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Research Article

Digital Economy Analysis in Driving Economic Growth in Indonesia

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Abstract: This study uses a quantitative associative technique to examine how Indonesia's digital economy contributes to economic growth. For the years 2014–2023, secondary data were acquired from the Central Bureau of Statistics, Bank Indonesia, and the World Bank. The Two-Stage Least Square (TSLS) method and a simultaneous model with two equations were used to analyze the impact of monetary variables (interest rates, money supply, and inflation) and digital economy variables (internet users, e-commerce growth, and e-money users) on economic growth. The findings indicate that while e-commerce expansion and inflation have a negligible negative impact on economic growth, internet and e-money users have a large beneficial impact. In the meanwhile, inflation is significantly impacted positively by the money supply and negatively by interest rates and economic growth. These results highlight how crucial it is to manage monetary factors and improve digital infrastructure in order to promote Indonesia's economic growth in the digital age.

Keywords: Digital Economy; Economic Growth; Monetary Variables.

1. Background

Industry 4.0's rise serves as proof that technical advancement and industrial development are inextricably linked in the modern era (Anisa Novia Rahmadani et al., 2024). A nation's economy has benefited from the growth of the technologically oriented industrial sector (Van Ark et al., 2016). During recessions, the digital economy has shown resilient and has kept up its contribution to economic growth (Sari et al., 2023). Technological innovation is a major driver of economic growth (Brynjolfsson & Kahin, 2011). The digital economy can make a substantial contribution to economic development and has expanding business potential (Tanjung & Rangkuti, 2024). Accessible financial services that promote recovery and economic resilience are crucial, as the COVID-19 pandemic has shown (Basnayake et al., 2024).

For Indonesia, the digital economy plays a particularly important role in growing its e-commerce industry. The expansion of online companies, or e-commerce, in Indonesia is closely linked to the country's extensive internet usage (Cristien, 2021). Numerous new electronic-based items have emerged as a result of the digital economy (Widayat et al., 2020). E-money has developed to make a number of transactions easier. E-money systems like Ovo, Gopay, and LinkAja are being used more and more by Indonesians for digital investments and cashless transactions (Lintangsari et al., 2018). The swift digitization of the banking and financial industries, which propels Indonesia's economic expansion, is reflected in the recent rise in the circulation of electronic money (Tumpal Manik, 2019).

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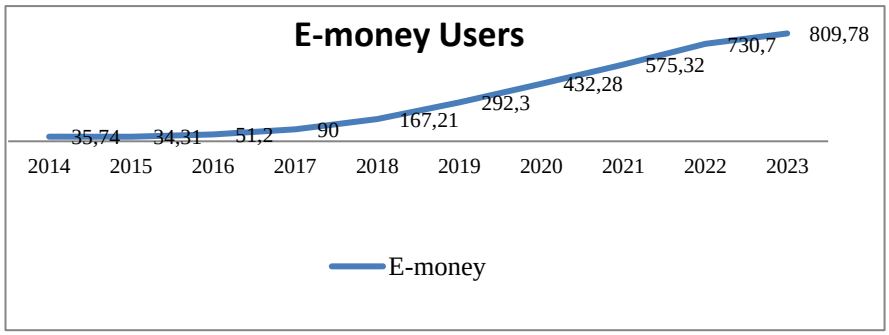

Figure 1. Chart of E-money Users in Indonesia

Source: Bank Indonesia

According to the following graphic, the number of people using e-money increased steadily between 2014 and 2023. With the advent of COVID-19, the number of e-money users increased from 292.3 million in 2019 to 432.28 million in 2020. The use of e-money increased significantly after the COVID-19 pandemic in Indonesia (Sitompul, 2020). One of the main causes of the digitalization of banking and business transactions was the COVID-19 pandemic (Rahul de et al., 2020). In order to facilitate the shift from offline to online business transactions, the Indonesian government has attempted to use technology, which should boost the nation's economy (Nizar & Sholeh, 2021).

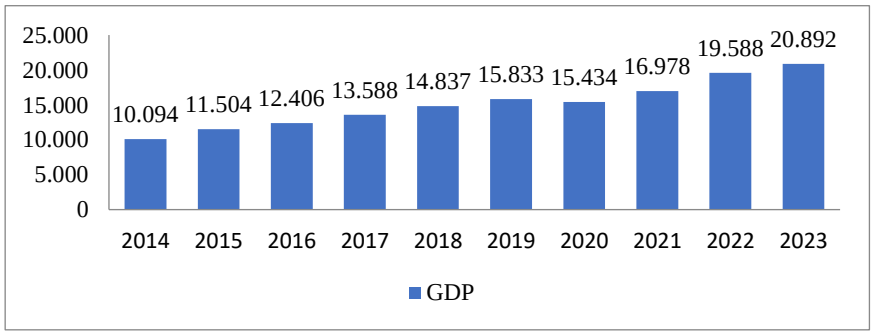

Figure 2. Chart of Economic Growth in Indonesia

Source: Central Bureau of Statistics

The COVID-19 epidemic affected economic activity in 2020, which resulted in a reduction in Indonesia's economic growth. However, the economy started to revive in 2021 despite the continued epidemic, partly due to the rise in electronic money usage, which boosted consumer purchasing (Tee and Ong, 2016). By raising the cost of goods and services, the usage of electronic money may also have an impact on inflation (Anugrah et al., 2022). Given this, interest rates also have a significant impact on monetary policy, affecting the usage of cash or electronic transactions by both individuals and businesses. The amount of money in circulation may change if interest rates rise because consumers may decide to save more or spend less (Febitania et al., 2024). The government must control the money supply, interest rates, inflation overall, and the use of electronic money in order to preserve economic stability.

