ASSESSING THE IMPACT OF BPRS FINANCING ON FARMER EMPOWERMENT AND FOOD SECURITY IN RURAL INDONESIA

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ABSTRACT

Islamic Rural Banks (BPRS) hold strategic potential in enhancing food security through inclusive, partnership-based Islamic financing, especially in the agricultural sector, which is a key income source for rural communities. This study aims to analyze the impact of BPRS financing based on *murabahah, musyarakah,* and *mudharabah* contracts on farmer empowerment across food security dimensions, including food production, prices, consumption, and stability. A quantitative analysis was conducted using panel data from 154 BPRS sourced from the Financial Services Authority (OJK) covering Q1 2019 to Q4 2023. Static panel models, employing both fixed effects and random effects, were used to determine the best-fit models. The results show that *murabahah* financing significantly increases food prices (0.055%; $p<0.01$) and instability (0.070%; $p<0.05$), while reducing food production (-0.080%; $p<0.05$) and consumption (-0.574%; $p<0.01$), indicating its consumptive nature. *Musyarakah* financing raises food prices (0.021%; $p<0.01$) and instability (0.023%; $p<0.05$), but reduces production (-0.029%; $p<0.05$) and consumption (-0.115%; $p<0.01$), reflecting its limited productive role. *Mudharabah* financing significantly reduces food consumption (-0.163%; $p<0.01$) without significantly affecting production, prices, or stability, suggesting cash flow and business risks for farmers. Macroeconomic factors like regional economic growth (PDRB) reduce production (-0.079%; $p<0.10$) and instability (-0.187%; $p<0.01$) while increasing prices (0.018%; $p<0.01$). These findings underline the importance of reorienting BPRS financing toward more productive, partnership-based schemes for sustainable food security.

Keywords: Sharia Financing; BPRS; Food Security; PDRB; CPI.

ABSTRAK

Bank Perkreditan Rakyat Syariah (BPRS) memiliki potensi strategis dalam meningkatkan ketahanan pangan melalui pembiayaan syariah yang inklusif dan berbasis kemitraan, terutama di sektor pertanian yang merupakan sumber pendapatan utama bagi masyarakat perdesaan. Penelitian ini bertujuan untuk menganalisis dampak pembiayaan BPRS berdasarkan akad *murabahah, musyarakah*, dan *mudharabah* terhadap pemberdayaan petani dalam dimensi ketahanan pangan, termasuk produksi pangan, harga pangan, konsumsi pangan, dan stabilitas pangan. Analisis kuantitatif dilakukan dengan menggunakan data panel dari 154 BPRS yang bersumber dari Otoritas Jasa Keuangan (OJK) dengan periode Q1 2019 hingga Q4 2023. Model panel statis, yang menggunakan fixed effects dan random effects, dipilih untuk menentukan model yang paling sesuai. Hasil penelitian menunjukkan bahwa pembiayaan murabahah secara signifikan meningkatkan harga pangan ($0,055\%$; $p<0,01$) dan ketidakstabilan pangan ($0,070\%$; $p<0,05$), sementara menurunkan produksi pangan ($-0,080\%$; $p<0,05$) dan konsumsi pangan ($-0,574\%$; $p<0,01$), yang mengindikasikan sifat konsumtif dari akad ini. Pembiayaan musyarakah meningkatkan harga pangan ($0,021\%$;

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p<0,01) dan ketidakstabilan (0,023%; p<0,05), namun menurunkan produksi (−0,029%; p<0,05) dan konsumsi (−0,115%; p<0,01), mencerminkan peran produktif yang terbatas. Pembiayaan *mudharabah* secara signifikan mengurangi konsumsi pangan (−0,163%; p<0,01) tanpa pengaruh signifikan terhadap produksi, harga, atau stabilitas, yang menunjukkan adanya kendala aliran kas dan risiko bisnis bagi petani. Faktor makroekonomi seperti pertumbuhan ekonomi regional (PDRB) mengurangi produksi (−0,079%; p<0,10) dan ketidakstabilan (−0,187%; p<0,01) sementara meningkatkan harga (0,018%; p<0,01). Temuan ini menekankan pentingnya mengarahkan kembali pembiayaan BPRS menuju skema yang lebih produktif dan berbasis kemitraan untuk memperkuat ketahanan pangan yang berkelanjutan.

Kata Kunci: Pembiayaan Syariah ; BPR Syariah; Ketahanan Pangan ; PDRB; IHK.

