Outlook for the medium and longer term. *Proceedings of the National Academy of Sciences of the United States of America*, *96*(11), 5908–5914. https://doi.org/10.1073/pnas.96.11.5908

Anton, A., Lorensa, S., Purnama, I., Eddy, P., & Andi, A. (2023). Net Profit Margin, Earnings per Share, Return on Asset, Debt Equity Ratio, and Current Ratio on Firm Value in Agricultural Sector Companies Listed on Indonesia Stock Exchange 2016-2021. *Journal of Applied Business and Technology*, *4*(2), 155-167.

Anwar, A. Z., Susilo, E., Rohman, F., Santosa, P. B., & Gunanto, E. Y. A. (2019). Integrated financing model in Islamic microfinance institutions for agriculture and fisheries sector. *Investment Management and Financial Innovations*, *16*(4), 303–314. https://doi.org/10.21511/imfi.16(4).2019.26

Asafu-Adjaye, J. (2014). The economic impacts of climate change on agriculture in Africa. *Journal of African Economies*, *23*(SUPPL.2). https://doi.org/10.1093/jae/eju011

Ashraf, M. A., Masood, O., Aktan, B., & Elseoud, M. S. A. (2024). Price inflation in aricultural sector during the COVID-19 pandemic: is it a supply or demand issue?. *International Journal of Economics and Business Research*, *28*(3-4), 294-303.

Asuquo, B., & Ibiyingibo, S. (2021). Sector-specific credit allocation by deposit money banks and real sector development in Nigeria. *African Journal of Business and Economic Development*| *ISSN*, *2782*, 7658

Brooks, K., & Gardner, B. (2004). Russian Agriculture in the transition to a market economy. *Economic Development and Cultural Change*, *52*(3), 571–586. https://doi.org/10.1086/386534

Bulut, M., & Celik, H. (2022). Farmers' perception and preference of Islamic Banking in Turkey. *Agricultural Finance Review*, *December*. https://doi.org/10.1108/AFR-02-2021-0022

Cariappa, A. A., Acharya, K. K., Adhav, C. A., Sendhil, R., & Ramasundaram, P. (2021). Impact of COVID-19 on the Indian agricultural system: A 10-point strategy for post-pandemic recovery. *Outlook on Agriculture*, *50*(1), 26-33.

Carvalho, J. L. (1991). Agriculture, industrialization and the macroeconomic environment in Brazil. *Food Policy*, *16*(1), 48–57. https://doi.org/10.1016/0306-9192(91)90076-V

De Roy, S. (2017). Economic reforms and agricultural growth in India. *Economic and Political Weekly*, *52*(9), 67–72.

Dethier, J. J., & Effenberger, A. (2012). Agriculture and development: A brief review of the literature. *Economic Systems*, *36*(2), 175–205. https://doi.org/10.1016/j.ecosys.2011.09.003

Elhiraika, A. B. (1996). Risk-sharing and the supply of agricultural credit: A case study of Islamic finance in Sudan. *Journal of Agricultural Economics*, *47*(3), 390–402. https://doi.org/10.1111/j.1477-9552.1996.tb00700.x

Filianti, D., Rusmita, S. A., & Indrawan, I. W. (2020). The impact of sectoral financing to NPF of BPRS in Indonesia from January 2012-August 2018. *International Journal of Innovation, Creativity and Change*, *10*(12), 277–287.

Hamidi, I., Pertiwi, R., Atiyatna, D. P., & Bashir, A. (2023). Does Banking Risk And Macroeconomics Variables Matter For Agricultural Sector? Evidence From Lampung Province. *Sriwijaya International Journal of Dynamic Economics and Business*, 359-370.

Haqiqi, I., & Horeh, M. B. (2021). Assessment of COVID-19 impacts on US counties using the immediate impact model of local agricultural production (IMLAP). *Agricultural Systems*, *190*, 103132.

Hartarska, V., Nadolnyak, D., & Shen, X. (2015). Agricultural credit and economic growth in rural areas. *Agricultural Finance Review*, *75*(3), 302–312. https://doi.org/10.1108/AFR-04-2015-0018

Hayat, U., Shah, T., Bacha, M. S., & Muhammad. (2019). An empirical assessment of the dynamics of agricultural growth in Pakistan. *Sarhad Journal of Agriculture*, *35*(3), 782–787. https://doi.org/10.17582/journal.sja/2019/35.3.782.787

Hermawan, H., Mulyono, J., Sirnawati, E., Sihombing, Y., & Ratri, D. N. (2021). Covid-19: impact on agricultural and anticipate strategies. In *E3S Web of Conferences* (Vol. 306, p. 02016). EDP Sciences.

Kajola, S. O., Olabisi, J., Ajayi, J. A., & Agbatogun, T. O. (2018). Determinants of Profitability in Nigerian Listed Deposit Money Banks. *Journal of Economics & Business Research*, *24*(1).

Kantoroeva, A. K., & Toktomamatova, N. K. (2021). Ijara as an innovative product in agricultural financing. *International Journal of Agricultural Extension*, *9*(Special Issue), 141–147. https://doi.org/10.33687/ijae.009.00.3729

Kocturk, O. M., Tepeci, M., Duramaz, S., & Yatbaz, A. (2013). The use of agricultural loan: An analysis of farmers' bank selection decisions in Manisa, Turkey. *Journal of Food, Agriculture and Environment*, *11*(3–4), 764–768.

