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The impact of financial intermediation by BPRs, commercial banks, and fintech P2P lending on per capita consumption, MSME production, and GRDP in Indonesia

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A B S T R A C T

We investigate how financial intermediation by rural banks (BPRs), commercial banks, and fintech P2P lending influences per-capita household consumption, MSME production, and Gross Regional Domestic Product (GRDP) across Indonesia's 34 provinces during 2022–2024 (N = 102). Using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS with bootstrapped inference, we estimate a system of simultaneous equations that captures both direct and indirect (mediated) pathways from each intermediation channel to regional output. Results show that BPR intermediation (X_1) and commercial-bank intermediation (X_2) significantly and positively affect MSME production (H4 and H5 supported; $p < 0.05$), whereas fintech P2P lending (X_3) does not (H6 rejected; $p = 0.161$). Fintech P2P lending positively influences per-capita consumption (H3 supported at the 90% level; $p \approx 0.078$), while BPR and commercial-bank intermediation have no significant effect (H1 and H2 rejected). MSME production strongly enhances GRDP (H7 supported; $p < 0.01$), and consumption is positively associated with GRDP at the 90% level (H8 supported; $p \approx 0.085$). Direct paths from intermediation to GRDP (H9–H11) are not significant, supporting a mediated mechanism: BPRs and commercial banks primarily operate through MSME production, while fintech channels influence GRDP via consumption. Model fit is acceptable (SRMR = 0.091), although some covariance-fit indices are weak (discussed in the manuscript), so inference relies on bootstrapped path estimates and mediation diagnostics. Policy implications suggest regulators should reinforce BPR and commercial-bank support for MSME financing, while guiding fintech to expand safe consumer access that enhances household purchasing power without introducing systemic risks.

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a central role in the Indonesian economy, employing nearly 97% of the national workforce and contributing significantly to regional GDP (Hoesada, 2025). Inclusive MSME growth is highly dependent on access to formal financing. The OJK emphasizes the importance of improving financial literacy and inclusion to empower MSMEs, as access to formal financial products will increase the capacity and sustainability of MSMEs (OJK, 2016). In short, channeling savings into productive loans (financial intermediation) matters for MSME finance and growth. Increasing financial inclusion is believed to develop MSMEs by strengthening the financial management capabilities of small entrepreneurs (OJK, 2016). In a macroeconomic context, increased access to digital finance has also been shown to encourage household welfare; international studies show that access to mobile-based financial services (e.g., M-PESA in Kenya) increases per capita consumption, even lifting approximately 2% of households out of poverty (Moorena et al., 2020). Thus, strengthening financial intermediation in Indonesia, both through traditional banks and digital innovation, is urgent for the OJK to support the growth of household consumption, MSME production, and GRDP. Historically, the banking sector (commercial banks and BPRs) has dominated financial intermediation in Indonesia. OJK noted that by the end of 2024, bank credit growth doubled, driven by investment credit (growth of 13.77% year-on-year) and consumption credit (growth of

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10.94% year-on-year) (Otoritas Jasa Keuangan, 2025a). However, credit disbursement for MSMEs remains relatively low; in November 2024, MSME loan growth was only around 4.02% year-on-year (Otoritas Jasa Keuangan, 2025a), with the share of MSME loans in total bank credit only around 19–20% (OJK, 2024). On the other hand, microfinance institutions such as BPRs have focused on serving local and micro segments (although data is more difficult to obtain), while fintech P2P lending platforms are growing rapidly: outstanding P2P fintech financing reached IDR 75.6 trillion in November 2024, representing a 27.3% year-on-year growth (Otoritas Jasa Keuangan, 2025a). The OJK also issued a 2023–2028 P2P Fintech Roadmap to promote inclusive and productive P2P fintech for the national economy (Otoritas Jasa Keuangan, 2023). Fintech is emerging as an alternative for less-bankable MSMEs and as a channel that can raise household spending. OJK data shows a trend of strengthening banking intermediation and fintech advancements that can boost consumption and production: for example, banking Third Party Funds grew 7–8% year-on-year by the end of 2024, while P2P fintech continues to expand its business scale (Otoritas Jasa Keuangan, 2025a).

Yet, Indonesia needs studies that compare BPRs, commercial banks, and fintech simultaneously on consumption and MSME output. This study first compares the role of BPR, commercial banks, and P2P fintech simultaneously on consumption, MSME production, and GRDP at the provincial level. Most studies focus on a single institution or a single aspect. Some studies only examine how bank credit or financial inclusion in general affects economic growth (Basnayake et al., 2025; Pal et al., 2025; Risqita & Saraswati, 2022), but few compare the roles of BPR, commercial banks, and fintech simultaneously. Similarly, studies such as (Aisyah, 2024) conduct qualitative analyses of poverty reduction or inclusive economic growth, which crucially requires MSME empowerment. A survey study (Glo & Papers, 2025) only highlighted barriers to financial access for women-owned MSMEs, without directly linking them to consumption growth or GRDP. However, if intermediation by different financial institutions can increase purchasing power and productivity, it is crucial for policymakers to understand which channels are most effective in driving inclusive economic growth.

Based on this urgency and the limitations of previous research, this study formulates an explicit research question*: How does financial intermediation by rural banks (BPR), commercial banks, and fintech P2P lending affect per capita consumption, MSME production, and GRDP in Indonesia?* This question includes a comparison of the contributions of these three forms of financial intermediation to macroeconomic indicators, as well as implications for regional financial policy. Using a spatial analysis approach, this study is expected to fill the research gap and provide input for the regulator in formulating more targeted financial sector policies.

2. Literature Review

2.1 Theoretical Framework

2.1.1 Financial Intermediation Theory

Financial intermediation theory explains how banks and similar institutions bridge the gap between savers and borrowers, transforming household deposits into productive investments. Intermediaries mobilize savings, allocate capital, manage risk, ease transactions, and monitor firms, roles found essential for economic growth (Wensveen, 2003). In Indonesia, rural banks (BPRs) and commercial banks perform this role: under intermediation theory, BPRs in particular transform savings into productive credit, channeling local deposits into enterprise lending (Puspitasari et al., 2025). By pooling many small deposits and diversifying across borrowers, banks lower each depositor's risk and reduce the overall cost of screening loans. They also create liquidity through maturity transformation: for example, banks can fund long term projects using short term deposits because not all savers withdraw simultaneously. In short, intermediaries offer payment and deposit services and tailor financial instruments (deposits, insurance, mutual funds, etc.) to match savers' liquidity and risk preferences. These intermediation services, allocating savings, providing liquidity, and managing risk improve capital allocation and have been linked empirically to higher growth (Wensveen, 2003; Halperin, 2017).

