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Regional Fiscal Performance and Inclusive Economic Growth in Yogyakarta's Digital Era

Wuku Astuti[1*], Baldric Siregar[2], Rudy Badrudin[3], Miswanto[4]

[1]Department of Accounting, Faculty of Economics, Universitas Widya Mataram, Yogyakarta, 55293, Indonesia
[2,3]Department of Accounting, Sekolah Tinggi Ilmu Ekonomi YKPN, Yogyakarta, 55281, Indonesia
[4]Department of Management, Sekolah Tinggi Ilmu Ekonomi YKPN, Yogyakarta, 55281, Indonesia

ABSTRACT

Purpose – This study examines the relationship between regional fiscal performance, economic growth, and inclusive economic growth in the Special Region of Yogyakarta, Indonesia, during the digital governance era.
Design/methodology/approach – Using panel data from five regencies/municipalities during 2008–2024, this study applies pooled OLS-based multiple regression. Regional fiscal performance is measured through fiscal independence, local own-source revenue effectiveness, expenditure efficiency, expenditure harmony, fiscal dependency, and regional revenue growth. Fiscal digitalization is examined as a moderating variable, while economic growth is assessed as a possible pathway variable through sequential regression evidence. The models were re-estimated using bootstrapped standard errors with 5,000 resamples and percentile confidence intervals.
Finding/Results – The results show that expenditure efficiency (coefficient = −1.645, p = 0.017), expenditure harmony (coefficient = −0.288, p = 0.023), and fiscal dependency (coefficient = −1.599, p < 0.001) are significantly associated with economic growth. Fiscal digitalization strengthens the relationships of fiscal independence and expenditure harmony with economic growth, with the significant moderation effect of expenditure harmony (coefficient = 0.215, p = 0.013), while the interaction between fiscal dependency and fiscal digitalization is only marginally significant at the 10% level. Economic growth is negatively associated with inclusive economic growth (coefficient = −2.342, p < 0.001), indicating that regional growth has not fully translated into inclusive welfare outcomes. Sequential regression further indicates that the expected pathway through economic growth is not supported in the hypothesized direction.
Originality/Value – This study integrates regional fiscal performance, fiscal digitalization, economic growth, and inclusive economic growth within a single empirical framework. The findings highlight the importance of fiscal digitalization while showing that economic growth does not automatically produce inclusive development.

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*Corresponding Author at:
Department of Accounting, Faculty of Economics, Universitas Widya Mataram, Yogyakarta, 55293, Indonesia
E-mail address: wukuastuti@gmail.com (Wuku Astuti)

1. Introduction

Fiscal decentralization has become an important public sector reform in many developing countries because it is expected to bring government closer to citizens, improve public service delivery, and strengthen local fiscal management (de Mello, 2000; Hung & Thanh, 2022; Oates, 1972; Rodriguez-Plesa et al., 2022). In Indonesia, fiscal decentralization was strengthened through Law No. 22 of 1999 and Law No. 25 of 1999, which gave local governments broader authority to manage revenue and expenditure based on regional needs. In principle, this authority should improve fiscal independence, optimize local own-source revenue, and support more responsive development policies (Christia & Ispriyarso, 2019; Lewis, 2023; Prayuda & Arifin, 2024; Saksono, 2025). Nevertheless, the extent to which these expected benefits have been realized remains uneven across regions.

However, the outcomes of fiscal decentralization have not always met expectations. Many regions remain dependent on central government transfers, while fiscal capacity, expenditure quality, and institutional readiness vary across local governments (Lewis, 2023; Sofilda et al., 2023). High fiscal dependency may reduce fiscal flexibility and weaken local innovation, while inefficient expenditure allocation may limit the contribution of regional budgets to economic growth and welfare improvement (Anggriawan & Prasetyia, 2025; Rahmawati et al., 2024). . This shows that fiscal authority alone is not sufficient; the quality of fiscal management is also crucial.

This issue has become more relevant in the digital governance era. The Indonesian government has promoted Electronic-Based Government Systems (SPBE), e-budgeting, e-audit, and Regional Government Information Systems (SIPD) to improve transparency, accountability, monitoring, and fiscal decision making (Heeks, 2017; Irwansyah et al., 2025). Fiscal digitalization may strengthen the relationship between fiscal performance and economic outcomes by improving budget planning, reporting, supervision, and data-based decision making. Recent evidence also indicates that digital government can enhance regional innovation, while digital financial development can contribute to more equitable access to public services (Gan et al., 2024; Yang & Gong, 2025). Nevertheless, digital systems do not automatically improve development outcomes unless supported by institutional capacity and effective fiscal governance.

Inclusive economic growth is also central to this study. Economic growth is not fully meaningful when its benefits are concentrated only in certain sectors, groups, or territories. Growth can be considered inclusive when it contributes to poverty reduction, employment creation, lower inequality, and broader access to economic opportunities (Amponsah et al., 2023; Karimu & Abubakar, 2025; Widianingsih et al., 2024). In Indonesia, regional growth may still coexist with poverty, unemployment, and inequality, indicating that economic expansion alone does not necessarily ensure an equitable distribution of welfare (Agussalim et al., 2024; Herman et al., 2024; Ihwandi & Khoirunurrofik, 2023; Suparman & Muzakir, 2023). Moreover, broader access to financial services may contribute to inclusive economic growth by expanding economic opportunities across regions (Ayu Az Zahra & Ajija, 2023). These observations underscore the importance of examining inclusive economic growth within a broader framework that considers regional fiscal performance, digital governance, and economic dynamics.

