ANALYSIS OF FACTORS AFFECTING THE ABSORPTION OF FEMALE LABOR IN CENTRAL JAWA

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ABSTRACT

Women's participation in the labor market plays a crucial role in advancing economic growth and fostering gender equality, yet it continues to encounter persistent social and structural obstacles. This research seeks to examine the determinants of female employment absorption in Central Java from 2019 to 2023. The analysis applies panel data regression with a Fixed Effect Model (FEM) to capture the influence of each explanatory variable. The study incorporates the Information and Communication Technology Development Index (ICTDI), Provincial Minimum Wage (PMW), Average Years of Schooling (AYS), investment, labor force, and the presence of vocational training centers. Findings reveal that PMW, AYS, labor force, and vocational training centers exert a significant impact on female labor absorption, whereas ICTDI and investment show no meaningful effect. In light of these results, it is recommended that policymakers emphasize equitable wage systems, broaden educational opportunities, encourage women's participation in the workforce, and reinforce the contribution of vocational training institutions to sustainably enhance competitiveness and the integration of women into the labor market.

Keywords: *Labor Absorption; Information; Provincial Minimum Wage; Labor Force; Communication and Technology Development Index (IP-ICT); Level of Education; Vocational Training Institutions*

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INTRODUCTION

Economic development is widely recognized as a fundamental benchmark for assessing the progress and advancement of a nation (Adriyanto et al., 2020). In general, economic growth within a region serves as the primary indicator of development success (Ahmad et al., 2024). Various categories of factors including human resources, natural resources, capital, technology, and others play essential roles in driving economic development at both the regional and national levels (Puspita et al., 2021). Consequently, humans cannot be detached from the process, as they function simultaneously as labor, inputs of development, and consumers of its outcomes.

One of the crucial dimensions in evaluating economic development is the employment absorption of women (Al Faizah et al., 2022). Shifts in social, cultural, and economic dynamics have increasingly encouraged women to participate in economic activities, spanning both the formal and informal sectors (Alfandi & Pancakurniasih, 2024). To address the imbalance between labor demand and supply, comprehensive policy frameworks are required (Antika et al., 2022). In addition, the provision of education and vocational training for the workforce remains indispensable (Desanta & Aisyah, 2025).

Although global improvements have been achieved, gender-based disparities in employment opportunities persist (Desmawan et al., 2023). Female labor force participation continues to exhibit inequality, even in regions that are often perceived as the most gender-equitable (Reljic & Zezza, 2025). As emphasized by Hidayat and Ash Shidiqie (2024), labor issues still represent unresolved challenges. A growing workforce that is not matched by sufficient job creation inevitably leads to unemployment (Pratiwi & Aisyah, 2019). Furthermore, labor market conditions remain constrained by several issues, such as gender discrimination, wage inequality, limited access to education and training, and the concentration of women in specific occupational sectors (Nuraeni & Lilin Suryono, 2021).

Table 1
Labor Force Participation Rate (TPAK) of Central Java by gender

Year (as of August)	Male	Female
2019	82,78	55,35
2020	81,68	57,54
2021	81,94	57,58
2022	83,74	58,31
2023	84,52	58,92

Source: Central Java BPS, 2025

Based on the data presented in Table 1, the Labor Force Participation Rate (LFPR) of men has experienced fluctuations over the past few years, particularly during the period when the COVID-19 pandemic disrupted economic and social activities worldwide. In contrast, the LFPR of women shows an opposite trend, demonstrating a gradual increase each year, although the growth has not been particularly substantial. Nevertheless, between 2019 and 2024, men's LFPR remained at 84.52%, while women's LFPR reached only 58.92%. This highlights a significant gender disparity in the labor market, which is clearly reflected in the employment absorption gap over time. Since this study focuses on Central Java Province, the labor market data presented in Table 1 specifically reflects the regional context. Central Java was selected as the focus area because it is one of the most populous provinces in Indonesia, contributes significantly to

the national economy, and still faces considerable gender disparities in labor market participation.

The Information and Communication Technology Development Index (ICT-DI) serves as one of the crucial indicators of labor absorption within a country or region in the current generation (Hidayat & Ash Shidiqie, 2024). Over the past decades, digital technologies have played a transformative role in driving economic development (Watson et al., 2018). Ahmad et al. (2024) further emphasize that Information and Communication Technology (ICT) fosters innovation by building extensive information networks that facilitate the broad dissemination of knowledge. Consequently, individuals with access to ICT are more likely to benefit from expanded employment opportunities, particularly for women.