Key functions of financial intermediaries according to Wensveen, (2003) and Halperin, (2017) include First, they allocate savings to investment, identifying and funding productive projects that individual savers could not finance alone. Second, they manage risk through pooling and diversification; by holding a large portfolio of loans, they absorb individual borrower defaults, protecting depositors. This is complemented by "delegated monitoring," where banks use their expertise to evaluate borrowers, lowering information costs for the entire economy. A third critical function is liquidity creation. Through maturity transformation, banks use short-term deposits to fund long-term loans, as not all depositors withdraw their funds at once. This provides savers with ready access to their money while ensuring capital is available for business investment. Finally, intermediaries facilitate payments and offer tailored financial services, from simple checking accounts to insurance, that match the risk and liquidity preferences of savers.

The intermediation process of financial institutions is crucial to the functioning of modern economies. The financial system has many components that interact to drive economic growth, with banks and other financial institutions being crucial and interconnected (Greenbaum et al., 2016). Through price fluctuations and risks, financial intermediaries play a significant role in the monetary economy and are the engine that drives the financial cycle (Adrian & Song Shin, 2010).

2.1.2 Information Asymmetry and Lending Technologies

Credit markets suffer from asymmetric information, where borrowers typically know more about their projects or creditworthiness than lenders. To overcome this, financial institutions use different lending technologies:

The first is relationship lending, which relies on “soft”, qualitative information gathered through ongoing, personal contact with a borrower (Pang, 2019). This approach is a cornerstone for rural and community banks. A loan officer develops a deep understanding of a firm's management, operations, and local context, details absent from formal records. While difficult to scale, this method is vital for financing opaque or young micro and small enterprises (MSEs) that lack extensive credit histories. As Bernanke, (2011) Hughes et al., (2022), this relational advantage, built on local knowledge and trust, is something that “cannot be matched by models or algorithms”, making these lenders particularly effective, especially during economic downturns.

In contrast, transactional lending depends on “hard”, quantifiable data like credit scores, audited financials, and collateral values. Used predominantly by commercial banks, this arm’s-length approach is cost-effective and easily scaled, as loans are approved based on standardized rules. However, it naturally favors borrowers with established credit histories or substantial assets, often excluding very small or informal firms. As information technology advances, the literature notes a shift toward this more efficient model, which can lead commercial banks to focus on larger, less risky loans rather than microcredit (Fdic, 2024; Pang, 2019).

A newer model algorithmic (Fintech) lending, uses machine learning to analyze vast datasets, including alternative metrics like mobile phone usage or social media activity. By leveraging this "big data," fintech platforms can often predict default with surprising accuracy, allowing them to extend credit to previously "credit-invisible" individuals. This process reduces information asymmetry without human interaction, dramatically speeding up approvals and lowering costs. The trade-off is the loss of qualitative nuance a relationship lender would catch. While celebrated for expanding financial access, its novel use of data raises ongoing questions about credit risk and regulatory oversight (Hughes et al., 2022)

2.1.3 Financial Intermediation by BPR

Rural Banks (BPR) are local banking institutions that collect savings from rural/urban communities and channel them back into loans to MSMEs and other small businesses. Theoretically, BPRs act as financial intermediaries, facilitating the flow of funds from savers to small borrowers. Commonly used indicators of BPR intermediation include the amount of BPR credit, growth in third-party funds (DPK), the credit-to-DPK ratio (LDR), and the microcredit market share. Previous research has shown that BPR financing, particularly working capital loans, has a positive effect on MSME output. For example, (Budiyanti, 2018) noted that BPR working capital loans can increase GRDP, but the effect is still very small, implying that working capital loans are still not being used for productive sectors. Another study (Devi, 2016) shows that an increase in overall BPR credit contributes to regional economic growth and poverty reduction. (Chen et al., 2025) found that transforming rural cooperatives into rural banks (BPR) can encourage the growth of micro-family farming in rural areas through two mechanisms: reducing financing constraints and reducing leverage. (Anwar et al., 2019) also stated in their research implications that BPR financing efficiency can improve the local economy. Furthermore, (Hasan et al., 2021) found that local banks (BPR), with their capabilities and local wisdom, are far more capable than large-scale commercial banks in providing loans tailored to the characteristics of MSME development. This empirical evidence supports the view that BPR intermediation mobilizes funds for the micro-sector, which in turn increases MSME production activities and encourages local economic expansion.

2.1.4 Financial Intermediation by Commercial Banks

Commercial banks are conventional banking institutions that collect current accounts, savings, and large time deposits from the general public and distribute credit to various sectors (consumption, working capital, investment, and multipurpose). Commercial banks' primary role as financial intermediaries in the economy is reflected in their credit services to consumers and businesses (Otoritas Jasa Keuangan, 2021). Indicators of commercial bank intermediation include total bank assets, the number of quality loans, third-party fund growth, the credit-to-deposit ratio (LDR), and the credit-to-GDP/GRDP ratio. The literature notes a positive relationship between commercial bank credit distribution and economic performance. However, the impact of bank lending, as the oldest and most prominent financing approach, has experienced a slight decline in its impact on GDP worldwide (Zhang et al., 2019). Domestically, research (Mulyati & Widiawati, 2020) found that commercial bank lending had a significant positive effect on Gross Regional Domestic Product (GRDP) in Tasikmalaya City. The study reported that an increase in commercial bank credit volume was associated with an increase in regional GRDP. Research (Afonso & Blanco-Arana, 2024) found that commercial bank intermediation activities for financial inclusion in developing countries had a positive impact on per capita economic growth (GDP). Meanwhile, (Ho & Saadaoui, 2022) found that the relationship between financial activities and economic growth is very complex. Taking a sample of ASEAN countries from 1993 to 2019, a significance level of only 0.08 was found. Thus, if the significance level is 95%, bank intermediation will not affect GDP.

However, if the significance level is lowered to 90%, bank intermediation can only affect GDP. Thus, commercial bank intermediation is conceptually capable of stimulating consumption and investment, which triggers regional economic growth.

2.1.4 P2P Fintech Lending Intermediation

Fintech P2P (peer-to-peer) lending is an information technology-based financial service that directly connects lenders and borrowers through a digital platform (Dwi et al., 2022; Syofyan et al., 2025). In P2P fintech, the public or investors can lend funds online to MSMEs or individuals without going through a bank. General indicators of P2P fintech include the number of platforms licensed by the OJK, total loans disbursed, the number of borrowers/lenders, and the fintech's non-performing loan (NPL) rate (Otoritas Jasa Keuangan, 2016, 2022). OJK data shows that the P2P fintech sector continues to grow rapidly, with outstanding P2P lending loans increasing by 28.72 percent year-on-year to IDR 80.02 trillion. The aggregate non-performing loan risk (TWP90) is at 2.77 percent (Otoritas Jasa Keuangan, 2025b). Empirical studies confirm the role of P2P fintech as a financing alternative for MSMEs. Research (Ciza et al., 2025) shows that informal financing positively impacts the financial performance of MSMEs and can increase access to formal financing. (Musdalifa et al., 2021) found that fintech P2P lending helps improve the financial performance of MSMEs by facilitating access to business capital. The study reported that P2P lending has a positive and significant impact on MSME business performance. Furthermore, (Luo et al., 2025) found that Fintech Lending can improve the quality of consumption structures, a manifestation of the quality of life of 160,000 Ant Group users observed between 2017 and 2019. In addition to supporting MSMEs and consumption, Fintech has also been empirically proven to increase regional economic growth in 246 cities in China (Huang et al., 2025). Similarly, (Jun & Ran, 2024) found that intermediation through digital finance, or Fintech, can ease the financing burden on MSMEs, which contribute up to 60% to the Chinese economy. Therefore, intermediation through P2P fintech is seen as expanding access to financing for MSMEs that have previously been completely excluded from conventional banking.

