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The Influence of Information And Communication Technology (ICT) Development on Income Inequality Through Economic Development

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ABSTRACT

Over the last few decades, the development of information and communication technology (ICT) has had a major impact on the economy and society more broadly. There is currently a consensus that developments in information and communication technology (ICT) can provide a boost to sustainable economic development. This study aims to analyze the influence of the development of information and communication technology (ICT) on income inequality through economic development in Indonesia. Analysis of the research uses econometric analysis using the *fixed effect model* with the *Two-Stage-Least-Square* (TSLS) method with a time of 2017–2021 to understand the extent to which the development of information and communication technology (ICT) can facilitate reducing income inequality through economic development. The data used in this study came from the Central Statistics Agency (BPS), the Ministry of Finance of the Republic of Indonesia, the Ministry of Communication and Information, and the National Socioeconomic Survey (SUSENAS). The results of this study found that the influence of significant positive ICT development can encourage reduced income inequality through economic development in Indonesia. Social assistance provided by the government has shown significant help in reducing inequality in Indonesia. ICT development can encourage reducing inequality and economic development outside Java Island but not in Java Island. The influence of ICT development is greater in provinces with the lowest service sector compared to provinces with the highest service sector.

INTRODUCTION

The economic development of a country is no longer about income growth or achieving the

highest level of economic growth, but about alleviating poverty, overcoming the problem of income inequality, and creating jobs in an economy that continues to grow (Todaro and Smith, 2004). Development is defined as an effort to achieve sustainable growth in per capita income so that the country can increase output faster than population growth. Achieving high economic population growth is one of the development goals of a country. In the long term, development can improve community welfare to reduce poverty (Todaro and Smith, 2004).

Inequality is one of the problems that occur in developing countries, including Indonesia. Economic growth has not focused on equal distribution of income. Inequality of opinion occurs because of the disproportionate distribution of total national income among various households in the country. The impact of economic growth has not been felt by all Indonesian people. According to Todaro and Smith (2004), technology plays a role in economic growth in a region. Therefore, ICT plays a significant role in regional development.

Information and communications technology (ICT) is developing rapidly throughout the world. In the current digital era, the Internet is increasingly developing and is widely used by people throughout the world to obtain information. Information and Communication Technology (ICT) has become a new source of economic growth. This can be seen from the impact of the widespread use of ICT to create more efficient ways of carrying out the production, distribution, and consumption of goods and services.

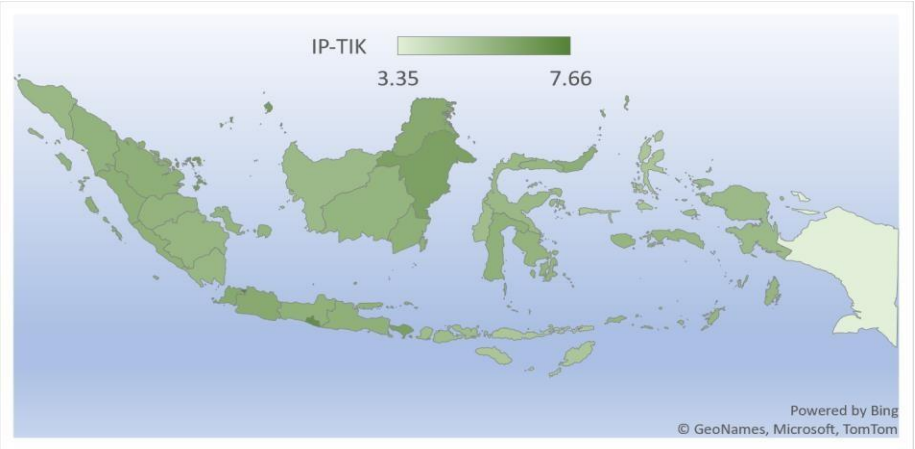
The Information and Technology Development Index (IP-TIK) is an index used to compare the ICT achievements of each country to assess regional and global competitiveness, thereby having an impact on advancing ICT development at the national level. IP-TIK developed by the International Telecommunication Union (ITU) is an ICT Development Index that describes the level of development of information and communication technology in a region. The ICT Development Index is important as a standard measure of the level of ICT development in a region, which can be compared over time and between regions. Apart from that, the ICT Development Index is also able to measure the speed of ICT development, measure digital or digital gaps between regions, and measure the potential for ICT development.

