Journal of Finance and Business Digital (JFBD)
Vol. 4, No. 4 2025: 1083-1094

Information and Technology (IT) and Development Policy as a Determinant of Wage and Salaried Worker

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A R T I C L E I N F O

Keywords: SDG 8, Wage and Salaried Workers, Economic growth, World Bank

Received : 25, Oktober
Revised : 27, November
Accepted: 29, Desember

A B S T R A C T

This research was conducted to examine the determinants of Information and Technology (IT) and development policies in increasing wages and salaried workers, total (percent of total employment). The data used in this study were obtained from World Bank macro data (accessed July 5, 2025). This data covers all countries worldwide. The dependent variables used are Wage and salaried workers, total (% of total employment) and the independent variables are School enrolment, tertiary, Automated teller machines (ATMs) (per 100,000 adults), Individuals using the Internet (% of population), Inflation (annual %), Industry, value added, Foreign direct investment, net inflows. The analysis method used is multinomial linear regression. The results of the analysis show that all independent variables are positively associated with the dependent variable, -Wage and salaried workers, total (% of total employment).

DOI prefik: https://doi.org/10.55927/jfbd.v4i4.442
ISSN-E: 2964-8688
https://srhformosapublisher.org/index.php/jfbd

INTRODUCTION

The United Nations Sustainable Development Goals (SDGs) are a set of 17 interrelated global goals established in 2015 to address pressing social and environmental challenges facing the world. These 17 goals serve as a comprehensive development blueprint for achieving a more just, prosperous, and sustainable future for all. They aim to guide the collective efforts of all nations and entities to address issues such as poverty, inequality, environmental degradation, and peace. The SDGs build on previous UN development agendas, including the Millennium Development Goals, by adding several key components that reflect and demonstrate the complexity of today's global challenges. The SDGs specifically focus on issues related to poverty and health, while addressing key issues such as environmental sustainability, gender equality, education, and economic growth. They are designed to bridge gaps in these areas and provide a holistic and integrated framework. The SDGs recognize the complexity of factors influencing human well-being and the health of our planet, Earth.

In 2015, 195 countries agreed with the United Nations that they could change the world for the better. This agenda was named the Sustainable Development Goals (SDGs) 2030. SDG 2030 is expected to be achieved if governments, businesses, media, higher education institutions, and local NGOs from each country unite to improve the lives of their respective citizens by 2030. SDG 8, "Decent Work and Economic Growth," aims to ensure full and productive employment and decent work for all, including equal pay for equal work. This involves promoting sustainable economic growth, protecting labour rights, and ensuring safe working environments.

Figures 1, 2, And 3 Show the Percentage of Workers Paid to Specific Entities

Figure 1 shows the inequality in worker pay between high-income, middle-income, and low-income countries and the world. The inequality in wages and salaries of workers between high-income countries and other areas, and even the world, is very clear.

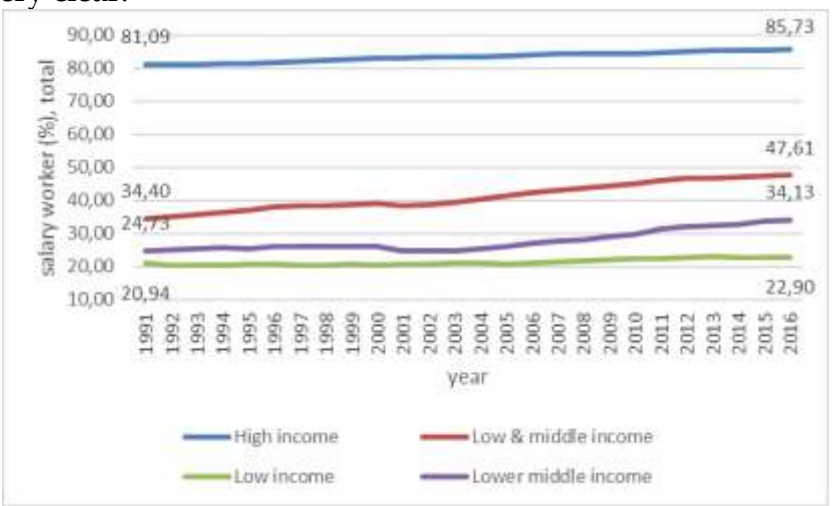

Figure 1. Wage and Salaried Workers, Total (% of Total Employment), High Income, Middle Income. Low Income, And World, 1991-2023

Source: World Bank (2025). Own calculation

The percentage of wage and paid workers in high-income, middle-income, and low-income countries is 84.9, 44.3, 32.5, and 18.2, respectively. This percentage in 2023 increased successively to 88.6, 52.0, 45.2, 19.9 percent. there is a large gap between high income and other economic groups and for the world.