2.1.5 Per Capita Consumption

Per capita consumption is defined as the average household consumption expenditure per person in a given period (Badan Pusat Statistik Kabupaten Pidie, 2017). This variable reflects the level of welfare and income of the people in a region. The higher the per capita consumption, the greater the portion of income used for living expenses. A commonly used indicator is the value of per capita consumption expenditure (in rupiah). Household consumption is generally the largest component of GRDP; for example, Surakarta data shows that the proportion of final consumption expenditure to GRDP reached 61.70% in 2020 (Kementerian Keuangan, 2023). This emphasizes the importance of household consumption to the regional economy. Access to financing (through BPRs, commercial banks, or fintech) can increase people's purchasing power. When credit access is widespread and inclusive, residents tend to increase consumption due to greater funding capacity (Afonso & Blanco-Arana, 2024). In other words, good financial intermediation can encourage increased per capita consumption, which in turn strengthens domestic demand.

2.1.6 MSME Production

MSME production refers to the total output or added value generated by the micro, small, and medium enterprise sector in a region. MSMEs are defined based on asset and turnover criteria according to statutory regulations, and they serve as the backbone of the local economy. MSME productivity indicators include production value (volume production or turnover), productivity per worker, and growth in the number of business units. Government regulations regarding access to capital have been established to increase MSME production, such as the People's Business Credit (KUR) program and ultra-micro financing through the Ministry of Finance (Manganti, 2025).

Empirical studies demonstrate the strategic role of MSMEs in economic growth. Economic growth is indeed determined by multiple factors, including technology, capital, and human resources, which are significant contributors to MSMEs (Al-Karkhi, 2024). A spatial study in Makassar also found that government policies in the form of business capital support and human resource capacity building simultaneously positively influenced the development of MSME production, thereby supporting the local economy (Surya et al., 2021). Furthermore, MSMEs contribute significantly to job creation and the growth of regional domestic products, but unfortunately, their role is often hampered by a lack of capital (Nanta et al., 2022). In other words, the availability of adequate financing through various financial intermediation channels will encourage the expansion of MSME production.

2.1.7 Gross Regional Domestic Product (GRDP)

GRDP is the total value of all final goods and services produced in a region during a given period, valued at current or constant prices. GRDP is often used as a primary indicator of regional economic conditions (BPS, 2022). GRDP is determined by the intermediation of financial institutions (Greenbaum et al., 2016). In addition to financial intermediation, household consumption and the added value of the MSME sector are two important components of GRDP. For example, the household consumption sector can account for a large portion of GRDP (around 60–70%), while MSME production contributes a significant proportion to the regional economic structure (Nanta et al., 2022). In addition, (Woźniak et al., 2019) found a strong relationship between components of gross domestic product (GDP) and the development of small and medium

enterprises (SMEs) in Poland from 1996 to 2016. In other words, the financial intermediation variables of rural banks, commercial banks, and fintech indirectly influence regional economic growth through their impact on per capita consumption and MSME production.

3. Conceptual Framework and Research Hypothesis

Conceptual framework showing direct and indirect pathways from financial intermediation (BPR, commercial banks, fintech P2P) to Per-Capita Consumption and MSME Production, and their effects on GRDP.

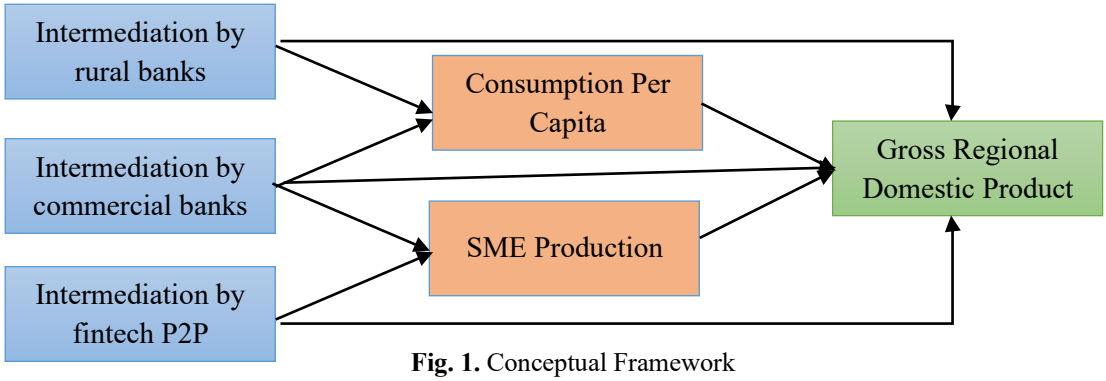

Fig. 1. Conceptual Framework

Fig. 1 presents the theoretical causal network motivating the empirical model. Three intermediation channels (X1 = BPR, X2 = Commercial banks, X3 = Fintech P2P) are specified as exogenous drivers that may affect both household demand (Y1 = per-capita consumption) and supply/productivity (Y2 = MSME production). Both Y1 and Y2 are then modeled as determinants of regional income (Z = GRDP). Direct paths from each X to Z are also included (hypotheses H9–H11) to allow for both direct and mediated effects. Therefore, the conceptual model captures *simultaneous* direct and indirect causal mechanisms that the empirical PLS-SEM estimates.

Hypothesis (plain): intermediation boosts consumption and MSME output, and those increases then lift regional growth. Based on the literature review and the framework above, the research hypothesis proposed is:

a. **H_1:** *Financial intermediation by rural banks has a positive effect on per capita consumption.*
b. **H_2:** *Financial intermediation by commercial banks has a positive effect on per capita consumption.*
c. **H_3:** *Financial intermediation by fintech P2P lending has a positive effect on per capita consumption.*
d. **H_4:** *Financial intermediation by rural banks has a positive effect on MSME production.*
e. **H_5:** *Financial intermediation by commercial banks has a positive effect on MSME production.*
f. **H_6:** *Financial intermediation by fintech P2P lending has a positive effect on MSME production.*
g. **H_7:** *MSME production has a positive effect on Gross Domestic Product.*
h. **H_8:** *Per capita consumption has a positive effect on Gross Domestic Product.*
i. **H_9:** *Financial intermediation by rural banks has a positive effect on Gross Domestic Product.*
j. **H_{10}:** *Financial intermediation by commercial banks has a positive effect on Gross Domestic Product.*
k. **H_{11}:** *Financial intermediation by fintech P2P lending has a positive effect on Gross Domestic Product.*

Each of the above hypotheses reflects the causal relationships that have been identified in the literature, namely that increased financial intermediation (from each source) will increase household consumption capacity and MSME production capacity, which collectively drive GRDP growth. H9–H11 tests whether financial intermediation channels (BPR, commercial banks, fintech) exert a direct effect on GRDP that is independent of the two hypothesized mediators (per-capita consumption and MSME production). These direct paths are included not because strong theoretical priors predict large direct X→GRDP effects, but to empirically distinguish partial mediation (direct + indirect channels) from full mediation (indirect channels only). If the direct effects are weak or non-significant while indirect paths are significant, this pattern provides evidence that the impact of intermediation on GRDP operates primarily through the proposed consumption and MSME production channels.