According to Alfandi & Pancakurniasih (2024), the utilization of technology significantly influences labor markets. Investments and innovations targeted at low-skilled labor yield important benefits for the workforce as a whole (Khakim, 2020). Furthermore, the expansion of the digital economy has intensified wage inequality, as high-skilled workers tend to secure greater opportunities, thereby widening the wage gap with their low-skilled counterparts (Kurniasari et al., 2024). This occurs because digitalization allows technology to replace human labor at an accelerated pace.

Employment absorption is also closely linked to minimum wage policies. In many provinces or districts, workers often migrate to other regions as the wages offered in their local areas fail to meet their living needs (Listari et al., 2024). Lokiman et al. (2014) define wages as the monetary compensation received by workers from employers as a reward for their services. Similarly, Wihastuti & Rahmatullah (2018) describe the Provincial Minimum Wage as a production cost borne by producers in return for the labor contribution to production activities. Indonesia demonstrates a distinctive pattern in this regard, as minimum wages vary across provinces rather than being standardized at the national level (Pratomo, 2011).

Education plays a crucial role in enhancing women's participation in the labor market, both in formal and informal sectors (Muslihatinningsih & Subagiarta, 2020). According to Desanta & Aisyah (2025), women with higher levels of education are more likely to secure decent jobs with better earnings, since education strengthens skills, knowledge, and individual competitiveness. Furthermore, education facilitates access to professional networks and training opportunities aligned with industry demands (Ningsih, 2024). In contrast, Buchari (2016) argues that low educational attainment reduces both the quality and quantity of production outcomes, thereby limiting employment absorption in certain sectors. Hence, improving women's education not only benefits individual welfare but also contributes to economic growth through higher labor productivity.

Human capital development, supported by education, is one of the key drivers of regional and national progress (Nugraha et al., 2024). Desmawan et al. (2023) highlight that skilled human resources significantly contribute to economic expansion, as societies with higher productivity levels generally achieve better income and living standards. Similarly, Yansyah et al. (2024) found that women with at least secondary education are more likely to enter formal employment sectors.

Investment also serves as a fundamental factor in driving national economic growth (Nuraeni & Suryono, 2021). Large-scale capital inflows can expand production capacity and increase national income, which subsequently stimulates labor demand as industries require more workers (Khakim, 2020). Sakti et al. (2021) emphasize that both domestic and foreign investment play a vital role in creating new job opportunities,

including for women. Globally, labor-intensive industries such as textiles, garments, and electronics have been the main absorbers of female workers. However, Nasution & Hidayat (2020) note that despite the rise in women's employment driven by investment, persistent structural challenges remain, including wage inequality and inadequate working conditions.

The Labor Force Participation Rate (LFPR) reflects the proportion of the working-age population engaged in the labor market, either through employment or active job seeking (Pratiwi & Aisyah, 2019). Although women's involvement in the workforce has risen, their absorption into employment remains suboptimal. Goldin (2014) emphasizes that despite the global increase in female labor force participation, gender disparities in wages and access to formal jobs persist. Similarly, Kurniasari et al. (2024) report that the growth of women entering the labor force has not been matched by opportunities in the formal sector, as many are concentrated in informal employment with relatively low wages.

Vocational training institutions play a crucial role in enhancing women's employability, thereby increasing their chances of entering the labor market (Puspita et al., 2021). Antika et al. (2022) note that training programs are designed to reduce unemployment by equipping job seekers with skills and competencies that enhance their quality and productivity to remain competitive. In the same vein, Wahyuningsih (2021) highlights that training involves transferring specific knowledge, technical abilities, and attitudes to employees, enabling them to perform their tasks more effectively, in line with established standards, and with higher productivity.

In light of these issues, the objective of this study is to investigate the effects of the Information and Communication Technology Development Index, Provincial Minimum Wage, Average Years of Schooling, Investment, Female Labor Force, and Job Training Institutions on labor absorption in Central Java Province. This research seeks to provide empirical evidence on the determinants of employment absorption while highlighting the gender dimension, with the ultimate goal of offering policy insights to strengthen labor market participation and reduce disparities.

LITERATURE REVIEW AND HYPOTHESES

Information and Communication Technology Development Index (ICT-DI) and Labor Absorption

The advancement of information and communication technology (ICT) has become one of the critical indicators in enhancing labor absorption (Rachmadani et al., 2023). Watson et al. (2018) emphasize that digitalization plays a major role in transforming economies. Ahmad et al. (2024) argue that ICT fosters innovation by building extensive information networks that accelerate knowledge dissemination, thereby creating new job opportunities, particularly for women. On the other hand, Alfandi & Pancakurniasih (2024) highlight that digitalization may also widen wage inequality, since highly skilled workers tend to capture greater opportunities than their low-skilled counterparts. Hence, ICT-DI can stimulate labor absorption but also poses challenges related to inequality in labor markets.