INTRODUCTION

Food security is a strategic issue in sustainable national development, encompassing aspects of availability, accessibility, and affordability (Nasution & Kamilah, 2025). In Indonesia, the agricultural sector is the most significant contributor to employment and the primary source of income, particularly in rural areas distant from urban centers (Suwandi & Marliyah, 2023). Global food crises and unequal access to capital exacerbate food vulnerability, creating significant socio-economic challenges for vulnerable groups, including small-scale farmers and food-related MSMEs. (Badan Pangan Nasional, 2022) , approximately 15% of farmers in remote areas continue to face difficulties accessing formal financing from banks or official financial institutions, indicating low financial inclusion in the agricultural sector. Moreover, smallholder farmers with landholdings of less than 0.5 hectares face structural capital limitations and a reliance on intermediaries and inefficient markets to obtain production inputs (Akbar et al., 2025). Limited capitalization also affects households' purchasing power. On the MSME side, nearly 70% of MSMEs lack access to formal bank credit facilities, severely restricting their capacity to expand businesses and improve productivity (LDASI, 2020). These conditions underscore the urgency of effective interventions to enhance national food security.

In this context, Islamic Rural Bank (BPRS) holds significant potential to support food security in Indonesia through inclusive, equitable, and partnership-oriented Islamic financing schemes, particularly in the agricultural sector (Essa et al., 2022 ; Aidah & Anugrah, 2021; (Hendri et al., 2025). The location of BPRS branches is also relevant, as they are predominantly situated in rural areas beyond the reach of large banks (Shaban dkk., 2014) . According to the OJK report for Q2 2024, BPRS financing for the agricultural sector reached 6.10% of total BPRS financing, with an annual growth rate of 10.08%. The government, through the National Research Masterplan (RIRN) 2017–2045, has designated food as a key research focus to achieve national self-sufficiency and sovereignty, aligned with global Sustainable Development Goals (SDGs),

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particularly Goal 1 (poverty alleviation) and Goal 2 (ending hunger and promoting good nutrition), as well as supporting Goal 8 (decent work and economic growth). Nationally, this commitment is reflected in eight priority development programs, including Asta Cita 2 (national self-sufficiency through food sovereignty, creative, green, and blue economy) and Asta Cita 3 and 4 (job creation and grassroots economic equality).

According to Law No. 18/2012 on Food, food security refers to the condition in which the food needs of both the state and individuals are met, reflected in sufficient, safe, nutritious, evenly distributed, and affordable food. In agrarian countries with large populations, food security is closely linked to economic stability, societal welfare, and national development (Taufiqurrohman & Jayanti, 2022).

The commitment of financial institutions to supporting agricultural growth demonstrates efforts to develop sustainable financing for this sector. Studies highlight the risks to agricultural infrastructure that impact food production, where *murabahah, musyarakah*, and *mudharabah*-based financing are used as risk mitigation instruments (Azizi & Lubis, 2025) . Financing has been shown to improve community welfare, benefiting both income and access to agricultural inputs (Feryanto, 2019) . Furthermore, from a macroeconomic perspective, regional GDP (PDRB) serves as an indicator of economic growth, which can strengthen food access and distribution (Timmer, 2004) . While the Consumer Price Index (CPI) acts as a proxy for inflation that affects food prices. Islamic financing integrated with macroeconomic conditions is, therefore, expected to contribute significantly to sustainable food security.

Previous studies have reported mixed results on the impact of bank financing on food security in Indonesia. Syamsuri et al., (2022) noted, through a literature review, that micro Islamic banks play a role in achieving rural food security by promoting economic development, technology adoption, improved agricultural mechanisms, productivity gains, enhanced living standards, and poverty reduction. Nasution and Kamilah (2025) found that *murabahah* and *musyarakah* financing improve smallholder farmers' access to capital and productivity, although financial literacy gaps remain. Osabohien et al. (2020) observed that households with access to agricultural financing achieved harvests three times higher than those without. Basyariah (2022) in a qualitative, descriptive-exploratory study, concluded that Islamic finance has significant potential to enhance food security through agricultural financing, particularly for staple crops and herbal plants. However, prior empirical studies primarily rely on literature reviews and lack focus on specific financing products such as *murabahah, musyarakah*, and *mudharabah*

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contracts. *Musharakah* and *mudharabah* contracts, based on profit-sharing and collaboration, hold significant potential for implementation in agricultural and food-related MSME financing, yet their utilization remains limited.