4. Research Methods

4.1 Types and Approaches to Research

This study uses a descriptive quantitative approach and causality with spatial panel data analysis across all provinces in Indonesia. The objective is to analyze the influence of financial intermediation by rural banks (BPR), commercial banks, and fintech P2P lending on per capita consumption, MSME production, and its implications for economic growth as proxied by Gross Regional Domestic Product (GRDP). The causality model was tested using Partial Least Squares-Structural Equation

Modelling (PLS-SEM) through the SmartPLS application. We chose PLS-SEM because the paper's primary aim is to estimate a network of simultaneously interacting relationships and to test indirect (mediating) effects within one coherent model. Unlike conventional panel regressions that typically estimate single equations separately and require additional steps to assess mediation, SEM directly models the theoretical causal network and uses bootstrap procedures to test path-level and indirect effects, an approach widely recommended for mediation and complex path analysis. Moreover, PLS-SEM's favorable small-sample and non-normality properties make it appropriate for our provincial panel (34 provinces × 3 years), and the method has become the standard approach in applied research when the goal is explanation and prediction of interconnected latent/observed constructs (Hughes et al., 2022).

4.2 Population and Sample

Our analysis employs a provincial panel dataset comprising 102 observations (34 provinces over 3 years), which we deem sufficient for the Partial Least Squares–Structural Equation Modelling (PLS-SEM) approach used in this study. This conclusion is supported by two key considerations. First, applying the common "10-times rule" for PLS-SEM, our model, which has a maximum of three predictors for any single outcome variable, requires a minimum of 30 observations. Our sample of 102 comfortably surpasses this threshold. Second, and more importantly, our sample size aligns with conservative guidelines in the PLS-SEM literature. For models of modest complexity that use single-indicator measures, as ours does, a sample in the low hundreds is generally considered adequate. This research uses secondary data sourced from:

1. OJK for intermediation data on rural banks (BPR), commercial banks, and fintech P2P lending (credit disbursement and outstanding loans).
2. BPS for data on per capita consumption, MSME value-added/production, and GRDP per province.

All data was obtained through official publications on the ojk.go.id and bps.go.id websites.

4.3 Operational Definition of Variables

The operational definition of each variable is described as follows:

1. X1 (BPR Intermediation): Annual delta of BPR credit disbursement in each province (in billions of rupiah).
2. X2 (Commercial Bank Intermediation): Annual delta of commercial bank credit disbursement (consumer credit, working capital, investment) in each province.
3. X3 (P2P Fintech Lending Intermediation): Annual delta of outstanding P2P fintech lending loans in the province.
4. Y1 (Per Capita Consumption): Average monthly per capita expenditure/consumption (in rupiah) as released by BPS.
5. Y2 (MSME Production): Annual Y-on-Y Production Growth of Micro and Small-Scale Industries per province.
6. Z (GRDP): Gross Regional Domestic Product at constant prices as a proxy for regional economic growth.

4.4 Data Analysis Techniques

The analysis was conducted in several stages:

1) Spatial Analysis: Visualization of the distribution of intermediary BPRs, commercial banks, fintech P2P lending and GRDP on a provincial map.
2) Structural Equation Modeling (SEM-PLS) Analysis

- The structural model was estimated using Partial Least Squares (PLS) path modelling. Given that all constructs were operationalized using single, objective administrative indicators (such as provincial credit data and official statistics from BPS), we treated them as observed variables rather than as multi-item latent constructs. Consequently, standard measurement-model metrics like Average Variance Extracted (AVE), composite reliability, and discriminant validity—which are designed for models with multi-item scales—were not applicable and are not reported.
- The evaluation of the inner (structural) model therefore focused on its explanatory and predictive power. We assessed the model's fit using the Standardized Root Mean Square Residual (SRMR), Chi-Square, and the Normed Fit Index (NFI). Furthermore, we examined the coefficient of determination (R^2) and the predictive relevance (Q^2) of the dependent constructs. The significance of the path coefficients was tested via bootstrapping, primarily at the 95% confidence level ($p < 0.05$), with supplementary analysis conducted at the 90% confidence level ($p < 0.10$) to explore marginally significant relationships.
- Mediation testing strategy. To evaluate whether the effects of X_1 (BPR), X_2 (Commercial banks), and X_3 (Fintech) on GRDP operate indirectly via per-capita consumption (Y_1) and MSME production (Y_2), we report bootstrapped direct, indirect, and total effects for every X→Z relation. Indirect effects were estimated and tested using non-parametric bootstrapping (5,000 resamples) within the PLS-SEM framework, consistent with contemporary mediation practice in SEM (Preacher & Hayes, 2008; Zhao et al., 2010).

4.5 Research Model

Mathematically, the structural model used is:

- $Y1 = \beta1 \cdot X1 + \beta2 \cdot X2 + \beta3 \cdot X3 + \varepsilon1$
- $Y2 = \beta4 \cdot X1 + \beta5 \cdot X2 + \beta6 \cdot X3 + \varepsilon2$
- $Z = \beta7 \cdot Y1 + \beta8 \cdot Y2 + \varepsilon3$

where:

X1 = BPR Intermediation
X2 = Commercial Bank Intermediation
X3 = Fintech P2P Lending Intermediation
Y1 = Per Capita Consumption
Y2 = MSME Production
Z = GRDP

We chose PLS-SEM because it handles non-normal data, works with our modest sample (102 observations), and estimates direct plus indirect effects in one framework.

5. Results and Discussion

5.1 Spatial Analysis

Provincial map of commercial-bank intermediation intensity (annual Δ commercial-bank credit, 2022–2024):

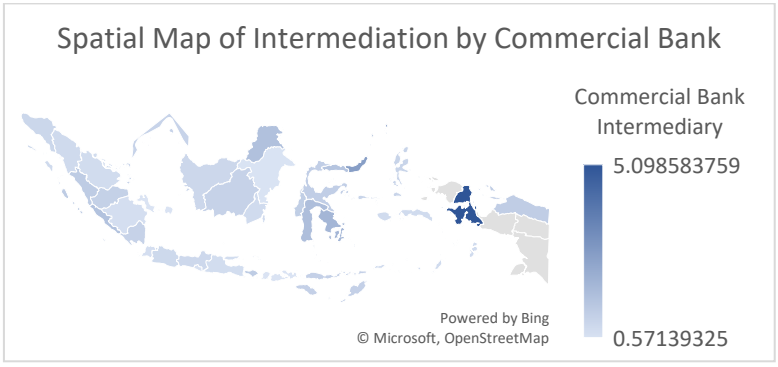

Fig. 2. The provincial intensity of commercial bank lending

Fig. 2 depicts the provincial intensity of commercial bank lending, revealing a distinct geographical concentration. In nominal terms, commercial lending is heavily clustered in provinces with robust deposit bases and mature financial markets, such as those in Java. These regions consequently exhibit moderate loan-to-deposit ratios (LDR). Conversely, in areas with limited local funding, such as Papua and North Maluku, the credit-to-deposit ratio is markedly high. This pattern indicates a relative funding disequilibrium, where credit extension appears to be substantially decoupled from the local deposit base.