Kumar, S., & Singh, R. (2007). Impact of cooperative credit on the agriculture sector of Himachal Pradesh: A study of the mid-hill zone. *Social Change*, *37*(2), 53–68. https://doi.org/10.1177/004908570703700204

Magazzino, C., Mele, M., & Santeramo, F. G. (2021). Using an artificial neural networks experiment to assess the links among financial development and growth in agriculture. *Sustainability (Switzerland)*, *13*(5), 1–15. https://doi.org/10.3390/su13052828

Mamatzakis, E., & Staikouras, C. (2020). Common Agriculture Police in the EU, direct payments, solvency and income. *Agricultural Finance Review*, *80*(4), 529–547. https://doi.org/10.1108/AFR-04-2019-0047

Middendorf, B. J., Traoré, H., Middendorf, G., Jha, P. K., Yonli, D., Palé, S., & Prasad, P. V. (2022). Impacts of the COVID-19 pandemic on vegetable production systems and livelihoods: smallholder farmer experiences in Burkina Faso. *Food and Energy Security*, *11*(1), e337.

Mijiyawa, A. G. (2013). Africa's recent economic growth: What are the contributing factors? *African Development Review*, *25*(3), 289–302. https://doi.org/10.1111/j.1467-8268.2013.12030.x

Murungi, K., Alhassan, A. L., & Zeka, B. (2023). Regulation and agriculture financing in Kenya. *Agricultural Finance Review*, *83*(4/5), 783-799.

Ogbuabor, J. E., & Nwosu, C. A. (2017). The impact of deposit money bank's agricultural credit on agricultural productivity in Nigeria: Evidence from an error correctionmodel. *International Journal of Economics and Financial Issues*, *7*(2), 513-517.

Ogunlokun, A. D., & Liasu, A. A. (2021). Effect of Bank Financial Intermediation on Agricultural Performance in Nigeria. *South Asian Research Journal of Business and Management*, *3*(1), 1-13.

Olorogun, L. A. (2020). Spillover effects of Covid-19 uncertainty on non-performing loans of the Turkish agricultural sector on bank performance. *Journal for Global Business Advancement*, *13*(4), 514-532.

Onyiriuba, L., Okoro, E. U. O., & Ibe, G. I. (2020). Strategic government policies on agricultural financing in African emerging markets. *Agricultural Finance Review*, *80*(4), 563–588. https://doi.org/10.1108/AFR-01-2020-0013

Orji, A., Ogbuabor, J. E., Anthony-Orji, O. I., & Nkechi Alisigwe, J. (2020). Agricultural financing and agricultural output growth in developing economies: any causal linkage in Nigeria?.

Pramudya, E. P., Hospes, O., & Termeer, C. J. A. M. (2017). Governing the Palm-Oil Sector through Finance: The Changing Roles of the Indonesian State. *Bulletin of Indonesian Economic Studies*, *53*(1), 57–82. https://doi.org/10.1080/00074918.2016.1228829

Rada, N. E., & Buccola, S. T. (2012). Agricultural policy and productivity: Evidence from Brazilian censuses. *Agricultural Economics (United Kingdom)*, *43*(4), 355–367. https://doi.org/10.1111/j.1574-0862.2012.00588.x

Rajagukguk, W. (2021). Agriculture and regional economic growth in Indonesia. *E3S Web of Conferences*, *258*. https://doi.org/10.1051/e3sconf/202125806037

Reardon, T., Kelly, V., Crawford, E., Diagana, B., Dioné, J., Savadogo, K., & Boughton, D. (1997). Promoting sustainable intensification and productivity growth in Sahel agriculture after macroeconomic policy reform. *Food Policy*, *22*(4), 317–327. https://doi.org/10.1016/S0306-9192(97)00022-5

Salma, U., Alam, M. J., Begum, I. A., Sarkar, M. A. R., Jackson, T., Mastura, T., ... & Kishore, A. (2024). The impact of COVID-19 on livelihood assets: a case study of high-value crop farmers in North-West Bangladesh. *Scientific reports*, *14*(1), 20121.

Samal, B. (2002). Institutional credit flow to West Bengal agriculture: Revisited. *Indian Journal of Agricultural Economics*, *57*(3), 546–559.

Saqib, L., Zafar, M. A., Khan, K., Roberts, K. W., & Zafar, A. M. (2015). Local agricultural financing and Islamic banks: is Qard-al-Hassan a possible solution? *Journal of Islamic Accounting and Business Research*, *6*(1), 122–147. https://doi.org/10.1108/JIABR-04-2012-0018

Saqib, L., Zafar, M. A., Roberts, K. W., Zafar, A., & Khan, K. (2014). Mushārakah-A realistic approach to the concept in Islamic Finance and its application to the agricultural sector in Pakistan. *Arab Law Quarterly*, *28*(1), 1–39. https://doi.org/10.1163/15730255-12341270

Singh, K. (2000). Subject III Education, Technology Adoption and Agricultural Productivity Education, Technology Adoption and Agricultural Productivity. *Jn. of Agri. Econ*, *55*(3).

Toby, A. J., & Peterside, D. B. (2014). Analysis of the role of banks in financing the agriculture and manufacturing sectors in Nigeria. *International Journal of Research in Business Management*, *2*(2), 9-22.

Utama, S., Suwarsi, A. A., & Listiono. (2019). The role of islamic banking in agriculture financing (Case study of indonesian agriculture sector). *Humanities and Social Sciences Reviews*, *7*(2), 261–269. https://doi.org/10.18510/hssr.2019.7230

Wang, X., Chen, M., He, X., & Zhang, F. (2018). Credit constraint, credit adjustment, and sustainable growth of farmers' income. *Sustainability (Switzerland)*, *10*(12), 1–15. https://doi.org/10.3390/su10124407

Yazid, F., Kamello, T., Nasution, Y., & Ikhsan, E. (2021). Sharia based economics in support of Indonesia's sustainable agricultural sector. *IOP Conference Series: Earth and Environmental Science*, *782*(3). https://doi.org/10.1088/1755-1315/782/3/032040