Previous studies have examined fiscal decentralization, fiscal performance, digital governance, and inclusive economic growth, but these issues are often analyzed separately. Empirical studies that integrate regional fiscal performance, fiscal digitalization, economic growth, and inclusive economic growth within a single framework remain limited, particularly at the regency and municipality level. Previous evidence also shows that regional economic growth in Indonesia

varies alongside differences in structural transformation across provinces (Andriansyah et al., 2023). This study addresses this gap by examining regency/municipality-level data in the Special Region of Yogyakarta from 2008 to 2024. Yogyakarta is a relevant setting because relatively advanced digital governance and fiscal system adoption coexist with persistent poverty, welfare disparity, and uneven development across regions. Therefore, this study aims to analyze the relationship between regional fiscal performance, economic growth, and inclusive economic growth, examine the moderating role of fiscal digitalization, and assess economic growth as a possible pathway variable through sequential regression evidence. The study contributes to Fiscal Federalism Theory, Good Governance Theory, and Inclusive Growth Theory by showing how fiscal capacity, fiscal digitalization, and growth distribution are connected in a decentralized regional context.

2. Literature Review and Hypothesis Development

This study employs Fiscal Federalism Theory as the main theoretical foundation to explain the relationship between regional fiscal performance, economic growth, and inclusive economic growth. Fiscal Federalism Theory argues that delegating fiscal authority to local governments can improve public resource allocation because local governments are assumed to better understand local needs and priorities than the central government (Lewis, 2023; Oates, 1972). In this study, regional fiscal performance, including fiscal independence, local own-source revenue effectiveness, expenditure efficiency, expenditure harmony, fiscal dependency, and regional revenue growth, reflects the capacity of local governments to manage fiscal authority. However, fiscal decentralization does not automatically lead to better economic outcomes because its effectiveness depends on institutional capacity, accountability, governance quality, and budget management efficiency (de Mello, 2000; Lewis, 2023; Sofilda et al., 2023). These governance requirements highlight the importance of mechanisms that can strengthen transparency, accountability, and efficiency in regional fiscal management.

Good Governance Theory is used to explain the role of fiscal digitalization as a moderating variable. Fiscal digitalization through SPBE, SIPD, e-budgeting, e-audit, and digital fiscal monitoring systems may improve transparency, accountability, efficiency, and control in regional financial management. Therefore, fiscal digitalization is viewed as a governance mechanism that may strengthen the relationship between regional fiscal performance and economic growth (Gan et al., 2024; Heeks, 2017; Siahay et al., 2025). However, improvements in economic performance do not necessarily ensure that the resulting benefits are distributed broadly across society.

Inclusive economic growth Theory explains the relationship between economic growth and inclusive economic growth. Economic growth is not necessarily inclusive when its benefits are unevenly distributed across society. Growth can be considered inclusive when it contributes to poverty reduction, lower unemployment, reduced inequality, and broader access to economic opportunities (Amponsah et al., 2023; Karimu & Abubakar, 2025; Yang & Gong, 2025). Accordingly, this study positions economic growth as a possible pathway variable that may link regional fiscal performance to inclusive economic growth through sequential regression evidence rather than formal mediation testing.

2.1 Theoretical Contribution of the Study

This study contributes to the literature in three ways. First, it extends Fiscal Federalism Theory by demonstrating that the effectiveness of fiscal decentralization depends not only on fiscal capacity, but also on governance quality and digital fiscal integration (Gan et al., 2024; Lewis, 2023; Sofilda et al., 2023). Second, the study conceptualizes fiscal digitalization as a governance mechanism that

strengthens transparency, accountability, and fiscal coordination rather than merely serving administrative functions (Gan et al., 2024; Yang & Gong, 2025). Third, the study contributes to the inclusive economic growth literature by showing that regional economic growth does not automatically generate inclusive welfare outcomes, particularly in decentralized emerging economies such as Indonesia (Agussalim et al., 2024; Widianingsih et al., 2024). These theoretical contributions provide a foundation for further examining fiscal decentralization and regional fiscal performance as the core concepts underlying the empirical model.

Fiscal decentralization refers to the transfer of fiscal authority and financial responsibility from the central government to local governments to improve public service efficiency and regional economic performance (de Mello, 2000; Lewis, 2023; Oates, 1972). In this context, regional fiscal performance reflects the capacity of local governments to manage revenue, allocate expenditure, and support development priorities. It is commonly measured through fiscal independence, local own-source revenue effectiveness, expenditure efficiency, expenditure harmony, fiscal dependency, and regional revenue growth (Prayuda & Arifin, 2024). Accordingly, examining how these fiscal performance indicators relate to economic growth is essential for understanding the effectiveness of fiscal decentralization at the regional level.

Previous studies have reported mixed findings on the relationship between regional fiscal performance and economic growth (Hung & Thanh, 2022; Sofilda et al., 2023). Aditya et al. (2024) found that fiscal decentralization and capital expenditure are positively related to regional economic growth, while Rahmawati et al. (2024) showed that fiscal independence contributes to poverty reduction and welfare improvement. In contrast, Anggriawan & Prasetyia (2025) argued that high fiscal dependency may weaken regional economic performance by reducing local fiscal innovation. Based on fiscal decentralization theory and prior findings, better regional fiscal performance is expected to support economic growth through stronger fiscal capacity and more effective expenditure allocation (Andriansyah et al., 2023; Lewis, 2023; Sofilda et al., 2023). In this study, the expenditure efficiency ratio is treated as an inverse efficiency indicator; a higher ratio reflects a greater expenditure burden and lower spending efficiency, so it is expected to be negatively associated with economic growth.

H1a: Fiscal independence ratio positively affects economic growth.

H1b: Local own-source revenue effectiveness ratio positively affects economic growth.

H1c: Expenditure efficiency ratio negatively affects economic growth.

H1d: Expenditure harmony ratio positively affects economic growth.

H1e: Fiscal dependency ratio negatively affects economic growth.

H1f: Regional revenue growth positively affects economic growth.