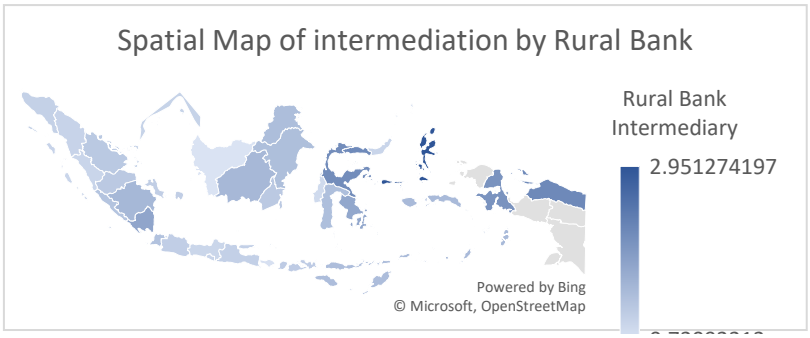

Fig. 3. Provincial map of BPR intermediation intensity (annual Δ BPR credit, 2022–2024)

Fig. 3 displays the intensity of BPR (rural bank) intermediation measured as the annual change in BPR credit per province (2022–2024). Darker provinces indicate stronger BPR credit growth relative to local economic scale, the map shows higher

BPR intensity in several eastern provinces (and pockets of Sumatra) consistent with BPRs' local-market focus. The visual highlights geographic concentration of BPR lending and helps explain why BPRs exert stronger MSME production effects in provinces where they are locally active.

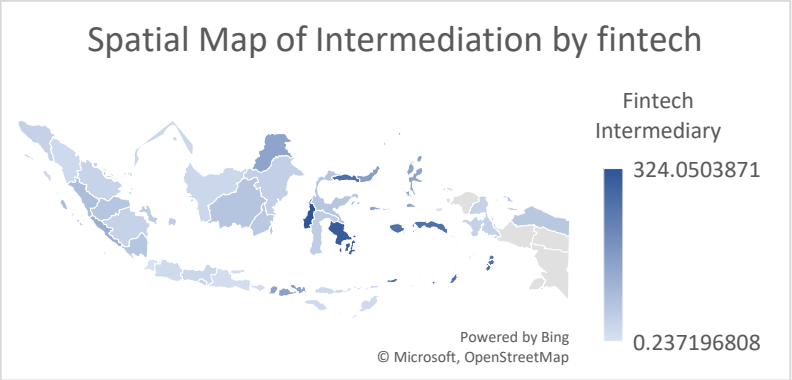

Fig. 4. Provincial map of fintech P2P lending intensity (annual Δ outstanding P2P loans, 2022–2024).

Fig. 4 displays fintech P2P lending intensity across provinces: fintech shows the most uneven geographic distribution with extreme intensities in Sulawesi, Kalimantan, Nusa Tenggara and especially Maluku, reflecting rapid fintech penetration relative to local economic scale. The map visually supports our interpretation that fintech is expanding fastest where conventional banking is thin, and that its primary effect in the structural model is on consumption rather than MSME production. These extreme regional fintech intensities are important when discussing potential over-leverage and consumer-protection risks in specific provinces.

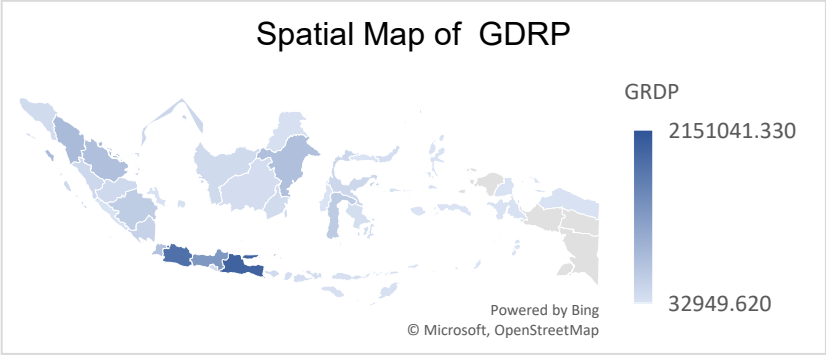

Fig. 5. Composite spatial comparison Gross Regional Domestic Product (GRDP) per province in 2022–2024

Fig. 5 reveal a pronounced regional disparity in economic output, as measured by GRDP. Java accounts for a disproportionately high share, followed distantly by Sumatra and Kalimantan. In contrast, regions such as Papua, Sulawesi, Nusa Tenggara, and Maluku demonstrate significantly lower GRDP levels. This pattern suggests an inverse correlation between a region's economic size and its financial intermediation intensity. Notably, Java exhibits high GRDP yet a relatively low level of intermediation, whereas less economically developed regions like Maluku and Papua display a much higher intensity of fintech activity. The spatial analysis reveals heterogeneous patterns between regional GDP (PDRB) and the intensity of financial intermediation across institutions:

- Java (average PDRB: 7,652,274) records weighted mean intermediation by commercial banks of 0.84, BPR 0.97, and fintech 13.49.
- Sumatra (PDRB: 2,719,736) records weighted mean intermediation commercial banks 0.94, BPR 1.16, fintech 44.28.
- Kalimantan (PDRB: 1,081,846) records weighted mean intermediation commercial banks 0.81, BPR 1.20, fintech 54.70.
- Sulawesi (PDRB: 967,000) records weighted mean intermediation commercial banks 1.17, BPR 1.06, fintech 120.56.
- Bali & Nusa Tenggara (relatively small PDRB: 431,000) records weighted mean intermediation commercial banks 1.05, BPR 0.99, fintech 56.91.
- Papua (small PDRB: 101,073) records weighted mean intermediation commercial banks 3.14 (very high), BPR 2.05, fintech 52.13.
- Maluku (smallest PDRB: 92,362) records weighted mean intermediation commercial banks 0.95, BPR 2.31, fintech 192.14 (very high).

Regions with a very large PDRB, such as Java, exhibit relatively low commercial bank intermediation, a pattern consistent with substantial deposit bases (DPK) that mechanically lower credit/DPK ratios and reflect more conservative intermediation.