Therefore, further research is needed. This study offers novelty by analyzing the impact of BPRS financing on farmer empowerment and food security in rural Indonesia, through the development of a food security detection model that considers multiple dimensions, including availability (food production), accessibility (food prices), quality (food consumption), and stability. Regional GDP (PDRB) and CPI are included as control variables. The study employs a quantitative approach, utilizing secondary data from OJK reports on BPRS financing by contract type (*murabahah, musyarakah*, and *mudharabah*) and food security data from BPN and BPS for the period from Q1 2019 to Q4 2023. Panel data analysis of 154 BPRS is applied. The results are expected to provide empirical evidence of BPRS contributions to food security in Indonesia and offer policy recommendations to strengthen food security and support sustainable economic development (Hendri dkk., 2025a).

RESEARCH METHOD

The sample in this study comprises all Sharia Rural Banks (BPRS) in Indonesia, totaling 154 BPRS, for the period 2019–2023, using annual individual BPRS data across Indonesia. In the empirical analysis, the dependent variable consists of secondary data on food security, including food availability (food production), food accessibility (food prices), food quality (food consumption), and food stability (the percentage of the population experiencing food insecurity), obtained from the official websites of the Badan Pangan National (BPN) and Badan Pusat Statistik (BPS) for Q12019–Q42023. Food security is measured by the availability, quality, accessibility, and stability of food. The independent variables are BPRS financing based on profit-sharing contracts, specifically *murabahah, mudharabah*, and *musyarakah*, with data obtained from Sharia Banking Statistics on the official OJK website for the period from Q1 2019 to Q4 2023. Data interpolation was then conducted for research variables, including PPKP, KP, and PP, following the procedure by Kang (2011). The reason for performing data interpolation was to meet the study's more detailed objectives using quarterly data, while the available data were only annual at the district/city level. Using only annual data would reduce the degrees of freedom in the model, given the five years.

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The interpolation method used is the Quadratic Match Average (QMA) in EViews. QMA was chosen because it produces smooth interpolation while ensuring that the quarterly averages within a year remain identical to the original annual data. This maintains the consistency of annual data aggregation while meeting the research requirement for quarterly data. To ensure validity, the interpolated data were verified by comparing the annual trends of the interpolated data with the original annual data from BPS and BPN, demonstrating a high level of conformity. Reliability was maintained using standard and tested interpolation procedures (Lepot et al., 2017), allowing quarterly data to be reliably used for panel analysis without altering the underlying variable patterns. This process required additional time and meticulous attention to ensure the data could be processed according to the study's methodological needs.

The dynamic panel approach is commonly used to address endogeneity. Initial tests showed $AR(1) = 0.000$, $AR(2) = 0.475$, and $Hansen = 0.001$ for Model 1; $AR(1)$, $AR(2)$, and $Hansen = 0.000$ for Models 2 and 3; and Model 4 with $AR(1) = 0.188$, $AR(2) = 0.310$, and $Hansen = 0.466$, which was not significant. It can be concluded that only Model 4 is valid, whereas Models 1, 2, and 3 indicate the presence of autocorrelation and potentially invalid instruments, which could bias the results. (Adzobu et al., 2017; Shim, 2019; Jolo dkk., 2022; Widarjono & Misanam, 2023; Doerr, 2024 ; Kamau & Simo-Kengne, 2025; Widarjono dkk., 2025) . The research models are as follows:

$$LPP_{it} = \beta_0 + \beta_1 LMUR_{it} + \beta_2 LMUS_{it} + \beta_3 LMUD_{it} + \beta_4 LGRDB_{it} + \beta_5 CPI_{it} + \varepsilon_{it} \text{ , (1)}$$
$$LHP_{it} = \beta_0 + \beta_1 LMUR_{it} + \beta_2 LMUS_{it} + \beta_3 LMUD_{it} + \beta_4 LGRBB_{it} + \beta_5 CPI_{it} + \varepsilon_{it} \text{ , (2)}$$
$$LKP_{it} = \beta_0 + \beta_1 LMUR_{it} + \beta_2 LMUS_{it} + \beta_3 LMUD_{it} + \beta_4 LGRDB_{it} + \beta_5 CPI_{it} + \varepsilon_{it} \text{ , (2)}$$
$$LPPKP_{it} = \beta_0 + \beta_1 LMUR_{it} + \beta_2 LMUS_{it} + \beta_3 LMUD_{it} + \beta_4 LPDRB_{it} + \beta_5 CPI_{it} + \varepsilon_{it..} \text{, (4)}$$

HP,PP, KP, PPKP, LMUR, LMUS,LMUD, LGRDB in the form of natural logarithms.