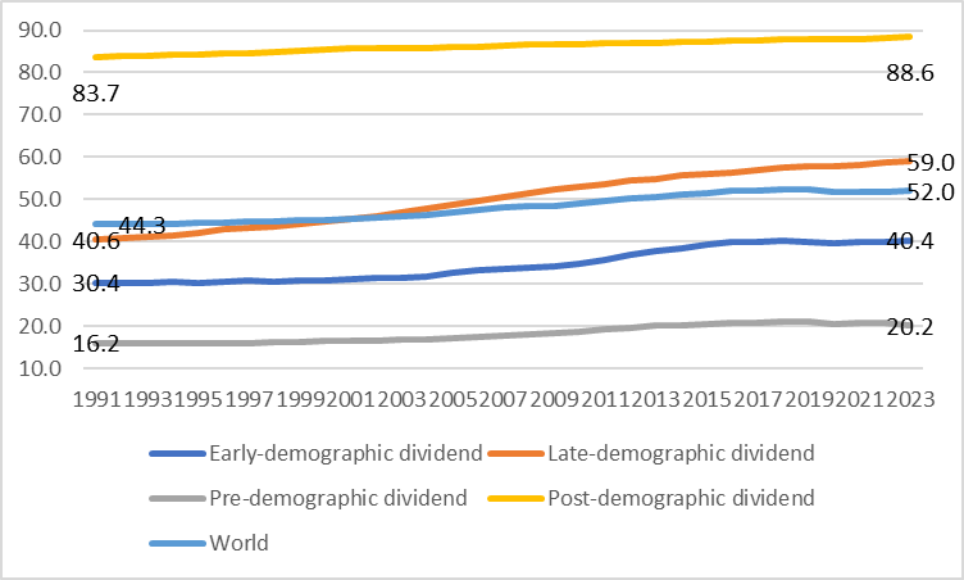

Figure 2. Wage and Salaried Workers, Total (% of Total Employment) By Demographic Dividend Country and World, 1991-2023

Source: World Bank (2025). Own calculation

Figure 2 shows the percentage of wage and salary workers in groups of countries according to the achievement of the demographic bonus, and the world. Countries in the post-demographic sector have a higher figure compared to other groups and world. The percentage of wage and salary workers in post-demographic dividend, world, late-demographic dividend, early-demographic dividend, and pre-demographic dividend countries is 83.7, 44.3, 40.6, 300.4, and 16.6, respectively. This figure only slightly improved until 2023. For post-demographic dividend, late-demographic dividend, world, early-demographic dividend, and pre-demographic dividend countries, this percentage was 88.6, 590, 52.0, 40.4, and 20.2 percent, respectively.

From Figures 1, 2, and 3, we can discuss that economic growth, progress, and development are associated with wage and salary workers (% employment). High-income countries tend to have higher wage and salary workers (% employment).

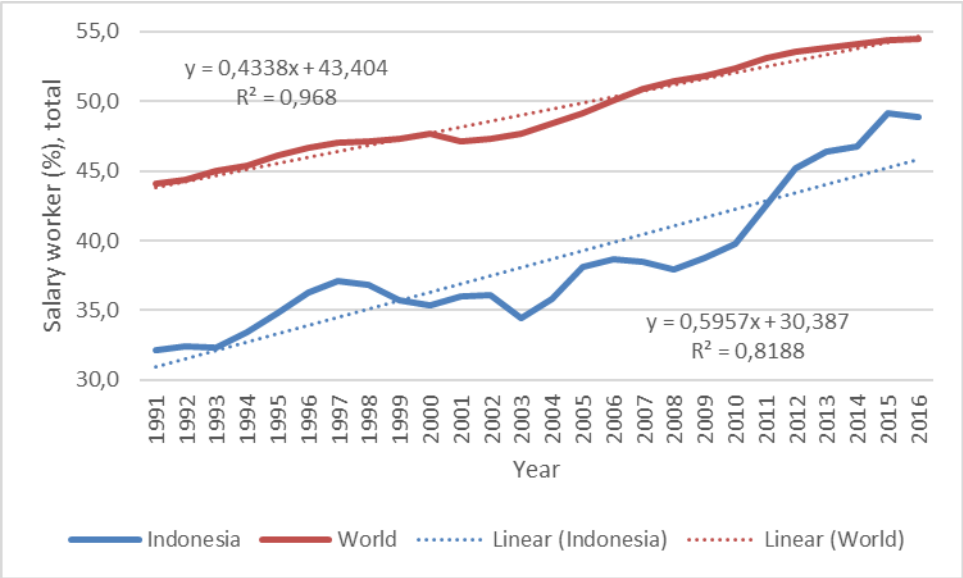

Figure 3. Wage and Salaried Workers, Total (% of Total Employment) Indonesia and World, 1991-2023