Long-term increases in a nation's ability to supply its people with a wider variety of goods are referred to as economic growth. In addition to institutional and ideological changes, technical improvements also have an impact on this growth. Economic growth is seen to be significantly influenced by technological progress, especially when it comes to innovative production techniques based on fresh research (Rahmat, 2020). As technology develops, economic roles become more significant, and the rise of different digital payment apps has emerged as one of the primary markers of the financial sector's growth in the age of the digital economy (Zuhri et al., 2022).

The digital economy is a collection of interconnected economic activities that utilize data resources as production factors, modern information networks as media, and effective use of information and communication technology (Yasmeen et al., 2024). The digital economy is transforming the global financial landscape by offering innovative solutions to environmental challenges while simultaneously driving economic growth (Medaglia et al., 2024). Among the fastest-growing sectors in the digital economy are e-commerce and financial technology (fintech) (Sandip, 2019).

2. Research Method

Determining the degree of association and the pattern or form of effect between two or more variables is the goal of an associative or quantitative study (Rusiadi, 2023). A simultaneous examination of monetary and digital economy variables is the methodology employed. The Central Bureau of Statistics, Bank Indonesia, and the World Bank provided the secondary data used in this study, which ran from 2014 to 2023. The Two-Stage Least Square (TSLS) method is used in the simultaneous model, which consists of two equations, to evaluate the degree of influence and correlation that exists inside the model. After identifying the simultaneous equations, TSLS is employed (Widiarjo, 2013). Internet users, e-commerce growth, interest rates, e-money users, money supply, inflation, and economic growth are among the variables under investigation. The structure of the econometric model is as follows:

a. First Equation
   GDP=(PI,PEC,PEM and INF)
   GDP=C(10)+C(11)*PI+C(12)*PEC+(C13)*PEM+C(14)*INF
b. Second Equation
   INF=(SB,JUB and GDP)
   INF=C(20)+C(21)*SB+C(22)*JUB+C(23)*GDP

Where:
INF = Inflation
SB = Interest Rate
JUB = Money Supply
GDP = Gross Domestic Product
PI = Internet Users
PEC = E-Commerce Growth
PEM = E-Money Users

To ascertain whether the equation is under-identified (unable to be identified), exactly identified (completely identified), or over-identified (still identifiable), simultaneous identification is then performed. According to Rusiadi and Nur Subiantoro (2017), an equation must be precisely identified or over-identified in order to be deemed suitable for analysis.

Table 1. Identification Test of the Equations

Dependent Variable	K-k	m-1	Results	Identification
GDP (Equation 1)	**5-2**	**4-1**	**3=3**	**Exacty identified**
INF	**5-2**	**3-1**	**3>2**	**Over identified**

After determining that the simultaneous equations are in conditions of exactly identified and over-identified, the TSLS (Two-Stage Least Square) analysis can be conducted, provided that the classical assumptions are met, including the normality and autocorrelation tests.

3. Results and Discussion

This section presents the results of classical assumption testing through the normality and autocorrelation tests. The normality test uses the Jarque-Bera statistic, where a probability value greater than 0.05 indicates that the data are normally distributed. Meanwhile, the autocorrelation test examines the probability value of the Adjusted Q-Stat; if the chi-square result is less than 0.05, it indicates the presence of autocorrelation (Fikri, 2021).

Table 2. Classical Assumption Test

Classical Assumption	
Jarque-Bera **0.8064 > 0.05**	**Prob. Adj Q-Stat** **>0.05**
Passed the data normality test	**No autocorrelation problem**

The data in this study satisfy the established classical assumption standards, according to the findings of the aforementioned tests of classical assumptions. Thus, it is possible to estimate the simultaneous equations under these circumstances.