The digital divide refers to the gaps that exist between individuals, groups, or regions in the access, use, and utilization of information and communications technology (ICT). These gaps can arise in various aspects, such as internet access, technological skills, and access to electronic devices. The impacts of the digital divide include:

1. Stunted economic growth: the digital divide can hinder the economic growth of a country or region. When part of the population in a country cannot have adequate access to ICT then they cannot take advantage of the opportunities offered by the digital economy. As a result, the potential for economic growth will be hampered because human potential resources cannot be used effectively.
2. Opinion Inequality: the digital divide will worsen income inequality, individuals and groups will not be able to access ICT or sufficient technological skills to access digital economic opportunities. At the same time, individuals and groups with good technology access and skills can take advantage of this opportunity to increase their income. Therefore, the digital divide will result in greater income inequality among individuals between different groups.
3. Education gap: the digital divide can also deepen the digital divide. In an era where technology will play a significant role in education, individuals who do not have easy access to ICT will have difficulty accessing distance learning and online educational resources. This will benefit individuals or groups who can access devicesand have good connectivity.
4. Job Opportunities: the digital divide can also affect job opportunities and social mobility. Individuals or groups who do not have adequate digital access or skills will have difficulty competing in a labor market that is increasingly dependent on technological advances. This can result in limited employment opportunities and difficulty moving up the socio-economic ladder.

The Information and Technology Development Index (IP-TIK) is an index used to compare the ICT achievements of each country to assess regional and global competitiveness, thereby having an impact on advancing ICT development at the national level. IP-TIK developed by the International Telecommunication Union (ITU) is an ICT Development Index that describes the level of development of information and communication technology in a region. The ICT Development Index is important as a standard measure of the level of ICT development in a region.

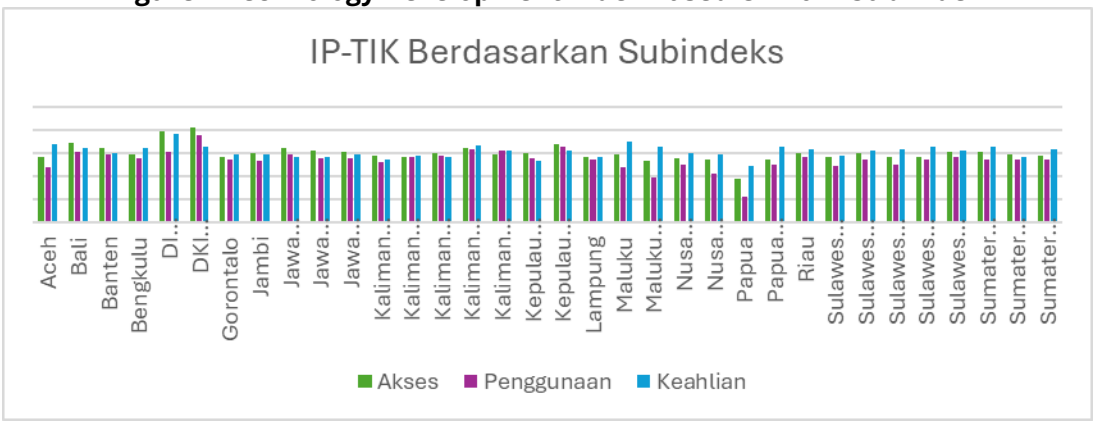
Figure 1 Technology Development Index By Province In 2021



Source: Central Statistics Agency 2021 (Processed By The Author)

The ICT Development Index in Indonesia from 2017-2021 has increased from year to year. On a scale of 0-10, the 2021 ICT Development Index is 5.76 compared to the previous year's 5.59 or growth of 3.04%. The same thing also happened to the three sub-indices that make up the ICT Development Index which experienced an increase. From the geographical data above, only DKI Jakarta is in the high category, the provinces of Papua and East Nusa Tenggara are in the low category, and the other provinces are in the medium category. Previous studies explain several research results on the impact of technology and information infrastructure on economic growth in a country and income inequality.

Figure 2 Technology Development Index Based On 2021 Sub-Index



Source: Central Statistics Agency 2021 (processed by the author)

According to the sub-indices that make up the ICT Development Index. The highest sub-index value in 2021 is the ICT skills sub-index of 5.97, followed by the ICT access and infrastructure sub-index of 5.76 and the ICT use sub-index of 5.66. The provinces with the highest ICT access and infrastructure sub-indices are DKI Jakarta and DI Yogyakarta and the

lowest provinces are Papua Province. The province that occupies a high sub-index for ICT use in 2021 is DKI Jakarta Province and the provinces that occupy the lowest category are the provinces of West Nusa Tenggara, West Papua, Central Sulawesi, West Sulawesi, Aceh, Maluku, East Nusa Tenggara, and North Maluku while the provinces Papua is in the very low category in the ICT use sub-index. In contrast to other sub-indices, in the ICT skills Sub-index, DI Yogyakarta Province is the only province that occupies the highest ICT skills Sub-index category. Papua Province is in the low ICT skills category, while the other provinces are in themedium category.