Source: World Bank (2025). Own calculation

Figure 3 shows the percentage of wage and salary workers for the world and Indonesia. Overall, this percentage is still higher than the world average compared to Indonesia. A linear trend analysis shows that the increase in wages and salary of workers (as a percentage of total employment) in Indonesia is higher than the global average. The annual increase in wages and salary of workers in Indonesia is 0.5747 percent. Meanwhile, the global average is 0.3115 percent.

Economic growth has a positive correlation with the growth of employment, wage and salary workers (5 of employment). The case of China, shows that economic expansion increases urban employment opportunities and the percentage of paid and monetized workers. This association has been improving since 2000. Chun-mei (n.d.) shows that economic growth can reciprocally increase employment prospects and the percentage of paid workers significantly in urban areas. Considering the importance of policies to increase the percentage of workers who are monetized and receive decent wages, this research was conducted to study the determinants of wage and salary workers (percentage of employment).

LITERATURE REVIEW

The relationship between school enrolment and employment, particularly among those who are salaried and receive a salary (the percentage of workers), is positive. This relationship is influenced by various factors, such as worker empowerment, educational attainment, economic conditions, and policy interventions. School enrolment can be associated with better employment outcomes, as higher educational attainment often leads to higher wages and more stable employment. (Neumark & Wascher, 1995; Hyder & Behrman, 2011; Branson & Leibbrandt, 2013; Federman & Levine, 2003; Palaščáková, 2020)

A number of studies have shown a positive correlation between education and employment, including wage and salary workers, which has been well documented. Minimum wage policies in some countries can negatively impact school enrolment by increasing the proportion of adolescents who are neither employed nor in school, as firms may prefer to employ more skilled workers, or by impacting unpaid workers (Neumark & Wascher, 1995). Further studies are needed to examine the interaction between education and employment, such as the percentage of unpaid or decently paid workers. Hyder and Behrman (2011) studied the relationship between education, such as school enrolment rates, and employment in Pakistan. They found that there is a relationship between school enrolment rates and the percentage of salaried workers. This study also examined the relationship between school attainment, average wages, wage risk, and disability risk in the context of the Pakistani labour market. The findings also showed that higher education is positively correlated with average wages and wage levels. Palaščáková (2020) emphasized the correlation between education level and employment. Higher education leads to increased employment opportunities and higher incomes. On a macro level, school enrolment in tertiary education impacts employment and income, particularly in Slovakia.

Education and school quality has a direct positive effect on earnings, its direct relationship to employment is less pronounced. However, better education quality, including school enrolment rates, indirectly affects employment through higher educational attainment. With higher education, workers have the power to demand pay (Branson & Leibbrandt, 2013). School enrolment rates are positively correlated with formal sector employment, including wage employment. A study by Federman & Levine (2003) showed that employment in the manufacturing sector leads to higher school enrolment rates, especially for adolescents aged 13-15. A one standard deviation increase in employment, particularly in the manufacturing sector, is associated with a 3.8 percentage point increase in school enrolment and participation rates.

The relationship between information technology (IT), ATM, and internet usage is positively associated with employment, including in Wage and salaried workers, total (% of total employment). This can be influenced by various factors such as IT skills, industry sector, and geographic location. IT, ATM and the internet have been shown to have a significant impact on wages and employment opportunities, generally resulting in an upward trend towards higher wages for those with IT skills and working in IT-related sectors. This is evident across various regions and industries. IT, ATM, and the internet continue to play a

crucial role in shaping the labour market. (Goss & Phillips,2002; Rajagukguk, 2022, Sarkar & Mehta, 2020; Zhao et al., 2022)

Goss & Phillips (2002) conducted a study that concluded that IT skills, workplace internet use, and ATM penetration in the economy resulted in an average wage increase of 13.5 percent. This wage increase was consistent across industries, particularly in less technology-intensive sectors, where wage premiums are higher. They found that workers with IT skills, ATM penetration, and internet usage tended to earn higher wages, with hourly wages improving by 8.22%.