Conversely, regions with low PDRB (Papua, Maluku, Sulawesi) display very high intermediation across multiple financial providers, indicating an imbalance between credit allocation and the local funding base. The exceptionally high fintech intermediation intensities observed in Sulawesi, Kalimantan, and Nusa Tenggara underscore uneven access to conventional banking across islands. The spatial patterns suggest possible reliance on external funds or on micro quick credit from fintech products that are relatively intensive compared with the limited local economic base. Sumatra and Kalimantan appear to be in an intermediate position, suggesting a transitional state in both PDRB and financial intermediation structures.

5.2 Goodness-of-Fit Model Test

Before conducting hypothesis testing, the model is first evaluated. For PLS-SEM, one measure of model goodness-of-fit is the Standardized Root Mean Square Residual (SRMR).

Table 1
Model Fit Test Results

Criteria	Saturated Model	Estimated Model
SRMR	0.091	0.092
d_ULS	0.375	0.384
d_G	0.093	0.095
Chi-Square	55.729	56.717
NFI	0.346	0.335

Source: Processed Data (2025)

Based on Table 1, the SRMR value of 0.091 below 0.10 (0-1) generally indicates a good model fit (Hu & Bentler, 1999).

5.3 Hypothesis Testing

The structural model was evaluated using **PLS-SEM**, with bootstrapping (500 iterations) to assess path coefficients and significance. Coefficients are original sample estimates; p-values shown in parentheses.

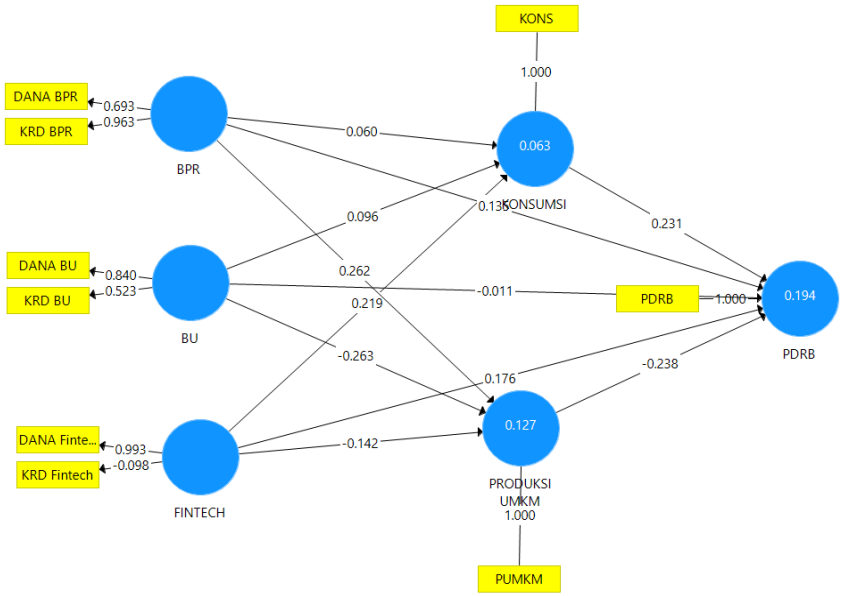

Fig. 6. Structural Model Results
Source: Processed Data (2025)

Fig. 6 displays the structural relationships and estimated path coefficients from the PLS-SEM. Key, statistically supported findings are: BPR → MSME Production = 0.262 (p = 0.004) and Commercial Banks → MSME Production = 0.263 (p = 0.015) — both significant at the 5% level — indicating that traditional banking channels materially raise MSME output. Fintech → Per-capita Consumption = 0.219 (p = 0.078) and Consumption → GRDP = 0.231 (p = 0.085) are significant at the 10% level, suggesting fintech primarily operates through the consumption channel. MSME Production → GRDP = 0.238 (p = 0.001) is strongly significant (p < 0.01). Other direct paths (e.g., BPR → Consumption, Commercial → Consumption, Fintech → MSME Production, and the direct X → GRDP paths) are not statistically significant in this model. All coefficient values and p-values are tabulated in Table 2 and summarized visually here for immediate interpretation.

Table 2
Analysis Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
BPR → Consumption	0.060	0.051	0.108	0.556	0.579
BPR → GRDP	0.135	0.127	0.099	1.363	0.174
BPR → MSME Production	0.262	0.249	0.090	2.924	0.004
Commercial Banks → Consumption	0.096	0.104	0.135	0.711	0.477
Commercial Banks → GRDP	0.011	0.000	0.102	0.105	0.916
Commercial Banks → MSME Production	0.263	0.241	0.108	2.441	0.015
Fintech → Consumption	0.219	0.222	0.124	1.768	0.078
Fintech → GRDP	0.176	0.161	0.126	1.400	0.162
Fintech → MSME Production	0.142	0.139	0.101	1.404	0.161
Consumption → GRDP	0.231	0.218	0.134	1.724	0.085
MSME Production → GRDP	0.238	0.234	0.073	3.267	0.001

Source: Processed Data (2025)

The Influence of Financial Intermediation on Consumption

Table 2 shows that financing through BPR and commercial banks does not significantly impact household consumption (t=0.556 and 0.711; p>0.10), (**H1 and H2 are rejected**). Conversely, fintech has a significant positive effect on consumption (coefficient ~0.22; t≈1.77; p≈0.078) (**H3 is accepted**). This means that technology-based financial services (Fintech) can increase consumption expenditure, while the role of rural banks and commercial banks in this model is less significant. These results are consistent with previous findings that the development of Fintech encourages consumer behavior in society (Saraswati et al., 2022) who found that fintech significantly increases household consumption in Indonesia in both the short and long term. Furthermore, (D. Hu et al., 2023) conducted a study using family panel data in China and the Digital Financial Inclusion Index, finding that the development of digital finance (fintech P2P Lending) plays a role in driving increased household consumption. Liquidity constraints, ease of payment, investment efficiency, and household risk hedging capabilities have proven to be important channels for the fintech P2P lending mechanism. In other words, increased access to modern finance (Fintech) has been shown to strengthen people's purchasing power, in line with the theory of consumer economics.

The Influence of Financial Intermediation → MSME Production

Table 2 shows a significant positive effect from BPR financing on MSME output, (t=2.924; p=0.004) and from Commercial Banks (t=2.441; p=0.015) (**H4 and H5 were accepted**), while the Fintech–MSME channel was not significant (t=1.404; p=0.161) (**H6 was rejected**). This means that increasing BPR and commercial bank funding directly increases MSME production. Traditional financial intermediation support (productive credit) through BPR/BU is still an important determinant in increasing MSME production capacity. This is in line with numerous studies (Abu et al., 2025; Berger et al., 2014; Schweitzer & Barkley, 2017) that banks of various sizes are still the main source of external capital for MSMEs. Practically, infrastructure and access to banking credit remain the primary choice before switching to other institutions in MSMEs' efforts to increase their productivity and market share. Thus, these results confirm that the role of traditional financial institutions facilitates the development of the MSME sector.