2.2 Fiscal Digitalization and Economic Growth

Digital transformation in public administration has significantly changed regional financial governance practices (Gan et al., 2024). Fiscal digitalization refers to the utilization of digital systems and information technology in regional financial management, including Electronic-Based Government Systems (SPBE), e-budgeting, e-audit, and digital fiscal monitoring systems (Heeks, 2017; Irwansyah et al., 2025). Fiscal digitalization is expected to improve transparency, accountability, efficiency, and effectiveness in fiscal administration processes (Gan et al., 2024; Yang & Gong, 2025).

Previous studies suggested that digital governance contributes positively to governance quality and public sector performance. Darusalam et al. (2023) explained that e-governance implementation improves transparency and accountability in Indonesian public administration. Ahad and Barsei (2023) emphasized that collaborative digital governance strengthens regional institutional effectiveness. Furthermore, Siahay et al. (2025) found that Digital Fiscal Monitoring Systems (DFMS) strengthen governance performance by improving fiscal supervision and reducing information asymmetry.

In the context of regional fiscal management, fiscal digitalization may strengthen the relationship between fiscal performance and economic growth (Gan et al., 2024). Digital systems enable better budget monitoring, improve revenue administration, and support more effective public expenditure allocation (Gan et al., 2024; Yang & Gong, 2025). Consequently, fiscal digitalization is expected to strengthen the positive impact of productive fiscal indicators and weaken the negative impact of fiscal dependency and inefficient expenditure, as illustrated in the conceptual framework in Figure 1.

H2a: Fiscal digitalization strengthens the positive effect of fiscal independence ratio on economic growth.

H2b: Fiscal digitalization strengthens the positive effect of local own-source revenue effectiveness ratio on economic growth.

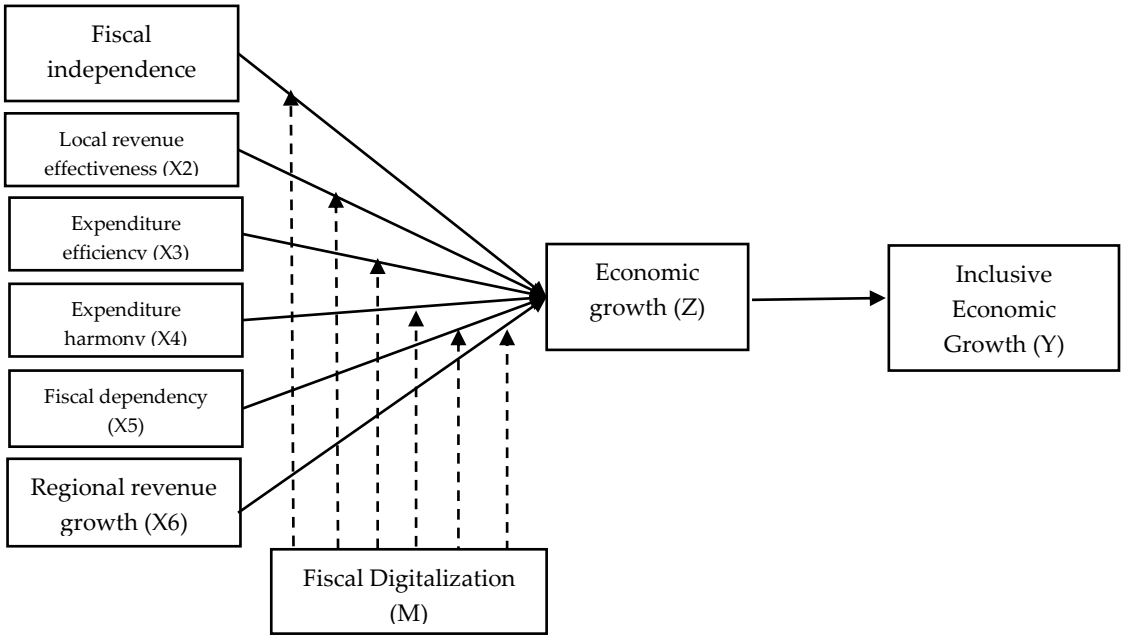
H2c: Fiscal digitalization weakens the negative effect of expenditure efficiency ratio on economic growth.

H2d: Fiscal digitalization strengthens the positive effect of expenditure harmony ratio on economic growth.

H2e: Fiscal digitalization weakens the negative effect of fiscal dependency ratio on economic growth.

H2f: Fiscal digitalization strengthens the positive effect of regional revenue growth on economic growth.

Figure 1. Conceptual Framework



Note: Fiscal digitalization is positioned as a moderating variable in the relationship between regional fiscal performance and economic growth. Economic growth is treated as a possible pathway variable based on sequential regression evidence, not as a formally tested mediator
Source: Author's conceptual framework

2.3 Economic Growth and Inclusive Economic Growth

Inclusive economic growth emphasizes not only economic expansion but also equitable welfare distribution across society. Inclusive economic growth is generally associated with poverty reduction, employment creation, reduced inequality, and improved access to economic opportunities (Agussalim et al., 2024; Amponsah et al., 2023; Karimu & Abubakar, 2025; Suparman & Muzakir, 2023). Therefore, economic growth is considered inclusive when its benefits are distributed broadly among social groups and regions.

Previous studies highlighted that rapid economic growth does not always produce equitable welfare outcomes. Ihwandi & Khoirunurrofik (2023) found that regional fiscal performance may influence inclusive development differently depending on expenditure allocation quality. Herman et al. (2024) also emphasized the importance of technology and regional financial management in promoting inclusive economic growth. Furthermore, Safitri et al. (2021) argued that governance quality and fiscal policy effectiveness are important determinants of inclusive regional development (Agussalim et al., 2024; Widianingsih et al., 2024). In this study, economic growth is positioned as a possible pathway variable that may link regional fiscal performance to inclusive economic growth. Better fiscal management is expected to improve economic growth, which subsequently contributes to broader social welfare distribution.

H3: Economic growth positively affects inclusive economic growth.

H4: Regional fiscal performance is associated with inclusive economic growth through the possible pathway of economic growth.