In India, over 80% of workers with educational and skilled backgrounds in the ICT sector are employed in the formal sector, and these workers are permanent and fully paid (Sarkar & Mehta, 2020). Their research found that over 67 percent of the workforce in the emerging IT and ICT sectors has a bachelor's degree or higher, indicating a strong correlation between education, employment, and pay, as well as the monetization of workers. Workers in the ICT sector enjoy higher wages than non-ICT workers. Wage inequality is lower in the ICT sector, reflecting the equitable distribution of returns to education. A study conducted by Rajagukguk (2022) shows that Internet penetration has a positive impact on economic growth and welfare.

The relationship between investment, industrial value added, and the percentage of paid and salaried employment can be positive, although it is multifaceted and requires further study. This relationship can be influenced by various economic factors and dynamics. Investment in various industries is often correlated with increased employment opportunities and a higher percentage of workers earning wages and salaries. From a macroeconomic perspective, this can increase GDP, industrial value added, and welfare. (Putra, 2012: Peraita de Grado & Sánchez Moreno, 1985; Lee, 2011, and Earle et al., 2012).

Putra, R. E. (2012). conducted research on industry in Semarang, Central Java, Indonesia, on the influence of investment value, wage value, and production value on labor absorption in industry. It was found that there was a positive relationship with the absorption of paid labor. Peraita de Grado, C., & Sánchez Moreno, M. (1985) tested a quantitative model that attempted to explain variations in the wage share in gross value added for Spanish industry during the period 1964 to 1981. They found that industrial value added impacted and was associated with the wage share within each industry and the increase in the percentage of workers receiving full wages. Lee, K.-B. (2011) found that as the proportion of IT workers in the total workforce increases, investment and employment in Korea increase, particularly in the percentage of salaried workers.

Earle et al., 2012, analyzed the wage impact of foreign direct investment (FDI) using universal, linked firm-employee panel data covering 4,926 foreign acquisitions in Hungary. By matching pre-acquisition data and controlling for fixed effects for detailed firm and worker groups, they found a 12-28 percent impact on average wages. The analysis found a positive impact for all worker types, occupations, wage quintiles, and the percentage of workers earning wages.

The novelty of this research is that to improve the dependent variable, various policy directions are needed. As usual in economic policy, a result is obtained through the intervening variables.

METHODOLOGY

Data

The data used in this study was obtained from the World Bank (2025) (accessed on July 3, 2025) in the World Development Indicator section on employment. Table 1 presents the variables, observation quantity, minimum, maximum, mean, and standard deviation. The dependent variable in this research is Wage and salaried workers, total (% of total employment) and the independent variables are: School enrolment tertiary (gross), gender parity index (GPI), Automated teller machines (ATMs) (per 100,000 adults), Individuals using the Internet (% of population), Inflation, consumer prices (annual %), Industry, value added (% of GDP), and Foreign direct investment, net inflows (% of GDP).

Table 1. Variables, N, Minimum, Maximum, Mean, and Std. Deviation

Variables	N	Minimum	Maximum	Mean	Std. Deviation
School enrolment, tertiary (gross), gender parity index (GPI)	1105	.20	7.40	1.24	.62
Automated teller machines (ATMs) (per 100,000 adults)	1120	.00	288.60	49.67	45.31
Individuals using the Internet (% of population)	1116	.20	98.20	41.99	28.34
Inflation, consumer prices (annual %)	1101	-7.10	59.20	4.77	5.54
Industry, value added (% of GDP)	1113	2.50	156.90	27.67	13.18
Foreign direct investment, net inflows (% of GDP)	1120	-43.50	451.70	7.26	24.62
Wage and salaried workers, total (% of total employment)	1120	6.70	99.60	64.76	24.49

Source: World Bank (2025). Own calculation

Method

In this study, the analysis method used is multinomial linear regression (Rajagukguk, W., 2022b). The model equation can be written as follows:

$$\boldsymbol{Y = \alpha_0 + \alpha_1 . X_1 + \cdots + \alpha_k . X_k}$$

Where:
Y: Wage and salaried workers, total (% of total employment)
X_1: School enrolment tertiary (gross), gender parity index (GPI).
X_2: Automated teller machines (ATMs) (per 100,000 adults).
X_3: Individuals using the Internet (% of population).
X_4: Inflation, consumer prices (annual %).
X_5:Industry, value added (% of GDP).
X_6: Foreign direct investment, net inflows (% of GDP)

The analysis model is presented in Table 2 below.