In research conducted by Jiao et al. (2021) explains that the growth of the digital economy in China has a positive effect on the rate of urban economic growth and that there is heterogeneity of effects between different cities. In research conducted by Wang et al. (2021) conducted in China using socio-economic Technology and Information data from 31 Provinces in China to build a composite Index of Technology and Information (ICT) and socio-economic development. The results of this research also show that a good urbanization process can lead to rapid socio-economic development, uncontrolled population numbers, and urban sprawl can result in unbalanced development. In addition, to address the issue of the digital divide, several practical recommendations in China have been outlined. Internal and external factors related to ICT development must be considered to implement integrated development plans that can improve society. In contrast to research conducted by Bilan et al. (2019) conducted in Ukraine, the influence of ICT is not significant on GDP growth in Ukraine. This research shows that the influence of ICT development is significant on the economic performance of companies, ICT development must be increased both at the micro and national levels and must be focused on increasing the number of individuals, households, and businesses with access to technology and the internet, especially in the field of e-commerce.

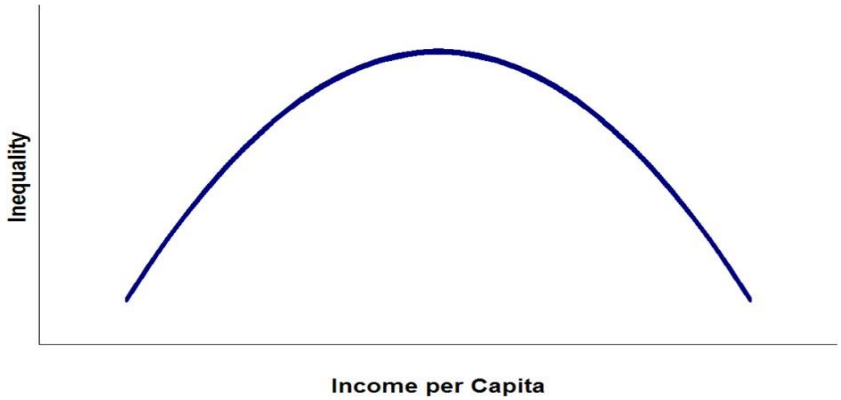
Several literatures have described the various influences of technology and information development on economic growth and income inequality in a country. However, for research in Indonesia, there has not been much research that focuses on the development of information and communication technology (ICT) on income inequality through economic development in Indonesia. This research focuses on the relationship between the influence of the Technology Development Index (IP-ICT) on income inequality through economic development in Indonesia at the provincial level from 2017-2021. The data used in the research comes from the Indonesian Central Statistics Agency (BPS), the National Socio-Economic Survey (SUSENAS), and the Ministry of Finance of the Republic of Indonesia (Kemenkeu) from 2017-2021.

LITERATURE REVIEW

Conventionally measuring economic growth is usually by calculating the percentage increase in Gross Domestic Product (GDP). GDP measures total income as well as total expenditure on various goods and services, so GDP per capita measures the average income and expenditure of individuals from the economy concerned, and therefore GDP per capita is a measure of the level of welfare of the average individual. GDP is used as the main indicator to measure a country's economic growth. The Gini ratio or Gini coefficient is a tool for measuring income inequality in a country or population. Income inequality is the disproportionate distribution of total national income between various households in a country.

According to the Kuznets Hypothesis, in the early stages of a country's economic growth, income inequality will increase. However, when the country reaches a higher level of economic growth, income inequality will decrease. In general, the Kuznets curve depicts a pattern indicating that income inequality tends to increase in the early stages of economic development when economic growth is still low. However, as development progresses, income inequality will tend to decrease.