3. Methodology

3.1 Research Design

This study employs a quantitative explanatory approach to examine the relationship between regional fiscal performance, fiscal digitalization, economic growth, and inclusive economic growth in the Special Region of Yogyakarta, Indonesia. The study uses panel data from five regencies and municipalities during the 2008–2024 period. This structure resulted in 85 regency/municipality-year observations, derived from five local governments observed over 17 years.

This study applies a pooled OLS-based regression approach to examine average associations across regency/municipality-year observations. Although the dataset has a panel structure, this approach was selected because the main objective of the study is to analyze general relationships among regional fiscal performance, fiscal digitalization, economic growth, and inclusive economic growth, rather than to estimate region-specific or year-specific effects. The model also includes interaction terms to examine the moderating role of fiscal digitalization and sequential regression evidence to assess economic growth as a possible pathway variable.

Fixed effects, random effects, and year-effects models were considered as alternative specifications. However, the study covers only five local governments, and the inclusion of multiple regional or year effects would substantially reduce degrees of freedom, particularly in the moderation model that includes several fiscal indicators and interaction terms. Therefore, pooled OLS was retained as the main estimation strategy, while the findings are interpreted cautiously as pooled associations rather than causal effects. To improve the reliability of statistical inference, the

regression models were re-estimated using bootstrapped standard errors with 5,000 resamples and percentile confidence intervals.

3.2 Data Sources and Variable Measurement

This study uses secondary data were collected from several official sources, including the Directorate General of Fiscal Balance (DJPK), the Regional Government Information System (SIPD), Statistics Indonesia (BPS), and the Ministry of Administrative and Bureaucratic Reform. Regional fiscal performance is measured using Fiscal Independence ratio, Local Own-Source Revenue Effectiveness ratio, Expenditure Efficiency ratio, Expenditure Harmony ratio, Fiscal Dependency ratio, and Regional Revenue Growth. Fiscal digitalization is measured using the SPBE index as the primary indicator, while digital fiscal implementation indicators are used to support the interpretation of digital governance adoption, while inclusive economic growth is constructed from poverty, unemployment, and income inequality indicators.

Inclusive economic growth was constructed from poverty rate, open unemployment rate, and income inequality indicators obtained from Statistics Indonesia (BPS). Since higher poverty, unemployment, and inequality indicate lower inclusiveness, the indicators were direction-adjusted so that higher values represent better inclusive economic growth. The adjusted indicators were standardized and combined using equal weights. Referring to the inclusive economic growth concept of Amponsah et al. (2023) and Karimu and Abubakar (2025), and following a composite index approach, this study constructed the inclusive economic growth index from poverty rate, open unemployment rate, and income inequality indicators obtained from BPS. Since higher poverty, unemployment, and income inequality indicate lower inclusiveness, the indicators were reverse-coded after standardization. The index was calculated as follows: $IEGI_{it} = 1/3 [-Z(Poverty_{it}) - Z(Unemployment_{it}) - Z(Gini_{it})]$, where $IEGI_{it}$ represents the inclusive economic growth index of region i in year t. A higher index value indicates better inclusive economic growth, reflecting lower poverty, lower unemployment, and lower income inequality.

As presented in Table 1, fiscal digitalization (DGF) was measured using the official SPBE index published by the Ministry of Administrative and Bureaucratic Reform as the primary indicator of digital governance maturity. Due to the limited availability of comparable SPBE-based scores across the full observation period, DGF was coded as 0 for 2008–2017 to represent the pre-comparable digital governance period, while for 2018–2024 it was measured using the official SPBE score for each regency/municipality. Thus, DGF was specified as follows: $DGF_{it} = 0$ for 2008–2017 and $DGF_{it} = SPBE_{it}$ for s2018–2024. No additional weighting was applied because the SPBE score was used as the standardized measure of fiscal digitalization. A higher DGF value indicates stronger digital governance maturity in regional fiscal administration.

Table 1. Operationalization of fiscal digitalization

Variable	Indicator	Source	Period	Coding
Fiscal digitalization	SPBE index	Ministry of Administrative and Bureaucratic Reform	2018–2024	Official SPBE score
Baseline digital period	Pre-comparable SPBE period	Author's coding	2008–2017	0
Final DGF variable	SPBE-based digital governance score	Constructed by author	2008–2024	0 for 2008–2017; SPBE score for 2018–2024

Note: The value 0 for 2008–2017 represents the baseline period before comparable SPBE-based scores were available. It does not necessarily imply the complete absence of digital practices.

Data analysis was conducted using pooled OLS-based multiple regression with moderation and sequential pathway models. Four regression equations were estimated to examine the proposed hypotheses. The first and second models assess the relationship between regional fiscal performance, fiscal digitalization, and economic growth. The third and fourth models assess economic growth as a possible pathway variable in relation to inclusive economic growth. The findings are interpreted as pooled associations rather than causal effects.

The first regression model examines the effect of regional fiscal performance on economic growth

$$Z=\alpha+\beta1KF+\beta2EP+\beta3EB+\beta4KB+\beta5KGF+\beta6PPD+e \quad (1)$$

In this equation, Z represents economic growth, KF represents fiscal independence ratio, EP represents local own-source revenue effectiveness ratio, EB represents expenditure efficiency ratio, KB represents expenditure harmony ratio, KGF represents fiscal dependency ratio, and PPD represents regional revenue growth.

The second regression model examines the moderating role of fiscal digitalization:

$$Z= \alpha + \beta1KF + \beta2EP + \beta3EB + \beta4KB + \beta5KGF + \beta6PPD + \beta7DGF + \beta8(KF\times DGF) + \beta9(EP\times DGF) + \beta10 (EB\times DGF) +\beta11(KB\times DGF) + \beta12(KGF\times DGF) + \beta13(PPD\times DGF) +e \quad (2)$$

In this model, DGF represents fiscal digitalization, while the interaction variables indicate the moderating role of fiscal digitalization on each regional fiscal performance indicator. Since the moderation model includes several predictors and six interaction terms, the results are interpreted cautiously to avoid overstating model stability and statistical power. This is particularly important because the study uses 85 regency/municipality-year observations.