HP (Food Price) is the amount of money paid by consumers to obtain food products in the market. PP (Food Production) is the total amount of food produced by farmers or the agricultural sector within a given period. KP (Food Consumption) refers to the amount of food consumed by the population during a specific period, reflecting their consumption patterns. The Prevalence of Inadequate Food Consumption (PPKP) indicates vulnerability in food security.

Food Security Indicators

Food security was measured by using four main dimensions: food availability, food accessibility, food quality or consumption, and food stability. These four dimensions reflect a region's ability to meet its population's food needs in a sustainable manner. Food availability is

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measured through food production. The volume of food production is measured in tons or kilograms. The higher the food production, the higher the level of food availability in the region (FOA, 2004)

1. Data were obtained from the National Food Agency (BPN) or the Central Bureau of Statistics (BPS) for various major food commodities in the study area. The formula to calculate food production is as follows:

   Food Production $= \frac{Food\ Output_{it}}{Population_{it}}$

2. Food accessibility is measured through food prices. HP (Food Price) is the amount of money paid by consumers to obtain food products in the market. Food accessibility refers to a community's ability to get food, both physically and economically. In this study, food accessibility is measured using food prices (HP), which reflect the purchasing power of the population for food products in the market. Higher food prices indicate lower access to food, especially for low-income groups. The formula for food accessibility is:

   Food Consumption $= \frac{food\ Consumption\ Quantity_{it}}{Population_{it}}$

3. Food quality (food consumption) is represented by KP (Food Consumption), which is the amount of food consumed by the population within a specific period, reflecting food consumption patterns. It is calculated from per capita food consumption data estimated based on household consumption surveys or national statistics from the BPS. The formula is:

   Food Accessibility $= \frac{Food\ Price_{it}}{Average\ Income_{it}}$

4. Stability is measured by the Prevalence of Inadequate Food Consumption. PPKP is the amount of food available per individual in a region, indicating food availability relative to the population. It is measured by dividing total food production by the population in the area (tons per capita). A higher PPKP value indicates a higher level of food stability. Food stability can be expressed with the following formula:

   Food Instability $= \frac{number\ of\ people\ experiencing\ food\ insecurityFood\ Price_{it}}{Population_{it}}$ x 100%

Sharia BPR Financing Indicators

In this study, several types of contract-based financing are used as independent variables. The financing measures include:

1. *Murabahah* Financing Scheme

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This is Sharia-compliant financing based on the sale and purchase of goods with a pre-agreed profit margin. The total value of *Murabahah* financing distributed by BPRS within a period (in millions or billions of IDR) is used.

2. *Musyarakah* Financing Scheme

This is a Sharia-based partnership capital financing scheme, where profit and loss are shared according to an agreed-upon ratio (Mawaddaturrahmah & Yuhasnibar, 2025). The total value of *Musyarakah* financing distributed by BPRS in a period (in millions or billions of IDR) is used.

3. *Mudharabah* Financing

This Sharia-compliant financing involves BPRS as the capital owner (*Sahibul Maal*) cooperating with a business partner (*Mudharib*) who operates the business, with profits shared according to a pre-agreed ratio. The total value of *Mudharabah* financing distributed by BPRS in a period (in millions or billions of IDR) is used. All data are based on BPRS Sharia financing reports.

The formula used to calculate the financing proportion ratio is as follows:

$$\text{Financing Proportion} = \frac{Financing_{it}}{Total\ Financing_{it}} \times 100\%$$

This study also includes control variables, which are macroeconomic conditions, following previous empirical studies (Widarjono et al., 2020; Al-kayed & Aliani, 2020; Aisjah et al., 2022; Gleißner et al,. 2022; Jolo et al., 2022b). Macroeconomic conditions are represented by the logarithm of regional gross domestic product (GDP) and the consumer price index (CPI). The data spans from the first quarter of 2019 to the fourth quarter of 2023. The formulas for GDP growth and inflation are as follows:

$$\text{GRDP} = \frac{GDRP_t - GDRP_{t-1}}{GDRP_{t-1}} \times 100\%$$

$$\text{Inflation} = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \times 100\%$$