Meanwhile, fintech P2P lending has not yet become an optimal source of funding for MSMEs. This can be explained by the characteristics of fintech financing products, which generally have higher interest rates than conventional bank loans, as well as relatively short loan tenors, making them less suitable for sustainable working capital needs or medium- to long-term productive investments. Furthermore, in terms of business actor preferences, MSMEs tend to require funding with low capital costs and flexible terms to support their production cycles. Unlike rural banks and commercial banks, which have specific MSME credit schemes, fintech is more often used as a temporary, quick funding solution (emergency lending), particularly to cover household consumption needs or urgent expenses. This phenomenon is also influenced by the low digital financial literacy of some MSMEs in the regions, so the adoption of fintech for productive purposes is still limited to certain segments with better access to technology and financial management awareness. Thus, although fintech can increase public consumption, its contribution to MSME production growth is still insignificant due to factors such as cost, tenor, literacy, and a mismatch between funding needs and the productive sector.

The results of this study align with (Abu et al., 2025)) who asserted that Fintech platforms, in their business processes, utilize more personal data than financial data or the feasibility of MSMEs, raising concerns about data privacy and cybersecurity. Without robust cybersecurity protection, MSMEs are hesitant to adopt digital financial services, thus limiting Fintech's potential to expand financial access. Therefore, a declaration to protect financial data from threats such as data breaches, phishing, and ransomware is crucial for building MSME trust in Fintech platforms. Furthermore, regulators can encourage collaboration between large banks and Fintech, as they are in fact more capable of increasing MSME capital accessibility than the government developing smaller banks to reach MSMEs (Sheng, 2021).

The Influence of MSME Production on GRDP

The results of Table 2 show that MSME production has a significant positive effect on regional economic growth (coefficient t = 3.267; p = 0.001) with a 95% confidence level (**H7 is accepted**). This means that any increase in MSME added value or output directly drives an increase in the province's Gross Regional Domestic Product (GRDP). MSMEs matter for GRDP for three main reasons: large structural share of output and employment, strong local multiplier effects, and agility in post-shock recovery:

a. The structural contribution of MSMEs to the regional economy is substantial. MSMEs contribute more than 60% of Indonesia's GDP and 97% of national employment. With a production base spread even to rural areas, MSMEs are the driving force of local economic activity, so that any increase in their output is directly reflected in the GRDP (Fridayani et al., 2024; Kurniadi et al., 2024).
b. The multiplier effect of MSME activity. MSME production not only increases the added value of the business sector but also creates demand for inputs for other sectors, reduces poverty, creates jobs, generates income, and generates wealth, resulting in a relatively high economic multiplier effect (Manzoor et al., 2021; Nurhasanah & Tiyasiningsih, 2023).
c. The resilience and flexibility of MSMEs in responding to economic fluctuations or restrictions. This phenomenon is clearly visible in the post-pandemic recovery period, where GRDP growth is largely driven by the recovery of MSME activities (Chotimah et al., 2025; Handoko, 2024; Liu et al., 2022; Madhavan et al., 2022).

Thus, these results confirm that MSMEs are an essential component in the regional economic structure, so that increasing access to financing and MSME production capacity is a key strategy in driving sustainable GRDP growth.

The Influence of Consumption on GRDP

Further analysis from Table 2 shows that the consumption variable has a significant positive effect on GRDP (regional income) growth: coefficient ($t \approx 1.724$; $p \approx 0.085$). With a 90% confidence level, the effect of consumption on GRDP is considered significant (**H8 is accepted**). This means that increases in household consumption expenditure in a region tend to be followed by higher economic growth (GRDP). This result is in accordance with the macroeconomic principle that household consumption is the main driver of aggregate demand. In general, household expenditure reaches around 60% of GDP (OECD, 2022). Research (Dutu, 2016) found that the cause of the economic decline was due to declining consumption by both households and the government. emphasizes that fluctuations in consumption significantly affect economic performance.

The Impact of Financial Intermediation on GRDP

The analysis results show that intermediation by rural banks (BPR) has no significant effect on GRDP (t=1.363; p=0.174), thus **rejecting H9**. BPR institutions in Indonesia are relatively small in scale and have low intermediation efficiency. Efficiency studies indicate that BPRs are inefficient in channelling funds (their intermediation role) (Wasiaturrahma et al., 2020), thus limiting their ability to channel funds to the productive sector. With small capital and a typically micro-loan reach (mostly for small businesses/consumers), BPR networks are not large enough to significantly drive national economic growth. Furthermore, many BPRs face high levels of non-performing loans (NPLs) and capital/technology constraints, thus lowering their intermediation potential compared to large banks. As noted (Wiwoho et al., 2021)), empirically, there is not always a positive correlation between loan volume (intermediation) and regional economic growth. Therefore, logically, BPR intermediation, with its limited scale, is unable to provide a significant positive boost to national GDP.

Commercial banks, despite their substantial assets, do not automatically significantly boost GDP. The analysis shows that intermediation by commercial banks has no significant effect on GRDP (t=0.105; p=0.916), thus **rejecting H10**. Several international studies have found that bank credit expansion does not always increase economic growth. For example, (Miftari, 2023) reported that bank credit (bank intermediation) did not increase economic growth in Eastern Europe, and the correlation was negative. Similarly, a study (Ho & Saadaoui, 2022) showed that after passing a certain threshold, increased bank credit did not have a significant positive effect on growth. Furthermore, research (Wibowo et al., 2023) found that not all intermediation activities affect economic growth. Credit distribution has an impact, but fundraising has no effect. Field observations in Indonesia show that large bank credit tends to surge during strong economic times and contract during downturns, indicating a cyclical nature where banks simply follow economic conditions. Furthermore, large banks often lend to established sectors (e.g., infrastructure projects or large corporations), so additional credit does not significantly increase new output. These factors explain why commercial bank intermediation has not been shown to have a significant positive impact on GDP, even though credit can theoretically stimulate investment.

Fintech P2P lending is a new financial intermediation channel whose scale and penetration are still very limited. The analysis shows that intermediation by fintech P2P lending does not significantly impact GRDP (t=0.105; p=0.916), thus **H11 is rejected**. Recent research indicates that P2P lending variables do not significantly impact economic growth (Sutjiono & Leng, 2024). This factually makes sense because the volume of P2P funding remains relatively small compared to the total economy, and most of its distribution focuses on consumer needs. In other words, although fintech supports financial inclusion, there

has been no significant surge in investment that could significantly drive national GDP. As noted (Sutjiono & Leng, 2024), while e-money adoption has had a significant impact on the economy, P2P lending has not shown a significant impact. Field observations confirm that fintech's advantage in accessing the unbanked population is limited to expanding the market base and has not yet expanded to a scale that stimulates aggregate growth. Thus, the small scale of fintech businesses, fragmented credit allocation among many micro-borrowers, and potential risks and regulations that hinder rapid growth mean that P2P lending has not yet had a significant positive impact on Indonesia's GDP (Sutjiono & Leng, 2024).
Overall, traditional banks matter more for MSME production; fintech has a clearer link with household spending. Subsequently, MSME production growth and high consumption contribute to increasing GRDP. This is consistent with economic literature: an inclusive financial sector supports MSMEs (a key economic sector, and high domestic consumption drives economic growth).