The third regression model examines the effect of economic growth on inclusive economic growth. Where Y represents inclusive economic growth and EG represents economic growth.

$$Y=\alpha+\beta1EG+e \quad (3)$$

The fourth regression model examines the possible pathway role of economic growth:

$$Y=\alpha+\beta1KF+\beta2EP+\beta3EB+\beta4KB+\beta5KGF+\beta6PPD+\beta7EG+e \quad (4)$$

The role of economic growth was assessed using sequential regression evidence rather than formal mediation testing. Since this study does not estimate bootstrapped confidence intervals for indirect effects, Sobel tests, or product-of-coefficients indirect effects, the findings are interpreted cautiously as evidence of a possible pathway rather than formal mediation.

Prior to hypothesis testing, the data were evaluated using classical assumption tests, including normality, multicollinearity, autocorrelation, and heteroscedasticity tests. Normality was assessed using the Normal Q-Q Plot, multicollinearity was evaluated using tolerance and Variance Inflation Factor (VIF), autocorrelation was examined using the Durbin–Watson statistic, and heteroscedasticity was tested using the Glejser method by regressing the absolute residuals on the independent variables. When heteroscedasticity was detected, the regression models were re-estimated using bootstrapped standard errors with 5,000 resamples and percentile confidence intervals. Hypothesis testing was conducted based on the corrected standard errors, t-statistics, and significance values. The moderation effect was evaluated based on the coefficient direction and significance of the interaction terms between fiscal digitalization and each fiscal performance indicator. The role of economic growth was assessed using sequential regression evidence and interpreted as a possible pathway rather than formal mediation.

4. Result and Discussion

4.1 Descriptive Statistics and Correlation Matrix

Before conducting regression analysis, descriptive statistics and a correlation matrix were examined to provide an overview of the main variables. Table 2 shows that the dataset consists of 85 regency/municipality-year observations. The fiscal digitalization variable has a relatively large standard deviation because the variable captures the transition from the pre-comparable digital governance period to the SPBE-based digital governance period. The inclusive economic growth index also shows variation across regions and years, indicating differences in poverty, unemployment, and inequality conditions.

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Fiscal Independence (KF)	85	0.000	1.750	0.344	0.304
Local own-source revenue effectiveness (EP)	85	0.100	1.760	1.151	0.229
Expenditure Efficiency (EB)	85	0.070	2.240	0.813	0.234
Expenditure Harmony (KB)	85	0.060	0.880	0.174	0.148
Fiscal Dependency (KGF)	85	0.450	0.920	0.642	0.115
Regional Revenue Growth (PPD)	85	-0.810	0.910	0.146	0.217
Fiscal Digitalization (DGF)	85	0.000	4.300	1.338	1.647
Economic Growth (EG)	85	-4.060	13.500	4.786	2.240
Inclusive Economic Growth (IEG)	85	3.650	10.230	6.310	1.582

Source: Processed data (2026)

Table 3. Pearson Correlation Matrix

Variable	KF	EP	EB	KB	KGF	PPD	DGF	EG	IEG
KF	1.000								
EP	0.089	1.000							
EB	0.381	0.123	1.000						
KB	0.639	0.144	0.319	1.000					
KGF	-0.484	-0.110	-0.090	-0.087	1.000				
PPD	-0.213	0.356	0.062	-0.074	-0.098	1.000			
DGF	0.059	-0.301	-0.207	-0.195	-0.164	-0.354	1.000		
EG	-0.007	0.179	-0.011	0.024	-0.006	0.163	-0.081	1.000	
IEG	-0.234	0.020	-0.113	0.312	0.591	0.152	-0.438	-0.107	1.000

Source: Processed data (2026)

As shown in Table 3, no pairwise correlation among the main independent variables exceeds 0.70, indicating that the relationships among variables remain within an acceptable range before regression analysis.

4.2 Classical Assumption Test

The classical assumption test results are presented in Table 4. Overall, the model satisfied the assumptions of no serious multicollinearity and no serious autocorrelation, while the Normal Q-Q Plot indicated that the residuals were approximately normal. Nevertheless, the Glejser test showed evidence of heteroscedasticity in the model. To address this issue, the regression models were re-estimated using bootstrapped standard errors with 5,000 resamples and percentile confidence intervals, ensuring more reliable statistical inference for hypothesis testing.

Table 4. Classical assumption test results

No.	Assumption	Test / Indicator	Result	Decision
1	Normality	Normal Q-Q Plot	Most residual points were relatively close to the diagonal line, although several deviations were observed	The residuals were approximately normal
2	Multicollinearity	Tolerance	0.401–0.966	No multicollinearity detected
		VIF	1.035–2.497	No multicollinearity detected
3	Autocorrelation	Durbin–Watson	2.211	No serious autocorrelation detected
4	Heteroscedasticity	Glejser Test	Regional revenue growth and log fiscal independence had Sig. < 0.05	Heteroscedasticity detected
5	Corrective Procedure	Bootstrapped Standard Errors	5,000 resamples with percentile confidence intervals	Regression inference was corrected

Note: Bootstrapped standard errors are reported based on 5,000 resamples. Confidence intervals are based on percentile bootstrap estimates. The models are estimated using pooled OLS and interpreted as pooled associations across regency/municipality-year observations.
Source: Processed data (2026)

4.3 The Effect of Regional Fiscal Performance on Economic Growth

The pooled regression results presented in Table 5 show that expenditure efficiency, fiscal dependency, and expenditure harmony are significantly associated with economic growth, while fiscal independence, local own-source revenue effectiveness, and regional revenue growth do not show significant associations.