Figure 2 Inverted "U" Kuznets Curve



Source: Todaro and Smith (2004)

Graphically the Kuznets curve, the horizontal axis shows the level of economic growth, and the vertical source shows the level of income inequality, this is because a small portion of the population has greater access to economic resources and income, income inequality is high at the beginning of the curve. However, as the economy expands and social development increases, income inequality tends to decrease. The relationship between economic growth and income inequality has been studied by Agusalim et.al (2016) in their research on economic growth, income inequality, and decentralization in Indonesia. Economic growth has a significant influence on overcoming income inequality. Quality infrastructure can influence economic growth and reduce income inequality. Higher adoption of technology and reduced income inequality. Higher adoption of technology and information infrastructure is positively correlated with higher economic growth and can reduce income inequality. Lee at al. (2018).

Incremental Capital Output Ratio (ICOR)

Investment is a source of growth because increasing investment will increase production capacity. This investment will encourage economic growth through the ability to provide additional inputs needed for the production process. In economic development planning, economic growth targets have been identified. One of them comes from investment, so the goal of economic growth requires targets related to investment. The indicator needed is the Incremental Capital Output Ratio (ICOR), namely additional output and additional capital. The determining factor that influences the formation of a region's economic output is capital (Central Statistics Agency, 2016).

The Harrod-Domar model deals with the effect of additional capital on output, known as ICOR. This ICOR calculation is used to determine the amount of investment required at the level of economic growth and with ICOR we can see the extent to which the investment is invested in a region or country within a certain period. Hapsari et al. (2017). The ICOR value which indicates a good level of return on investment is between 3 and 4. A higher ICOR value indicates less efficient use of investment. Conversely, a low ICOR indicates efficient use of capital.

In research conducted by Nakamura et al. (2019) research conducted in Japan, in this research the author used empirical data and regression analysis to examine the relationship between ICT use, economic growth, and productivity in the Japanese economic sector. The results of this research show that the adoption of ICT has a positive and significant influence on economic growth and productivity in Japan. Effective use of ICT increases production efficiency, accelerates innovation, and creates new opportunities for economic growth. In developing ICT, the most important policy is the need for further investment in ICT to maintain a more stable GDP growth rate. Stanley, et al. (2018).

The relationship between economic growth and income inequality has been studied by Agusalim et al. (2016) in their research on economic growth, income inequality, and decentralization in Indonesia. Research using data for the 1978-2015 period resulted in the conclusion that GDP is an indicator of economic growth. It has a significant negative influence on the Gini coefficient as a measure of income. In other words, economic growth has a considerable influence on overcoming income inequality. Quality infrastructure can influence economic growth and reduce income inequality. Higher adoption of technology and information infrastructure is positively correlated with higher economic growth and can reduce income inequality Lee et al. (2018).

Research on the relationship between the influence of the development of information and communication technology and economic growth and income inequality using panel regression analysis using data from 2000 to 2017. The variables used in this research include ICT, Gini coefficient/Gini ratio, level of education, urbanization, and other social as well as demographic factors. The results show that it is important to reduce the digital divide by developing ICT equally in urban and rural areas. This development can encourage inclusive economic growth and reduce income inequality in developing countries such as China Leng et al. (2020).

METHODS

This research uses secondary data originating from various sources, such as the Central Statistics Agency (BPS), the Ministry of Communication and Information (Kemkominfo), and the Ministry of Finance of the Republic of Indonesia (Kemenkeu RI).

Table 1 Operational Definition Of Research Variables

Variable (1)	Information (2)	unit (3)	Source (4)
Economic Growth	GDRP based on constant Price in 2010	Rupiah	BPS
Income Inequality	Gini Coefficient/*Gini Ratio*	Index	BPS
IP-TIK	ICT Development Index	Index	BPS
Access	ICT access and infrastructure	Index	BPS
Use	Use of ICT	Index	BPS
Skill	Skill of ICT	Index	BPS
The government budget	percentage of government budget in the ICT sector to the total government budget.	Percentage	Ministry of Finance
Wide Street	total length of roads each Province (Length of state roads + length of provincial roads and the length of district/city roads) Divided by the area of each province.	Ratio	BPS
Electricity	percentage of households with Access to electricity	percentage	BPS
Poor Population	percentage of the poor Poor population (P0)	percentage	BPS
Productive age	productive age (15-64 years old)	soul	SUSENAS
Social assistance Budget	government budget in the field of social protection to the total budget	percentage	Ministry of finance

Empirical Model

This research uses a Fixed-Effect Model with the Two-Stage-Least-Square (TSLS) method. The model selection refers to research that has researched the influence of information and communication technology (ICT) development on income inequality through economic development in various countries. This research has the main objective, namely, to analyze the influence of ICT development on income inequality through economic development at the provincial level in Indonesia from 2017-2021. The data used is annual data from 34 provinces in Indonesia for the period from 2017-2021 and analyzed using a fixed effect model with the Two Stage Least Square (TSLS) method as the best model, with the equation model as follows.