6. Conclusion

This study examined how different forms of financial intermediation: rural banks (BPR), commercial banks, and fintech (P2P lending), influence Indonesia's regional economic growth, measured by Gross Regional Domestic Product (GRDP). Using data from 34 provinces (2022–2024), our PLS-SEM analysis reveals distinct and specialized roles for each intermediary.

The primary finding is a clear divergence in impact channels. Traditional institutions (BPRs and commercial banks) significantly boost MSME production, confirming their critical role in supplying productive credit to businesses. In contrast, fintech lending does not significantly affect MSME output but does have a positive, if marginally significant, effect on per capita consumption. This suggests fintech's primary role is enhancing household purchasing power rather than funding business expansion. Furthermore, consumption itself positively influences GRDP, reinforcing its status as a key driver of domestic demand.

Notably, no intermediation channel directly and significantly increased GRDP. This can be attributed to their specific operational constraints: BPRs are limited by their small scale and microfinance focus, commercial bank lending is often pro-cyclical and concentrated in established sectors, and fintech's impact is tempered by its current orientation toward consumption and its nascent scale.

In summary, the findings suggest that financial intermediaries play complementary, not overlapping, roles. Policy aimed at fostering regional growth should leverage the strengths of each (harnessing traditional banks for MSME productivity and fintech for consumption stimulus) to create a synergistic effect on the broader economy.

7. Policy Recommendations

Based on empirical findings regarding the role of financial intermediation on household consumption, MSME production, and regional economic growth, several strategic policy recommendations that can be taken by the regulator, regional governments, and related stakeholders are as follows:

a. Policy recommendations (derived from spatial analysis)
   - Enhance deposit inclusion (DPK) in regions with high loan-to-deposit ratios (LDR) to mitigate local liquidity risk — for instance through targeted savings literacy programs and incentives for local deposit mobilization.
   - In provinces where fintech intermediation exceeds 100, business models may generate over-leverage risks and elevated default rates that lead to aggressive local collection practices; thus, consumer protection frameworks and supervisory oversight of fintech should be strengthened.
   - Promote development of local placement instruments (e.g., regional bonds) so that surplus liquidity in Java can be channeled safely and transparently into productive projects outside Java.

b. Strengthening the Role of Rural Banks (BPR) and Commercial Banks in Productive Financing for MSMEs
   - Research results show that intermediation between Rural Banks (BPR) and Commercial Banks has a significant impact on MSME production. Since MSMEs contribute approximately 60% of national GDP, the regulator can encourage policy incentives in the form of reducing the minimum capital adequacy ratio for productive microcredit or providing regulatory relief for MSME credit to encourage banks to be more aggressive in disbursing productive financing.
   - Regional governments can facilitate a regional budget-based credit guarantee scheme to mitigate the risk of non-performing loans for MSMEs, thus increasing the confidence of BPRs/Commercial Banks in providing working capital loans to local MSMEs.

c. Optimizing the Role of Fintech to Increase Consumption and Financial Inclusion
   - Fintech has been shown to significantly increase household consumption, which impacts GRDP. The regulator needs to expand consumer protection-based supervision and regulations to ensure that fintech growth does not pose a risk of over-indebtedness but still boosts public purchasing power.

- Regional governments can utilize the P2P lending fintech platform for productive consumer financing subsidy programs, for example, purchasing household production equipment or MSME needs, so that growing consumption is more oriented towards improving long-term welfare.

d. Integrating Traditional and Digital Intermediation Policies
   - The regulator is advised to formulate a collaborative roadmap between rural banks (BPR), commercial banks, and fintech platforms, for example through digital onboarding for BPRs, which would enable them to utilize fintech technology to expand the reach of MSME services in remote areas.
   - Encourage channeling or co-funding schemes between commercial banks/BPRs and fintech P2P lending platforms to combine the advantages of formal funding with the speed of digital technology, ensuring a more equitable impact on consumption and production in the real sector.

e. Increasing Financial Literacy and Capacity of the Public and MSMEs
   - Research findings emphasize the need for inclusive financial intermediation. The regulator can expand digital financial literacy programs, particularly in provinces with low consumption levels, to enable more productive use of fintech.
   - Regional governments can conduct financial management training for MSMEs so that financing from BPRs/commercial banks is truly directed towards increasing production capacity, not just short-term consumption.

f. Monitoring and Evaluation of the Impact of Intermediation Policies
   - Regulator should periodically monitor the contribution of credit from rural banks (BPR), commercial banks, and fintech companies to household consumption, MSME production, and provincial GRDP growth. The results of this monitoring are crucial for assessing the effectiveness of implemented financial inclusion policies.
   - Regional governments can use these monitoring results as a basis for adjusting local fiscal policies (for example, regional tax incentives for MSMEs receiving productive financing).

In practice, policy should encourage banks to scale productive MSME loans and guide fintech toward safe, inclusive consumer finance so both channels reinforce regional growth.

8. Limitation

The model yields a satisfactory approximate fit, with an SRMR of 0.091 (saturated) and 0.092 (estimated) falling within accepted thresholds. However, the Normed Fit Index (NFI) of 0.335 is low, indicating a poor replication of the observed covariance matrix. We interpret this with caution for several methodological reasons. First, PLS-SEM is a variance-based estimator, and covariance-fit indices like NFI are often naturally depressed in such applications. Second, our use of single-indicator constructs limits the model's ability to account for measurement error, which inherently constrains covariance fit. Finally, model complexity coupled with a modest sample size (N=102) can further suppress these indices.

Given this context, we base our interpretation primarily on PLS-appropriate metrics: the SRMR, other distance measures (d_ULS, d_G), predictive performance (R^2, Q^2), and the significance of bootstrapped path coefficients. To ensure robustness, we report these alternative statistics and formally test indirect effects. We also acknowledge that the low NFI necessitates caution regarding global model fit and causal claims. Consequently, we propose model re-specifications—such as multi-item constructs or covariance-based SEM, as valuable avenues for future research to strengthen these findings.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Approval

This study involved no human participants and relied solely on publicly available secondary data; hence, ethical approval was not required.

Data Availability Statement

The dataset analyzed in this study is publicly available in the Zenodo Repository at https://doi.org/10.5281/zenodo.17287873

Author Contributions

Conceptualization, Rino Dwi Putra (R.D.P.), Haryanto Haryanto (H.H.), and Nelvirita (N.); methodology, R.D.P., Ridha Azka Raga (R.A.R.), and H.H.; formal analysis, R.D.P., R.A.R., and Halkadri Fitra (H.F.); investigation, R.D.P., N., and H.F.; resources, N. and Dian Indah Hayati (D.I.H.); data curation, N. and R.A.R.; writing—original draft preparation, R.D.P.; writing—review and editing, R.D.P., H.H., D.I.H., and H.F.; visualization, R.A.R. and H.F.; supervision, H.H. and D.I.H.; project administration, R.D.P. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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