Table 5. Regression results of regional fiscal performance on economic growth

Variables	Coefficient	Std. Error	t-value	Significance
Constant	7.085	.686	10.323	.000
Local own-source revenue effectiveness	.176	.200	.877	.383
Expenditure efficiency	-1.645	.675	-2.435	.017
Fiscal dependency	-1.599	.395	-4.051	.000
Regional revenue growth	.004	.226	.018	.986
Fiscal Independence	-.270	.277	-.974	.333
Expenditure Harmony	-.288	.124	-2.314	.023

Model summary: R = 0.508; R^2 = 0.258; Adjusted R^2 = 0.201; Std. error of the estimate = 0.38972; F = 4.529; Significance = 0.001; N = 85

Notes: Bootstrapped standard errors are reported based on 5,000 resamples. Confidence intervals are based on percentile bootstrap estimates. The model is estimated using pooled OLS and interpreted as pooled associations across regency/municipality-year observations.
Source: Processed data (2026)

$$Z = 7.085 - 0.270KF + 0.176EP - 1.645EB - 0.288KB - 1.599KGF + 0.004PPD + e \quad (1)$$

The regression results show that fiscal independence, local own-source revenue effectiveness, and regional revenue growth do not significantly associated with economic growth. This suggests that higher fiscal capacity and better revenue realization may not be closely related to regional growth

unless supported by productive expenditure allocation and strong fiscal management. This finding is consistent with Fiscal Federalism Theory, which emphasizes that the effectiveness of decentralization depends not only on fiscal authority, but also on institutional quality, accountability, and fiscal management capacity (de Mello, 2000; Oates, 1972). These results indicate that fiscal capacity alone is insufficient to promote regional growth, making the efficiency and composition of regional expenditure equally important to consider.

Meanwhile, expenditure efficiency, fiscal dependency, and expenditure harmony show significant negative associations with economic growth. The negative association between expenditure efficiency and economic growth supports H1c because the expenditure efficiency ratio is interpreted as an inverse efficiency indicator, where a higher value reflects a greater expenditure burden and lower spending efficiency. The negative association between fiscal dependency and economic growth supports H1e, suggesting that reliance on central transfers may limit local fiscal flexibility and innovation. However, the negative coefficient of expenditure harmony does not support H1d, because the hypothesis predicted a positive effect. This result may indicate that development expenditure has not been optimally directed toward productive sectors or that its effect on growth requires a longer time lag. Therefore, expenditure harmony should be interpreted as significant but not supported in the expected direction. Overall, these findings are in line with Public Finance Theory, which emphasizes that government revenue and expenditure contribute to growth only when effectively allocated to productive sectors (Musgrave, 1959). To assess the explanatory strength of these fiscal performance indicators collectively, the overall model fit is examined next.

The model summary shows an R^2 value of 0.508, R^2 of 0.258, and adjusted R^2 of 0.201, indicating that regional fiscal performance explains 20.1% of the variation in economic growth after adjustment. The F-statistic of 4.529 with a significance value of 0.001 indicates that the model is statistically significant and feasible for further interpretation.

4.4 The Moderating Role of Fiscal Digitalization

The second regression model examines the moderating role of fiscal digitalization in the relationship between regional fiscal performance and economic growth. This model tests hypotheses H2a to H2f through interaction terms between fiscal digitalization and each fiscal performance indicator.

$$Z = 7.998 - 0.917\,KF + 0.033\,EP - 1.348\,EB - 0.514\,KB - 2.022\,KGF + 0.143\,PPD - 0.752\,DGF + 0.449\,(KF * DGF) + 0.197\,(EP * DGF) - 0.170\,(EB * DGF) + 0.215\,(KB * DGF) + 0.516\,(KGF*DGF) - 0.083\,(PPD * DGF) + e \quad (2)$$

Table 6. Moderating effect of fiscal digitalization on economic growth

Variables	Coefficient	Std. Error	t-value	Significance
Constant	7.998	.908	8.814	.000
Fiscal Independence	-.917	.322	-2.844	.006***
Local Own-Source Revenue Effectiveness	.033	.192	.171	.865
Expenditure Efficiency	-1.348	.842	-1.601	.114
Expenditure Harmony	-.514	.147	-3.499	.001***
Fiscal dependency	-2.022	.424	-4.765	.000***
Regional Revenue Growth	.143	.238	.602	.549
Fiscal Digitalization	-.752	.600	-1.253	.214
Fiscal Independence × Fiscal Digitalization	.449	.207	2.164	.034
Revenue Effectiveness × Fiscal Digitalization	.197	.309	.638	.525
Expenditure Efficiency × Fiscal Digitalization	-.170	.571	-.298	.766

Expenditure Harmony × Fiscal Digitalization	.215	.084	2.552	.013**
Fiscal Dependency × Fiscal Digitalization	.516	.295	1.750	.084*
Regional Revenue Growth × Fiscal Digitalization	-.083	.259	-.321	.749

Model summary: R = 0.674; R^2 = 0.455; Adjusted R^2 = 0.355; Std. error of the estimate = 0.35022; F-statistic = 4.556; Significance = 0.000; N = 85.

Notes: *** significant at α = 1%; ** significant at α = 5%; * significant at α = 10%. Interaction effects significant at the 10% level are interpreted as marginal evidence and should be treated more cautiously than effects significant at the 5% or 1% levels.

Source: Processed data (2026)

Table 6 presents the direct and moderating effects of fiscal digitalization. The direct association results show that fiscal independence, expenditure harmony, and fiscal dependency have negative and significant effects on economic growth, while local own-source revenue effectiveness, expenditure efficiency, regional revenue growth, and fiscal digitalization are not significant. These results indicate that, after including fiscal digitalization and interaction terms, several fiscal performance indicators remain important fiscal indicators of economic growth. The negative association of fiscal dependency is consistent with Fiscal Federalism Theory, which suggests that excessive reliance on central transfers may reduce local fiscal autonomy and fiscal innovation (Oates, 1972). Meanwhile, the insignificant direct effect of fiscal digitalization indicates that digital systems alone may not be associated with growth without effective fiscal management and institutional capacity.