RESULT AND DISCUSSION

RESULT

Summary of statistics

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Table.1 Desciptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
PP	3,080	7.945541	2.7739	−5.126467	11.8886
HP	3,080	9.311413	.1271739	9.047821	9.736074
KP	3.080	15.22092	3.521099	7.613854	20.13286
PPKP	3,080	2.473095	2.520969	−1.836495	19.05079
Mur	3,080	17.09465	1.173625	11.51293	20.76129
Mud	3,080	12.94064	2.227321	5.594711	18.41886
Mus	3,080	14.55131	2.44527	1.791759	20.482
PDRB	3,080	18.71146	1.11724	15.67933	20.07834
IHK	3,080	107.5676	9.453551	90.81	143.67

Source: SPS OJK, BPN, BPS, data processed, 2025

Descriptive statistics are employed to describe the characteristics of food security variables, including food availability (food production), food accessibility (food prices), food quality (food consumption), and food stability (Prevalence of Inadequate Food Consumption). Furthermore, we examine Islamic financing variables, namely *murabahah, musharakah*, and *mudharabah*. Finally, macroeconomic control variables are included, consisting of regional gross domestic product (RGDP) and the consumer price index (CPI).

Based on the food security theory from FAO (1996), food security is influenced by the availability, access, and stability of food, which in this context is supported by sharia financing. Table 1. is summary descriptive. The data show that the average food production (PP) is 7.95 tons, with quite significant variations (standard deviation 2.77), indicating that food production fluctuates between regions or over time. Food prices (hp) are relatively stable with an average of IDR 9,311 and a small spread (0.13), which helps maintain food accessibility. Food consumption (KP) also varies, with an average of 15.22 and a standard deviation of 3.52, reflecting differences in consumption levels. However, the percentage of the population experiencing food instability (PPKP), with an average of 2.47% and a high variation (standard deviation of 2.52), indicates that vulnerabilities in food security still exist. The *murabahah* (MUR) financing variable, with an average of 17.09, the *mudharabah* (MUD) variable, at 12.94, and the *musyarakah* (MUS) variable, at 14.55, demonstrate the significant and relatively stable role of financing in supporting the food sector. The macroeconomic variables indicate that Gross Regional Domestic Product (GRDP) has an average value of 18.71 with moderate variation, reflecting differences in the level

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of economic activity across regions. Meanwhile, the Consumer Price Index (CPI) records an average of 107.57 with a standard deviation of 9.45, indicating variations in inflationary pressure across regions during the observation period. These macroeconomic conditions may influence the effectiveness of BPRS financing in supporting food security.

Table 2 presents the correlation matrix among the research variables. Food production (PP) shows a positive correlation with food consumption (KP) at 0.2089 and with the prevalence of insufficient food consumption (PPKP) at 0.3833. In contrast, its correlations with food prices (HP), *murabahah* (MUR), and *mudharabah* (MUD) are relatively weak at 0.0266, 0.0647, and 0.0396, respectively, and negative with *musyarakah* (MUS) at -0.0706. Food prices (HP) exhibit very low correlations with all variables, including KP (-0.0427), PPKP (-0.0342), MUR (-0.0153), MUS (-0.0629), MUD (-0.1311), regional GDP (PDRB) at 0.0568, and CPI at 0.0034. Food consumption (KP) is positively correlated with PPKP (0.3195), MUR (0.1256), MUS (0.1031), MUD (0.0754), PDRB (0.0702), and CPI (0.0476). PPKP shows positive correlations with MUD (0.1840), MUS (0.0613), and MUR (0.0161), but a negative correlation with PDRB (-0.0981). Among Islamic financing variables, the strongest correlation is observed between *murabahah* and *musyarakah* (0.6065), followed by *murabahah* and *mudharabah* (0.3918) and *musyarakah* and *mudharabah* (0.2687). PDRB is positively correlated with MUR (0.1881) and MUS (0.0808), but negatively correlated with MUD (-0.0624), while CPI shows negligible correlations with all variables, including PP (-0.0239) and PDRB (-0.0187). Overall, the correlations are generally low to moderate, indicating no serious multicollinearity issues and providing an initial justification for further panel regression analysis.