$$\textbf{LnPDRB}_{it} = \beta_0 + \beta_1 IP\_TIK_{it} + \beta_2 government\_budget_{it} + \beta_3 wide\_street_{it} + \beta_4 electricity_{it} + u_{it}$$

$$\textbf{Gini\_ratio}_{it} = \beta_0 + \beta_5 \widehat{LnPDRB}_{it} + \beta_6 social\_budget_{it} + \beta_7 productivy\_age_{it} + \beta_8 poor\_population_{it} + v_{it}$$

Where:

InPDRBit	: GRDP at constant prices in 2010 (rupiah)
IP_TIK	: ICT development index variable
Government_Budget	: variable percentage of total government budget
wide_street	: variable ratio of street length to area of the province
Electricity	: variable percentage of households with a source of lighting PLN Electricity
Gini_Ratio	: Gini coefficient/Gini Ratio
Poor_population	: variable percentage of poor population (P0) by province
Social_budget	: percentage variable of the government's social protection
Productive_age	: productive age variable aged 15-64 years.
u, v	: error terms
i	: provincial data (1,2...,34)
t	= time unit 2017-2021

The research hypothesis that will be analyzed in this study is that the development of information and communication technology (ICT) is significantly associated with reducing income inequality through economic development in Indonesia in 2017-2021.

Identification

In the ICT Development index variable, omitted variable bias can occur when there are relevant factors such as cultural factors that are not included in the regression model. Culture such as norms, values, and beliefs of society can influence the adoption, use, and development of information and communication technology (ICT) as well as society's views on ICT development Yao et al. (2020). In this case, culture is not included in the regression analysis, so its possibly significant influence on the ICT Development Index and economic development and income inequality will not be visible. Selection bias can occur when data collection or research samples used to measure the ICT Development index do not represent the population well. For example, samples for measuring the ICT Development index are limited to certain regions or countries that have ICT characteristics that do not reflect the overall population, other factors such as demographics, and beliefs that can influence the acceptance and use of technology, apart from that household characteristics can also be a factor.selection bias Leng et al. (2020).

RESULTS

Table 1 Descriptive Statistics Of The Influence Of Information And Communication Technology (Ict) Development On Income Inequality Through Economic Development

Variable	2017-2021			
	Mean	Std. Dev	Min	Max
PDRB (Ln)	315.71	446.88	27.122	1.771.034
Gini Ratio (Index)	0.351	0.038	0.247	0.44
ICT Development (Index)	5.330	0.791	3.29	7.66
Government budget (Percentage)	0.0011	0.0018	0.000033	0.0202
Wide street (Ratio)	15.968	9.945	3.183	42.521
electricity (Persen)	92.506	10.885	41.61	100
Social Budget (Percentage)	0.0133	0.0243	0.00062	0.3187
Poor Population (Percentage)	10.6057	5.5089	3.42	27.76
Productivity age (million)	5.3172	7.5741	0.4522	34.4971

According to the Central Statistics Agency (2021), during the five years from 2017 to 2021, the distribution of GRDP per island in Indonesia did not experience significant changes. Java Island continues to have the largest GRDP, followed by Sumatra, Kalimantan, Sulawesi, Bali, and Nusa Tenggara, as well as Maluku and Papua. However, if we look at the rate of GDP growth in Indonesia, during the 2017-2021 period there was quite dynamic growth from year to year. In 2020, it experienced a contraction due to the COVID-19 pandemic, the economy of each island recovered and experienced positive growth in 2021.

Inferential Analysis Results

Table 2 Regression Estimation Results Of The Two-Stage-Least-Square (TSLS) Method For The Economic Development Equation

Variable	LnPDRB
Access	0.0714*** (4.33)
Use	0.0272** (3.18)
Skill	-0.0002 (-1.11)
Government Budget	-0.7271 (-0.44)
Wide of Street	0.0121 (-0.44)
Electricity	0.0005 (1.51)
Productive age	0.0258 (1.61)
Social Budget	0.0125 (0.18)
Poor Population	-0.0299* (-2.48)
Constant	18.2681*** (122.29)
R^2	0.6852
Prob > F	0.0000
Number of Obs.	170

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 3 Regression Estimation Results Of The Two Stage Least Square (TSLS) Method For The Income Inequality Equation

Variable	Gini Ratio
LnPDRB	-0.1250*** (-3.47)
Government_Budget	-0.7106*(-2.15)
Wide of streets	-0.00127 (-0.53)
electricity	-0.00014 (-1.22)
Productive_age	0.0046 (0.64)
Social_Budget	-0.0347** (-2.63)
Poor_Population	0.0008 (0.28)
Constant	2.713*** (4.12)
R^2	0.0255
Prob > chi2	0.0000
Number of Obs.	170

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 2 and Table 3 contain the results of the panel data fixed effect model regression estimation using the Two Stage Least Square (TSLS) method.