The moderation results show that fiscal digitalization significantly strengthens the relationship between fiscal independence and economic growth, as well as the relationship between expenditure harmony and economic growth. The interaction between fiscal dependency and fiscal digitalization is positive and marginally significant at the 10% level. This suggests weaker evidence that fiscal digitalization may reduce the negative relationship between fiscal dependency and economic growth. Therefore, this result should be interpreted more cautiously than the interaction effects that are significant at the 5% or 1% levels. Overall, these findings are broadly consistent with Good Governance Theory, which emphasizes transparency, accountability, and control as mechanisms that may improve public sector performance. However, the moderating role of fiscal digitalization is not uniform across all fiscal indicators, and the evidence for fiscal dependency is weaker because it is only marginally significant. Digital fiscal systems can improve budget planning, reporting, and supervision, thereby making regional fiscal performance more effective in supporting growth (Heeks, 2017; Siahay et al., 2025). These findings also indicate that the moderating effect of fiscal digitalization varies across fiscal indicators, making it important to consider the relationships in which no significant moderating effect is observed.

However, fiscal digitalization does not significantly moderate the effects of local own-source revenue effectiveness, expenditure efficiency, and regional revenue growth. This suggests that digitalization is not automatically effective for all fiscal indicators, as its impact depends on institutional readiness, human resource capacity, data integration, and the use of digital information in fiscal decision-making. Therefore, fiscal digitalization should be understood as part of broader governance reform rather than merely technological adoption.

4.5. The Effect of Economic Growth on Inclusive Economic Growth

The third regression model was used to examine the effect of economic growth on inclusive economic growth. The estimated regression equation is presented as follows:

$$Y = 18.077 - 2.342\ EG + e \quad (3)$$

Table 7. Effect of economic growth on inclusive economic growth

Variables	Coefficient	Std. Error	t-value	Significance
Constant	18.077	1.534	11.784	.000
Economic Growth	-2.342	.304	-7.700	.000

Model summary: R = 0.645; R^2 = 0.417; Adjusted R^2 = 0.410; Std. error of the estimate = 1.21585; F-statistic = 59.284; Significance = 0.000; N = 85

Notes: Bootstrapped standard errors are reported based on 5,000 resamples. Confidence intervals are based on percentile bootstrap estimates. The model is estimated using pooled OLS and interpreted as pooled associations across regency/municipality-year observations.

Source: Processed data (2026)

As presented in Table 7, the model summary shows an R^2 value of 0.417 and an adjusted R^2 value of 0.410, indicating that economic growth explains 41.0% of the variation in inclusive economic growth after adjustment. The F-test result is significant, with an F-statistic of 59.284 and a significance value of 0.000, indicating that the regression model is statistically feasible.

The regression results show that economic growth has a negative and significant effect on inclusive economic growth, with a coefficient of -2.342 and a significance value of 0.000. This indicates that an increase in economic growth is associated with a decrease in inclusive economic growth. Therefore, H3 is not supported because the direction of the relationship is negative, contrary to the proposed hypothesis.

The negative relationship between economic growth and inclusive economic growth indicates the existence of growth inequality within the Special Region of Yogyakarta. Economic expansion may be concentrated in urban-based service sectors, tourism activities, and digitally connected economic clusters that do not evenly absorb labor across all regencies and municipalities. As a result, economic growth may increase regional disparities when fiscal expenditure is not sufficiently directed toward labor-intensive sectors, rural development, and social protection programs.

This finding suggests that economic growth in the Special Region of Yogyakarta has not been fully inclusive. From the perspective of Inclusive economic growth Theory, economic growth should be accompanied by poverty reduction, lower unemployment, reduced inequality, and broader access to economic opportunities (Amponsah et al., 2023; Karimu & Abubakar, 2025). Therefore, regional economic growth should be supported by fiscal policies that strengthen employment creation, poverty alleviation, and equitable access to public services.

4.6. Sequential Regression Evidence on the Pathway Role of Economic Growth

The fourth regression model was used to examine whether economic growth provides sequential regression evidence of a possible pathway between regional fiscal performance and inclusive economic growth. The estimated regression equation is presented as follows:

$$Y = 6.649 + 2.145\ KF + 0.174\ EP + 1.491\ EB + 1.201\ KB + 5.893\ KGF + 1.240\ PPD - 1.442\ EG + e \quad (4)$$

Table 8. Sequential regression results on the pathway role of economic growth

Variables	Coefficient	Std. Error	t-value	Significance
Constant	6.649	2.512	2.647	.010
Fiscal Independence	2.145	.664	3.231	.002
Local Own-Source Revenue Effectiveness	.174	.479	.364	.717

Expenditure Efficiency Ratio	1.491	1.667	.895	.374
Expenditure Harmony	1.201	.306	3.920	.000
Fiscal dependency	5.893	1.033	5.703	.000
Regional Revenue Growth	1.240	.537	2.308	.024
Economic Growth	-1.442	.269	-5.352	.000

Model summary: R = 0.828; R^2 = 0.685; Adjusted R^2 = 0.657; Std. error of the estimate = 0.92712; F-statistic = 23.957; Significance = 0.000; N = 85.
Notes: Bootstrapped standard errors are reported based on 5,000 resamples. Confidence intervals are based on percentile bootstrap estimates. The model is estimated using pooled OLS and interpreted as pooled associations across regency/municipality-year observations.
Source: Processed data (2026)

The regression results presented in Table 8 show that fiscal independence, expenditure harmony, fiscal dependency, regional revenue growth, and economic growth significantly associated with inclusive economic growth. Fiscal independence has a positive and significant effect, indicating that stronger local fiscal capacity can support inclusive development. This finding is consistent with Fiscal Federalism Theory, which argues that local governments with sufficient fiscal authority and capacity are better positioned to allocate resources according to local needs (Oates, 1972). Beyond fiscal independence, the results also highlight the relevance of expenditure allocation and regional revenue growth to inclusive economic growth.