Table 2. Variables, Coefficient, Std. Error. T, and Sig

Variables	B	Std. Error	t	Sig.
(Constant)	20.145	1.453	13.861	.000
School enrolment, tertiary (gross), gender parity index (GPI)	8.930	.836	10.681	.000
Automated teller machines (ATMs) (per 100,000 adults)	.100	.013	7.857	.000
Individuals using the Internet (% of population)	.496	.022	22.085	.000
Inflation, consumer prices (annual %)	.193	.086	2.248	.025
Industry, value added (% of GDP)	.218	.037	5.960	.000
Foreign direct investment, net inflows	.068	.018	3.858	.000

a. Dependent Variable: Wage and salaried workers, total (% of total employment)

RESEARCH RESULT AND DISCUSSION

The Six Independent Variables are Significant and Positively Associated (Increase) the Dependent Variable Wage and Salaried Workers, Total (% of Total Employment)

Each unit increase in the independent variables School enrolment, tertiary (gross), gender parity index (GPI) is associated with an increase of 8,930% Wage and salaried workers. The independent variables and this figure also include parity in terms of gender. A one-unit increase in the independent variable, Automated Teller Machines (ATMs) (per 100,000 adults), is associated with a 0.100-unit increase in the independent variable, Wage and Salaried Workers Total (% of total employment). This indicates that technological development and penetration have an impact on improving employment.

Individuals using the internet (% of population) is associated with a one-unit increase in the independent variable, wage and salaried workers, total (% of total employment). For each one-unit increase in the variable, individuals using the internet (% of population), there is a 0.492% increase in the dependent variable, wage and salaried workers. Inflation, a measure of economic growth, was found to be associated with an increase in the independent variable, wages and salaried workers, total (% of total employment). Each one-unit increase in the variable, consumer prices (annual %), was associated with a 0.193% increase in the dependent variable, wages and salaried workers.

Each One-Unit Increase in the Industry Value-Added Variable (% of GDP) is Associated with A 0.218% Increase in the Dependent Variable, Wage and Salaried Workers

Foreign direct investment, net inflows (% of GDP) is associated with the dependent variable Wage and salaried workers, total (% of total employment). For every one unit increase in the independent variable Foreign direct investment, net inflows (% of GDP) has an impact on the increase in Wage and salaried workers, total (% of total employment) by 0.068%.

The Implication of the Findings in This Study is that Building a Nation, Especially the Dependent Variable, is Carried Out through the Independent Variable, The Findings of This Study

Economic development is multifaceted. This study identified several determinants for improving welfare through increasing the dependent variable, Wage and salaried workers, total (% of total employment). This was done due to data limitations. It is hoped that this will be replicated in Indonesia in the future, given the significant events in this case.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this research indicate that Information and Technology (IT) advancement and development policy play a significant role in shaping the distribution and growth of wage and salaried workers. IT adoption enhances productivity, expands job opportunities in high-skilled sectors, and encourages business formalization. Meanwhile, development policies through regulations, infrastructure improvement, education programs, and digital transformation initiatives provide an enabling environment that supports labor market expansion and competitiveness.

Overall, the study concludes that IT and development policies act as strong determinants of wage and salaried employment, especially in regions experiencing rapid technological progress and government-driven modernization efforts.

1. Strengthening Digital Literacy Programs
   Governments and institutions should intensify digital skill development to ensure workers can adapt to evolving technological demands, particularly in emerging digital sectors.
2. Enhancing IT Infrastructure
   Policymakers should invest in equitable IT infrastructure, especially in rural and developing areas, to reduce the digital divide and promote equal access to wage and salaried employment opportunities.
3. Encouraging Pro-Worker Development Policies
   Development policies should focus on labor protection, job security, and fair wage systems to ensure that technological progress benefits workers rather than exacerbating inequality.
4. Supporting SMEs in Digital Transformation
   Small and medium enterprises (SMEs) should be assisted through incentives, training, and technological support so they can adopt IT efficiently and create more formal employment opportunities.
5. Promoting Collaboration Between Private and Public Sectors
   Strengthening partnerships between government, industries, and educational institutions can improve workforce readiness and ensure development policies align with current market needs.

ADVANCED RESEARCH

Future research on the determinants of wage and salaried workers should expand the conceptual framework by integrating multidimensional aspects of technological transformation and governance. Information and Technology (IT) is no longer limited to basic digital tools but encompasses automation, artificial intelligence (AI), platform-based labor markets, and advanced data systems. These emerging technologies reshape labor dynamics by redefining job categories, required skill levels, and wage structures. Development policy, therefore, must be examined not only as regulatory intervention but as a strategic architecture governing how societies adapt to digital economic transitions.

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