Table 2. Correlation Matrix

	PP	HP	KP	PPKP	MUR	MUS	MUD	PDRB	CPI
PP	1.0000								
HP	0.0266	1.0000							
KP	0.2089	-0.0427	1.0000						
PPKP	0.3833	-0.0342	0.3195	1.0000					
MUR	0.0647	-0.0153	0.1256	0.0161	1.0000				
MUS	-0.0706	-0.0629	0.1031	0.0613	0.6065	1.0000			
MUD	0.0396	-0.1311	0.0754	0.1840	0.3918	0.2687	1.0000		
GDRB	0.1259	0.0568	0.0702	-0.0981	0.1881	0.0808	-0.0624	1.0000	
CPI	-0.0239	0.0034	0.0476	0.0055	0.0032	-0.0549	-0.0040	-0.0187	1.0000

Source:SPS OJK, BPN, BPS, processed data, 2025

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Table 3. The Estimation results of the Impact of BPRS Financing Distribution on Farmer Empowerment and Food Security in Rural areas of Indonesia

Variabel	PP(Model 1)		HP (Model 2)		KP (Model 3)		PPKP (model4)	
	Coef	Prob (Z)	Coef	Prob(t)	Coef	Prob(t)	Coef	Prob(z)
LMur	−0.080***	0.015	0.055***	0.000	−0.574***	0.000	0.070***	0.011
LMus	−0.029***	0.019	0.020***	0.000	−0.115***	0.001	0.023***	0.023
LMud	0.003	0.416	0.002	0.166	−0.163***	0.000	0.015	0.128
LPDRB	−0.078**	0.061	0.017***	0.007	−0.093	0.239	−0.186***	0.000
IHK	0.003***	0.005	0.000**	0.040	0.051**	0.082	−0.001	0.189
_cons	11.557	0.000	7.662	0.000	30.004	0.000	4.366	0.000
Within		0.0066		0.0929		0.0266		0.0095
Between		0.0020		0.0606		0.0660		0.0147
Overall		0.0032		0.0027		0.0356		0.0123
no.obser		3,069		3,080		2,885		3,067
jmlh. Bank		154		154		154		154
uji statistik								
F		239.52		10.20		42.59		294.50
LM		23629.13		1631.12		12432.16		22768.17
Hausman		4.35		234.83		51.38		3.46

Note: ***, ** and * significant at 1%, 5% and 10%
Source:SPS OJK, BPN, BPS, processed data, 2025

Table 3 presents the estimation results of the impact of BPRS financing distribution on farmer empowerment and food security in rural areas of Indonesia. Based on the model selection procedures, Models 1 (PP) and 4 (PPKP) are most appropriately estimated using the Random Effects Model (REM).

In contrast, Models 2 (HP) and 3 (KP) are best estimated using the Fixed Effects Model (FEM). This selection is grounded in the Hausman test results: the Hausman statistics for Model 1 (4.35) and Model 4 (3.46) indicate that REM is more efficient, whereas the high and statistically significant Hausman statistics for Model 2 (234.83) and Model 3 (51.38) suggest that FEM provides more consistent estimates. Using the best model for each specification, the results show that in Model 1 (PP-REM), *murabahah* financing has a negative and significant effect with a coefficient of -0.080 (p > 0.015), and *musyarakah* financing also exhibits a negative and significant impact with a coefficient of -0.029 (p<0.019), while *mudharabah* financing is not essential (0.003; p< 0.416). Regional Gross Domestic Product (PDRB) has a negative and significant effect at the 10% level (-0.078; p > 0.061), whereas the Consumer Price Index (IHK) shows a positive and significant effect (0.003; p = 0.005).

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In Model 2 (HP-FEM), *murabahah* (0.055; p<0.000) and *musyarakah* (0.020; p<0.000) financing have positive and significant effects, while *mudharabah* remains insignificant (0.002; p>0.166). Both PDRB (0.017; p <0.007) and IHK (0.000; p<0.040) also exert positive and statistically significant effects.

Furthermore, in Model 3 (KP-FEM), *murabahah* (-0.574; p<0.000), *musyarakah* (-0.115; p < 0.001), and *mudharabah* (-0.163; p<0.000) financing all show adverse and significant effects. PDRB is not statistically significant (-0.093; p>0.239), while IHK is significant at the 10% level (0.051; p>0.082).

In Model 4 (PPKP-REM), *murabahah* (0.070; p<0.011) and *musyarakah* (0.023; p<0.023) financing have positive and significant effects, whereas *mudharabah* financing is not essential (0.015; p>0.128). PDRB has a negative and highly significant effect (-0.186; p<0.000), while IHK is not statistically significant (-0.001; p>0.189).