Robustness Test

Table 4 Influence Of Information And Communication Technology (ICT) Development On Economic Development Based On Java Island And Non-Java Island

Variable	Java Island	Non-Java Island
	LnPDRB	LnPDRB
Access	0.0427 (1.62)	0.0696**(3.34)
Use	0.0526 (1.54)	0.0254**(2.38)
Skill	0.0451 (0.40)	-0.000267 (-1.10)
Government Budget	7.2051 (1.07)	-0.3364 (-0.22)
Wide of streets	-0.0218*** (-6.98)	0.0242* (1.98)
Electricity	0.00005 (0.06)	0.00059 (1.59)
Productive Age	0.0252 (1.72)	0.0009 (0.02)
Social Budget	1.009 (1.37)	-0.0232 (-0.45)
Poor Population	-0.0291*** (-5.72)	-0.0381* (-1.97)
Constant	19.7932*** (38.43)	18.0296*** (64.20)
R^2	0.0012	0.4891
Number of Obs.	30	140

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table 5 Effect Of Economic Development On Income Inequality Based On Java Island And Non-Java Island

Variable	Java Island	Non-Java Island
	Gini Ratio	Gini Ratio
LnPDRB	-0.1503* (-1.94)	-0.1149** (-2.43)
Government Budget	-1.9416 (-1.00)	-0.5756** (-2.19)
Wide of Streets	-0.0072 (-0.93)	0.0008 (0.44)
Electricity	0.0003 (1.07)	-0.00019 (-1.53)
Poor Population	0.0006 (0.15)	-0.0009 (-0.26)
Productive Age	0.0111 (1.25)	-0.0116 (-1.08)
Social Budget	0.3463 (0.95)	-0.0432*** (-4.54)
Constant	3.3708** (2.28)	2.5209** (2.95)
R^2	0.2533	0.0009
Number of Obs.	30	140

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.0

Table 6 Effect Of Information And Communication Technology (ICT) Development On Economic Growth Based On Provinces With Highest Service Sector And The Lowest Service Sector

Variable	Province with the highest service sector	Province with the lowest service sector
	LnPDRB	LnPDRB
Access	0.0093 (0.43)	0.0905*** (5.50)
Use	0.0696** (4.49)	0.0166 (1.27)
Skill	-0.2159 (-1.48)	-0.0002 (-0.83)
Government Budget	0.1885 (0.06)	-0.6126 (-0.36)
Wides of Streets	-0.0067 (-0.70)	0.0333* (1.98)
Electricity	0.0006 (0.92)	0.0006 (1.36)
Productive Age	0.0527** (2.61)	0.0322 (0.35)
Social Budget	1.8271** (3.93)	-.0337 (-0.63)
Poor Population	-.0326** (-3.66)	-0.0305 (-1.64)
Constant	20.8036*** (30.73)	17.4951*** (64.30)
R^2	0.4986	0.5604
Number of Obs.	50	120

Standard errors in parentheses
*p<0.10, ** p<0.05, *** p<0.01

Table 7 Effect Of Economic Development On Income Inequality Based On Provinces With The Highest Service Sector And The Lowest Service Sector

Variable	Provinces with the Highest Service Sector	Provinces with the Lowest Service Sector
	Gini Ratio	Gini Ratio
LnPDRB	-0.1369*** (-3.68)	-0.0964** (-2.06)
Government Budget	0.0936 (0.15)	-0.8073** (-2.00)
Wide of Streets	-0.0034 (-0.85)	0.0007 (0.23)
Electricity	0.0001 (0.68)	-0.0002 (-1.59)
Poor Population	0.0004 (0.11)	0.0011 (0.31)
Productive Age	0.0097 (1.83)	-0.0094 (-0.62)
Social Budget	0.1576 (0.48)	-0.0431*** (-4.23)
Constant	3.069*** (4.55)	2.1318** (2.58)
R^2	0.0223	0.0006
Number of Obs.	50	120