Table 3. Estimation Results of Two-Stage Least Squares (TSLS)

System: SIMULTAN				
Estimation Method: Two-Stage Least Squares				
Date: 04/18/25 Time: 15:55				
Sample: 2014 2023				
Included observations: 10				
Total system (balanced) observations 20				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(10)	**6.230872**	**2.135951**	**2.917141**	**0.0140**
C(11)	**0.041316**	**0.015520**	**2.662025**	**0.0221**
C(12)	**-0.000334**	**0.000236**	**-1.415582**	**0.1846**
C(13)	**0.006001**	**0.002306**	**2.602008**	**0.0246**
C(14)	**-0.091836**	**0.116231**	**0.790111**	**0.4462**
C(20)	**18.09764**	**1.098915**	**16.46864**	**0.0000**
C(21)	**-1.000548**	**0.041495**	**-24.11225**	**0.0000**
C(22)	**0.131147**	**0.041602**	**-3.152404**	**0.0092**
C(23)	**-0.435880**	**0.044001**	**-9.906207**	**0.0000**
Determinant residual covariance		**0.024397**		
Equation: GDP=C(10)+C(11)*PI+C(12)* PEC+C(13)*PEM+C (14)*INF				
Instruments: PI PEC SB PEM JUB C				
Observations: 10				
R-squared	**0.965752**	**Mean dependent var**		**15.11540**
Adjusted R-squared	**0.938354**	**S.D. dependent var**		**3.423237**
S.E. of regression	**0.849945**	**Sum squared resid**		**3.612036**
Durbin-Watson stat	**1.948943**			
Equation: INF=C(20)+C(21)*SB+C(22)*JUB+C(23)*GDP				
Instruments: PI PEC SB PEM JUB C				
Observations: 10				
R-squared	**0.990427**	**Mean dependent var**		**3.820000**
Adjusted R-squared	**0.985641**	**S.D. dependent var**		**2.809824**
S.E. of regression	**0.336698**	**Sum squared resid**		**0.680194**
Durbin-Watson stat	**0.944439**			

Sumber: Output Eviews 2025

GDP=6,2308+0,0413*PI-0,0003*PEC+0,0060*PEM-0,0918*INF

According to the estimation results, the variables of internet users, e-commerce growth, e-money users, and inflation can account for 96.57% of economic growth, with an R2 value of 0.9657. Other factors outside the purview of this research model have an impact on the remaining 3.43%.

The t-statistics indicate that internet users (p-value = 0.0221 < 0.05) and e-money users (p-value = 0.0246 < 0.05) have a substantial impact on economic growth. In the meantime, inflation (p-value = 0.4462 > 0.05) and e-commerce growth (p-value = 0.1846 > 0.05) have no discernible effects on economic growth.A coefficient value is also produced by each variable. With a coefficient of 0.0413 for internet users, economic development rises for every 1% increase in internet usage. Because digital connectivity allows economic players to access information, collaborate online, and create jobs in the digital sector, internet access has a major impact on economic growth (Lela et al., 2023).

The coefficient for e-money users is 0.0060, meaning that economic growth rises with every 1% increase in e-money usage. By lowering borrowing costs and increasing lending competitiveness, e-money adoption encourages investment and consumption, which ultimately raises real national production. Accordingly, the use of e-money promotes economic expansion (Sitompul, 2022).

On the other hand, e-commerce growth has a coefficient of -0.0003, meaning that every 1% increase in e-commerce growth results in a corresponding loss in economic growth. This can be because of the difficulties brought about by the digital economy's explosive growth, particularly in the e-commerce industry, which needs stringent regulation to safeguard the country's financial system (Heryanto & Astuti, 2022).In the meantime, the inflation coefficient is -0.0918, meaning that a 1 percent rise in inflation causes economic growth to slow down. Consumption declines when customers' purchasing power is diminished by high inflation. Furthermore, inflation might deter investment by increasing production costs and causing economic uncertainty (Sule et al., 2024).

INF=18,097-1,0005*SB+0,1311*JUB-0,4358*GDP

With an R2 value of 0.9904, the variables of interest rate, money supply, and economic growth account for 99.04% of inflation, with other variables not included in this research model influencing the remaining 0.96%. According to the t-statistics, the money supply (p-value = 0.0092 < 0.05), interest rate (p-value = 0.0000 < 0.05), and economic growth (p-value = 0.0000 < 0.05) are the three variables that significantly affect inflation.A coefficient value is also produced by each variable. The interest rate coefficient is -1.0005, which indicates that inflation will fall for every 1% increase in the interest rate. Higher interest rates make borrowing more expensive, which in turn reduces price pressures and suppresses demand (Wahyuni et al., 2022).

The coefficient for the money supply is 0.1311, indicating that a 1 percent increase in the money supply will raise inflation. This happens because more money in circulation boosts purchasing power, thereby increasing demand for goods and services and driving up prices (Rifantini et al., 2024).

Meanwhile, the coefficient for economic growth is -0.4358, suggesting that a 1 percent increase in economic growth will reduce inflation. This occurs because increased economic activity and demand for goods or services can raise prices, especially if production capacity and supply cannot meet the growing demand (Putri, 2024).

4. Conclusions

There is an influence and relationship between each variable, according to the analytical results from the equation model between economic growth and the digital economy. The economic growth model equation shows that while e-commerce growth and inflation have a negligible negative impact on economic growth, internet users and e-money users have a considerable beneficial impact.In the inflation equation, the money supply significantly raises inflation while the interest rate and economic growth variables significantly lower it.

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