Provincial Minimum Wage (UMP) and Labor Absorption

Minimum wage policy plays an important role in shaping labor dynamics (Reljic & Zezza, 2025). Lokiman et al. (2014) define wages as financial compensation paid to workers in return for their services, while Wihastuti & Rahmatullah (2018) describe the provincial minimum wage as a production cost borne by employers. In Indonesia, minimum wage

standards vary across provinces rather than being nationally uniform (Pratomo, 2011), which often triggers labor migration to higher-wage regions. Thus, UMP influences not only the distribution of labor but also regional labor absorption.

Average Years of Schooling (RLS) and Female Labor Participation

Education plays a crucial role in enhancing women's labor market participation (Wahyuningsih, 2021). Desanta & Aisyah (2025) state that higher education levels improve women's access to decent jobs with better earnings by strengthening skills, knowledge, and competitiveness. Moreover, education facilitates access to training programs aligned with industry needs. Conversely, Buchari (2016) argues that low educational attainment reduces labor quality, thereby limiting employment absorption. Supporting this, Yansyah et al. (2024) found that women with at least secondary education are more likely to enter formal employment.

Investment (INV) and Labor Absorption

Investment serves as a fundamental driver of economic and employment growth (Sakti et al., 2021). Khakim (2020) explains that capital inflows expand production capacity and stimulate labor demand. Sakti et al. (2021) further note that both domestic and foreign investment are vital in creating new job opportunities, including for women, particularly in labor-intensive sectors such as textiles, garments, and electronics. However, Nasution & Hidayat (2020) warn that despite rising employment from investment, structural challenges persist, including wage inequality and poor working conditions.

Female Labor Force (AK) and Labor Absorption

An increase in the female labor force does not necessarily translate into optimal labor absorption. Goldin (2014) stresses that although women's labor force participation has risen globally, gender disparities in wages and access to formal jobs remain prevalent. Similarly, Kurniasari et al. (2024) reveal that many women are still concentrated in informal employment sectors with relatively low pay, indicating persistent barriers to decent work.

Job Training Institutions (LPK) and Labor Absorption

Job training institutions play a key role in improving employability and labor absorption (Watson et al., 2018). Antika et al. (2022) argue that vocational training equips job seekers with industry-relevant skills and competencies, thereby reducing unemployment. Wahyuningsih (2021) adds that training also enhances technical abilities, knowledge, and work attitudes, enabling workers to meet performance standards and increase productivity. Consequently, the availability of job training institutions significantly contributes to expanding employment opportunities, particularly for women.

Research Hypotheses

Based on the literature review, this study formulates several hypotheses regarding the factors that may influence labor absorption. First, the Information and Communication Technology Development Index (ICT-DI) is hypothesized to influence labor absorption, as digitalization can create new job opportunities while also reshaping labor market structures. Second, the Provincial Minimum Wage (UMP) is expected to affect labor absorption, given that wage levels play a significant role in labor distribution and mobility across regions. Third, the Average Years of Schooling (RLS) is assumed to influence labor

absorption, since education enhances skills and competitiveness that determine employability. Fourth, investment (INV) is considered to influence labor absorption because capital inflows expand production capacity and increase labor demand. Fifth, the Female Labor Force (AK) is hypothesized to influence labor absorption, as the participation of women in the labor market contributes to workforce availability and economic productivity. Finally, Job Training Institutions (LPK) are expected to influence labor absorption by providing industry-relevant skills and competencies that improve employability and productivity.

METHOD

This research adopts a descriptive method with a quantitative approach. The study relies on secondary data obtained from the official website of BPS Central Java Province, which includes information on labor, the Information and Communication Technology Development Index, provincial minimum wage, average years of schooling, investment, female labor force, and vocational training institutions in Central Java during the period 2019–2023. Central Java was chosen as the focus of this study because it is one of the most populous provinces in Indonesia, plays a significant role in the national economy, and exhibits persistent gender disparities in labor market participation, making it a relevant case for analysis.