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

DISCUSSIONS

In the descriptive analysis of Table 1, the average value of GRDP from all provinces in Indonesia is 315,7169, where the lowest average GRDP is in North Maluku Province at 27,122 and the highest average GRDP is in DKI Jakarta Province at 1,771,034. and the average Gini coefficient index value is 0.3512706 with the province with the lowest average inequality being in the Bangka Belitung Islands Province with an average Gini coefficient of 0.47 and the province with the highest average level of inequality being D.I Yogyakarta at 0.44. The average value of the ICT Development Index is 5.329 with the lowest average index being in Papua Province at 3.29 and the highest index being in DKI Jakarta Province at 7.66.

From Table 2, the Information and Communication Technology Development Index has a significant positive association which can help to encourage economic development in Indonesia with a significant sub-index, namely ICT access and infrastructure, of 0.0714 or 7.1%. ICT access and infrastructure are defined as technological resources that can provide facilities related to the development of information and communication technology. The use of ICT is positively significant for economic development at 0.0272 or 2.7% but for the skills sub-index it is not significant. Although, individuals or populations who have expertise in information and communication technology (ICT) and ICT skills are quite important in increasing productivity and efficiency in several aspects of the economy, their impact on overall economic development is not significant or not strong.

According to Kuznets' hypothesis, when economic development can reduce income inequality between social groups, it will tend to shrink along with the economic development of a country. Table 3 shows that when economic development increases it can reduce income inequality in Indonesia. When economic growth increases by 1% it will reduce income inequality in Indonesia by -0.1250 points in the Gini ratio. If an increase in GDP affects a decrease in the Gini coefficient/Gini ratio, it shows that income distribution becomes more equal along with economic development. The government budget in the field of social assistance also shows that it can significantly help reduce income inequality in Indonesia. Social assistance policy is a real form of government responsibility both at the central and regional levels toward the conditions of its people who are underprivileged and neglected at the lowest level Rahmansyah et al. (2020).The adoption of information and communication technology (ICT) at low levels of income inequality will increase until a turning point where greater adoption of ICT will reduce income inequality in society. In other words, ICT Index Development plays an important role in increasing economic development and reducing income inequality. The results of this research are also in line with the results of research conducted by Agus et al. (2016) which states that an increase in GDP will reduce the Gini coefficient/Gini ratio.

Robustness Test

Table 4 shows that the influence of information and communication technology development has a significant influence outside of Java but not on Java. The ICT access and infrastructure sub-index and the ICT use sub-index can influence economic development, but the ICT skills sub-index does not affect economic development outside Java. Increasing ICT access and reliable infrastructure as well as household internet use in both urban and rural areas which is increasing every year with the gap decreasing every year can have an impact on economic development outside Java.

It can be seen from Table 5. that every increase in economic development will reduce the Gini coefficient outside Java by -0.1149 points in the Gini ratio and the social assistance budget variable significantly, this shows that government assistance programs such as PKH, BLT, and others help to reduce inequality outside the island of Java but it is different from the provinces on the island of Java, namely DKI Jakarta, Banten, East Java, Central Java, West Java, and D.I.Y Yogyakarta, in this case, the high economic growth on the island Java can reduce income inequality by -0.1503 greater than outside Java. According to the publication of the Central Statistics Agency (2021), the provinces on the island of Java are included in the group with a relatively high ICT development index compared to other provinces in Indonesia, but income inequality is also relatively large.

According to data from the Central Statistics Agency (2022), the provinces with the highest levels of inequality are on the island of Java, namely the Provinces of D.I.Y Yogyakarta, DKI Jakarta, Banten, Central Java, West Java, and East Java. Income inequality on the island of Java is influenced by several factors, namely differences in poverty levels and human development index levels in the region, Sari Farhan et al. (2022). The level of urbanization occurring on the island of Java is also a factor that causes increasing income inequality Arief et al. (2018). Apart from that, educational factors and gender gaps can also increase income inequality. Sari et al. (2021).