Expenditure harmony and regional revenue growth also have positive and significant effects on inclusive economic growth. These findings indicate that better expenditure allocation and higher fiscal capacity can improve welfare distribution when public spending is directed toward infrastructure, public services, and development programs. This is consistent with Public Finance Theory, which emphasizes that government revenue and expenditure can improve welfare when allocated to productive and socially beneficial sectors (Musgrave, 1959). Beyond expenditure allocation and regional revenue growth, the results also reveal significant associations of fiscal dependency and economic growth with inclusive economic growth.

Fiscal dependency also has a positive and significant effect on inclusive economic growth, suggesting that central government transfers may still play an important redistributive role, particularly in supporting public services, poverty alleviation, and social development programs. Meanwhile, economic growth has a negative and significant effect on inclusive economic growth, indicating that growth in the Special Region of Yogyakarta has not been fully inclusive. In line with Inclusive economic growth Theory, growth should reduce poverty, unemployment, and inequality while expanding access to economic opportunities (Amponsah et al., 2023; Karimu & Abubakar, 2025). This negative association also provides an important basis for interpreting the role of economic growth within the sequential regression framework.

Regarding the sequential regression evidence, economic growth does not support the expected pathway between regional fiscal performance and inclusive economic growth because its coefficient is negative. Therefore, H4 is not supported in the hypothesized direction. This finding suggests that regional fiscal performance may contribute to inclusive economic growth more directly through fiscal capacity and expenditure allocation rather than indirectly through economic growth.

5. Conclusion and Suggestion.

This study examines the relationships among regional fiscal performance, economic growth, and inclusive economic growth in the Special Region of Yogyakarta, with fiscal digitalization as a moderator and economic growth as a possible pathway variable based on sequential regression evidence. Using pooled regency/municipality-year observations from 2008 to 2024, the results

show that expenditure efficiency, fiscal dependency, and expenditure harmony are significantly associated with economic growth, whereas fiscal independence, local own-source revenue effectiveness, and regional revenue growth are not. Fiscal digitalization strengthens the relationships of fiscal independence and expenditure harmony with economic growth, while its interaction with fiscal dependency is only marginally significant at the 10% level and should be interpreted cautiously. Economic growth is negatively associated with inclusive economic growth, while fiscal independence, expenditure harmony, fiscal dependency, and regional revenue growth show positive associations, suggesting that fiscal policy may support inclusive development more directly through fiscal capacity and expenditure allocation than through growth alone. Theoretically, the study integrates Fiscal Federalism Theory, Good Governance Theory, and Inclusive Economic Growth Theory within a single framework. However, the sequential regression evidence does not constitute formal mediation because indirect effects are not tested, so economic growth is treated only as a possible pathway variable. In addition, the pooled OLS approach captures pooled associations and does not fully account for unobserved regional heterogeneity.

Based on these findings, local governments should improve expenditure allocation, strengthen fiscal digitalization through institutional readiness, human resource capacity, data integration, and evidence-based budgeting, and promote inclusive economic growth through redistributive fiscal policies, poverty reduction, employment creation, and improved access to public services. Particular attention should be given to ensuring that fiscal digitalization supports not only administrative efficiency but also the effectiveness of fiscal independence and expenditure allocation in promoting regional development. Since the interaction between fiscal dependency and fiscal digitalization is significant only at the 10% level, its policy implications should be considered cautiously and require further empirical confirmation. Future studies are also encouraged to formally test the mediating role of economic growth using indirect-effect procedures, such as bootstrapping, and to employ estimation approaches that can better account for unobserved regional and temporal heterogeneity, particularly with broader regional coverage and longer or more comprehensive panel datasets.

6. Limitations and Future Research

This study has several limitations. First, the research focuses only on regencies and municipalities in the Special Region of Yogyakarta, so the findings may not be fully generalizable to regions with different fiscal capacities, digital readiness, and socio-economic conditions. Second, fiscal digitalization was measured based on the availability of comparable SPBE-based scores. The 2008–2017 period was coded as the baseline pre-comparable digital governance period, which may not fully capture informal or partial digital practices before comparable SPBE assessment data were available. Third, this study applies a pooled OLS-based regression approach using regency/municipality-year observations. Although this approach is relevant for examining average associations, moderation effects, and sequential regression evidence, it does not fully control for unobserved regional heterogeneity, time-specific shocks, or possible lagged effects. To improve statistical inference, the regression models were re-estimated using bootstrapped standard errors with 5,000 resamples and percentile confidence intervals. However, the moderation model includes several fiscal indicators and six interaction terms with only 85 observations, which may limit model stability, reduce statistical power, and increase the risk of overfitting.

Future research should expand the study scope by including more provinces or regions with different fiscal and digital maturity levels. Further studies may develop a more comprehensive fiscal digitalization index by combining SPBE scores, SIPD implementation, system integration, data quality, human resource readiness, and the actual use of digital information in budget

decision-making. Future research may also apply centered or standardized interaction terms, additional robustness checks, dynamic panel models, and qualitative or mixed-method approaches to better capture institutional capacity, governance practices, and the long-term effects of fiscal digitalization on inclusive economic growth.

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Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Grammarly for English language editing and writing clarity. The authors also used plagiarism-checking software for similarity checking and Scopus AI to support literature exploration. These tools were used only to improve the manuscript preparation process and did not replace the authors' analysis, interpretation, or academic judgment. After using these tools, the authors reviewed, verified, and edited the content as needed and take full responsibility for the content of the publication.

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