Overall, the F-tests indicate that all models are jointly significant, with values of 239.52 (Model 1), 10.20 (Model 2), 42.59 (Model 3), and 294.50 (Model 4). These results are further supported by high Lagrange Multiplier (LM) test statistics, confirming that panel data approaches are more appropriate than pooled OLS. Collectively, these findings underscore that the proper selection of estimation models across different dimensions of food security yields consistent and reliable estimates.

DISCUSSION

The Impact of BPRS Financing Distribution on Farmer Empowerment and Food Security in Indonesia

This study examines the impact of financing distribution by Islamic Rural Banks (BPRS) on four key dimensions of food security in rural Indonesia: food production (Model 1), food prices (Model 2), food consumption (Model 3), and food stability (Model 4). Each model is estimated using the best panel data approach, as determined by the Hausman test, ensuring that the results reflect a more consistent and reliable causal relationship between Islamic financing instruments and food security indicators.

BPRS Financing, Farmer Empowerment, and Food Production

Model 1 represents the food production dimension, which reflects the agricultural sector's capacity to produce food in a sustainable manner. The estimation results indicate that *murabahah* and *musyarakah* financing have a negative and significant effect on food production. These

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findings suggest that trade-based and partnership-based financing schemes have not been fully effective in stimulating agricultural output, particularly when financing is primarily oriented toward short-term input fulfillment and is not integrated with improvements in production technology, seed quality, and efficient cultivation practices. These results are consistent with the findings of Purnomo & Albart (2023) and Habriyanto & Pratiwi (2022) , who argue that *murabahah* financing tends to be used for consumptive goods rather than productive investment. However, this finding contrasts with Khotijah (2020), who reports a positive effect of *murabahah* financing on food production. Such differences highlight that the effectiveness of funding for Islamic is highly contingent upon the indicators used, the level of analysis (micro versus macro), and the institutional context in which financing is implemented. The insignificance of *mudharabah* financing suggests that profit-sharing schemes have not been able to stimulate food production directly. This can be attributed to high agricultural production risks, weak farm business record-keeping, and the limited capacity of BPRS to conduct intensive monitoring and technical assistance. Therefore, Islamic financing does not automatically enhance food production; its impact depends critically on financing objectives, contract structures, and the availability of risk management and technical support. Without adequate risk management and extension services, agricultural financing may lead to production inefficiencies.

BPRS Financing, Farmer Empowerment, and Food Prices

Model 2 represents the food price dimension, which reflects affordability and price stability at the household level. The results indicate that *murabahah* and *musyarakah* financing have a positive and statistically significant impact on food prices. This finding suggests that improved access to funding strengthens distribution activities, agricultural trade, and food supply chain efficiency, thereby contributing to more stable and controlled food prices. This result aligns with Nasution dan Kamilah (2025) , who emphasize that Islamic financial institutions play a crucial role in strengthening the distribution networks and supply chains of smallholder farmers, thereby contributing to food price stability through improved trade efficiency and increased access to capital. However, this finding differs from Mubarok (2021), who argues that Islamic agricultural financing is heavily influenced by macroeconomic factors, such as inflation and interest rates, rather than access to financing alone. This perspective indicates that funding does not always guarantee stable food prices.

The positive effects of Gross Regional Domestic Product (GRDP) and the Consumer Price Index (CPI) further confirm that macroeconomic dynamics and general price levels shape food

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price structures. From the perspective of Islamic finance, real sector–based financing such as *murabahah* can enhance market efficiency. At the same time, *musyarakah* encourages collaboration between farmers and agribusiness actors, supporting fairer price formation mechanisms.

BPRS Financing, Farmer Empowerment, and Food Consumption

Model 3 represents the food consumption dimension, which reflects households' ability to meet adequate and diverse food needs. The estimation results indicate that all financing schemes *murabahah*, *musyarakah*, and *mudharabah* have a negative and significant effect on food consumption. These findings suggest that increased access to financing does not necessarily translate into improved food consumption outcomes. This result aligns with Tampubolon & Zen (2021), who find that financing does not automatically increase food consumption when it raises household financial obligations or is allocated to non-consumptive activities that do not generate short-term income. In contrast, other studies report that microcredit has a positive impact on food consumption and household expenditures in Indonesia, suggesting that financial inclusion can enhance consumption capacity under specific conditions. Similarly, research conducted in the Jimma zone of Southwest Ethiopia shows that microcredit utilization significantly improves household food security, including caloric intake, suggesting that access to formal credit can enhance food consumption among rural households (Berhanu et al., 2021).