The role of technology in the growth of the economic sector is significant. Technological developments can influence various aspects of the economy and contribute to the accelerated growth of certain sectors. One of the main factors that differentiates the level of economic growth between countries is technological development. Technology that is currently developing rapidly is Information and Communication Technology (ICT). ICT is currently the main facility for various life sector activities, ICT contributes to fundamental changes in the operational structure and management of organizations, education, transportation, health, and research.Table 6 and Table 7 show that the development of information and communication technology (ICT) also has a significant effect on economic development. In the province with the highest service sector, the ICT use sub-index has a significant influence on economic development with a value of 0.0696 or 6.9%. The use of ICT is higher than other sub-indices because the use of ICT can increase operational and production efficiency. When compared with provinces with the lowest service sector, the ICT access and infrastructure sub-index is significant with a value of 0.0905 or 9%.

The influence of information and communication technology (ICT) development is greater in provinces with the lowest service sector compared to high service sectors, in more advanced provinces they already have access to and use information and communication technology (ICT) better compared to provinces with higher service sectors. lowest service sector so that the influence of ICT development is not too large compared to provinces with the lowest service sector. In this case, there is a need to develop better infrastructure in areas with the lowest service sectors.In Table 8, the regression results show that every 1% of economic development will encourage reducing income inequality in regions with the highest service sector in Indonesia by -0.1369 points in the Gini ratio. In provinces with the lowest service sector, it also shows.

Cost Comparison

The construction of Base Transceiver Station (BTS) towers is one way to increase the ICT development index and has a significant influence on the economic growth of a region. According to the Ministry of Communication and Information (Kominfo), the costs incurred in making one BTS tower unit are 800 million to 1.5 billion, the costs incurred depend on several things, namely location, material distribution routes, grounding, and land prices. The amount of costs incurred depends on the level of difficulty, type of tower used, installation area, and the obstacles faced in the field.

BTS towers are important infrastructures in the telecommunications industry that are used to provide cellular network services to users. From a cost perspective, building and operating a BTS tower involves initial investment costs to build infrastructure, and operational costs such as maintenance, electricity, and land rental costs. However, from a benefits perspective, BTS Towers can provide significant economic benefits, such as increased access to telecommunications services, increased productivity, and a boost to economic growth. In this case, we cannot yet calculate the benefits in detail from the development of information and communication technology (ICT). This is because in the calculation of the information and communication technology development index, 11 indicators make up the ICT Development Index which are divided into 3 sub-indices, namely the ICT access and infrastructure sub-index, the ICT use sub-index, and the ICT skills sub-index.

CONCLUSION

1. In this research, developments in the development of information and communication technology (ICT) have a positive and significant influence on income inequality throughout the economy. In this research, the development of information and communication technology development (IP-ICT) has a positive and significant influence on economic development with significant sub-indices, namely access to ICT of 7.1% and ICT Use sub-index of 2.7% but the sub-index ICT Skills index is not significant.
2. When Indonesia's economic development increases by 1%, it will reduce income inequality in Indonesia by -0.1250 points in the Gini ratio.
3. Information and Communication Technology (ICT) development has an influence on Non-Java Island but not on Java Island with significant sub-indices, namely the ICT Access and Infrastructure Sub-Index and ICT Use. Adoption and use of information technology, increasing access to information and knowledge as well as technology innovation contribute to the improvement and competitiveness of economic sectors outside Java (Non-Java).
4. High Information and Communication Technology (ICT) development in provinces with high and low service sectors can help to reduce income inequality through economic development with a significant Information and Communication Technology (ICT) sub-index, namely the Use of ICT sub-index for Provinces with the highest service sector, in contrast to provinces with a low service sector, have a significant sub-index, namely the ICT access and infrastructure sub-index, which has a significant influence and can help to encourage economic development in Indonesia. The influence of Information and Communication Technology (ICT) development is not as great in provinces with a high service sector compared to provinces with the lowest service sector. In this case, there is a need for better infrastructure development in areas with the lowest service sectors.

SUGGESTIONS

1. National Digital Transformation to optimize the role of digital technology in increasing the nation's competitiveness and as a source of economic growth in Indonesia in the future. The strategy that can be implemented is to develop a national digital ecosystem, both the ICT infrastructure ecosystem and the ICT industrial ecosystem and ensure that its use can be felt by all aspects of society in Indonesia.
2. Implement policies that encourage investment in the ICT sector which should be directed towards ICT infrastructure such as increasing internet accessibility and adding BTS units in provinces outside Java and in rural areas because better connectivity can help reduce the digital gap in Indonesia and can significantly help encourage economic growth and reduce income inequality in Indonesia.
3. The government can improve the broadband internet network, by adding BTS units, especially in rural and remote areas.
4. Encourage the development of digital villages by providing ICT infrastructure and training in rural areas. This will help reduce access gaps and accelerate economic development in the area.

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