The negative impact of *mudharabah* financing underscores that profit-sharing schemes, when not supported by effective income risk management mechanisms, may increase income uncertainty for farming households, leading to reduced food consumption. This finding highlights that food consumption is vulnerable to income volatility, particularly in rural areas that heavily rely on agricultural activities.

BPRS Financing, Farmer Empowerment, and Food Stability

Model 4 represents the food stability dimension, which reflects the capacity of the food system to maintain availability, access, and consumption in a sustainable manner over time. The results indicate that *murabahah* and *musyarakah* financing have a positive and significant effect on food stability. These findings are consistent with those of Putri & Misbah (2025) dan Syamsuri et al. (2022), who suggest that Islamic financing can enhance long-term food security when directed toward strengthening farmer institutions, integrating value chains, and implementing effective risk management. However, this finding contrasts with (Akbar et al., 2025) who argue that contracts such as *salam* or other product-based agreements are more

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suitable for supporting agricultural stability than *murabahah* or *musyarakah*, particularly due to production risks and mismatches between harvest cycles and payment schedules. This indicates that different Islamic financing contracts have varying implications for food security stability. The insignificance of *mudharabah* reflects the inherent risks associated with profit-sharing schemes in agricultural financing, particularly production risks arising from crop failure, extreme weather events, pest attacks, and seasonal income volatility. These risks are exacerbated by information asymmetry and potential moral hazard due to weak farm record-keeping and limited monitoring capacity of BPRS, which complicate performance evaluation and fair profit-sharing arrangements. Without adequate monitoring systems, agricultural insurance, and enhanced managerial capacity among farmers, *mudharabah* financing may increase uncertainty and risk exposure for both banks and farmers, making it less effective in strengthening food stability.

CONCLUSION

This study aims to analyze the impact of BPRS financing based on *murabahah, musyarakah*, and *mudharabah* contracts on four dimensions of food security in Indonesia: food production, food prices, food consumption, and food stability, by developing a food security detection model. The data were analyzed using a static panel approach. The best models were determined as Random Effects Model (REM) for Model 1 (food production) and Model 4 (food stability), and Fixed Effects Model (FEM) for Model 2 (food prices) and Model 3 (food consumption), based on Hausman and F tests, supported by high Lagrange Multiplier (LM) values.

Based on the panel model estimation, the study reveals that various types of Islamic financing from rural banks (BPR) have heterogeneous impacts on the dimensions of food security. *Murabahah* has a significant adverse effect on food prices and consumption, but not on production or stability, confirming its consumptive nature. *Murabahah* works more indirectly by enhancing trade and distribution activities, which can streamline commodity flows and reduce supply bottlenecks. However, because it is not integrated with production risk management and seasonal fluctuations, *murabahah* cannot fully mitigate price volatility caused by weather, crop failures, or inflationary pressures, making its effect on price stability limited and contextual.

Musyarakah proves more effective in enhancing food security by improving stability and production capacity, supporting the development of the agricultural sector and micro/small enterprises. *Musyarakah* has the potential to strengthen long-term food security if directed toward

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enhancing farmer institutions, integrating value chains, and implementing adequate risk management.

Mudharabah has significant productive potential, particularly in supporting food production; however, it faces numerous challenges, including high production risk, seasonal and fluctuating farmer incomes, information asymmetry, moral hazard, and resistance from specific stakeholders. Its effectiveness depends on the selection of partners and effective risk management. Partner selection should consider the characteristics of farmers, their commodities, and agroclimatic risks. Financing should be integrated with technical assistance, financial literacy, and risk management mechanisms, such as agricultural insurance or harvest-based financing schemes.

Macroeconomic variables, such as GDP and the Consumer Price Index (CPI), also influence food security. In the rural macroeconomic context, GDP strengthens purchasing power and the absorption capacity of Islamic financing. At the same time, CPI increases transmit inflationary pressures to food prices, so the effectiveness of BPRS financing heavily depends on regional macroeconomic stability.

Optimizing the role of BPRS requires adaptive financing strategies, partner selection based on farmer characteristics and agroclimatic risks, integration with technical assistance, financial literacy, and risk management mechanisms such as agricultural insurance or harvest-based schemes. Further research is recommended to develop a more comprehensive food security model using microdata, spatial approaches, and other financing contracts such as *salam* or *istishna'*, to understand better the role of Islamic finance in supporting sustainable food security.

ACKNOWLEDGMENTS

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