The analysis employed in this study is quantitative in nature, using panel data methodology, which integrates both time series and cross-sectional dimensions (Gujarati, 2009). In this context, the cross-sectional data consist of 35 districts/cities in Central Java Province, while the time series covers the years 2019 to 2023. Three estimation techniques are applied, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) (Gujarati, 2009). Furthermore, to identify the most appropriate panel regression model, Chow and Hausman tests are conducted (Gujarati, 2009), with the econometric specification formulated as follows:

$$TK_i = \beta 1_{it} + \beta 2IP - TIK_{it} + \beta 3UMP_{it} + \beta 4RLS_{it} + \beta 5INV_{it} + \beta 6AK_{it} + \beta 7LPK_{it} + \mu_{it}$$

Where:

TK	= Labor Absorption (Thousand People)
IP-TIK	= Information, Communication, and Technology Development Index (%)
UMP	= Provincial Minimum Wage (Million)
RLS	= Average Years of Schooling (Years)
INV	= Investment (Billion)
AK	= Female Labor Force (Thousand People)
LPK	= Job Training Institution (Unit).

RESULTS AND DISCUSSION

Object Description and Research

This study employs the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) Gujarati, (2009), in estimating the econometric model, with the corresponding model selection results displayed in Table 2.

Table 2
Estimation Results of the Panel Data Regression Econometric Model

Variable	Regression Coefficient		
	CEM	FEM	REM
C	13653.42	-36417.98	6209.134
IP_TIK	-20.46503	0.644218	-2.008536
UMP	-0.007823	-0.046553	-0.017414
RLS	588.7601	12852.07	3073.000
INV	-0.002569	-0.000118	-0.000708
AK	0.933756	0.959830	0.941932
LPK	309.1897	1062.918	343.2141
R2	0.997019	0.999349	0.990761
Adjusted. R2	0.996912	0.999154	0.990431
Statistic F	9363.861	5140.948	3002.521
Prob. Statistic F	0.000000	0.000000	0.000000

Model Selection Test Chow :
Cross- Section F(34,134) = 14.102025; Prob. F(34,134) = 0,0000
Hausman :
Cross-Section random $\chi 2$ (6) = 20.608239 ; Prob. $\chi 2$ = 0.0022

Source: Data Processing Using Eviews 12, 2025

Based on the results of the Chow Test presented in Table 2, the empirical probability of the F-statistic is 0.0000. Since this value is below the significance level of α (0.01), the Fixed Effect Model (FEM) is selected as the appropriate model. Furthermore, the Hausman Test indicates a χ^2 probability of 0.0022, which is also lower than α (0.01). Therefore, the most suitable and reliable model is the Fixed Effect Model (FEM). A detailed summary of the FEM estimation is provided in the following table.

Table 3
Fixed Effect Model (FEM) Estimation Model

$$TK_{it} = -36417.98 + 0.644218\text{IP} - \text{TIK}_{it} - 0.046553UMP_{it} + 12852.07RLS_{it}$$
$$(0{,}9567) \quad (0{,}0000)^* \quad (0{,}0007)^*$$
$$-0.000118INV_{it} + 0.959830AK_{it} + 1062.918LPK_{it}$$
$$(0{,}8366) \quad (0{,}0000)^* \quad (0{,}0500)^{***}$$

R^2 = 0,9993; DW = 2.0546; F. = 5140,948; Prob. F = 0,0000

Source: Data Processing Using Eviews 12, 2025

Based on Table 3, the estimated FEM model indicates that the F-statistic probability value is 0.0000, which is lower than the 0.01 significance level, while the coefficient of determination (R^2) reaches 0.9993. This suggests that 99.93% of the variation in female labor absorption is explained by factors such as the Information and Communication Technology Development Index (ICTDI), Provincial Minimum Wage (PMW), Average Years of Schooling (AYS), investment, labor force size, and the presence of job training institutions, with the remaining 0.07% being influenced by variables outside the model.

The t-test results reveal that the provincial minimum wage has a negative effect on female labor absorption. In contrast, average years of schooling, labor force participation, and job training institutions exert a positive and significant impact, with probability values of 0.0007 < 0.01, 0.0000 < 0.01, and 0.0500 < 0.10, respectively.

Meanwhile, the ICT development index and investment show no significant influence on female labor absorption.

The regression coefficient of the provincial minimum wage is −0.046553, indicating that a one-million-rupiah increase in the minimum wage reduces female labor absorption by 0.046553. For average years of schooling, the coefficient of 12,852.07 implies that an additional year of education raises female labor absorption by 12,852.07 thousand individuals. Similarly, the coefficient for the labor force is 0.9598, meaning that every additional 1,000 workers leads to an increase of 0.9598 thousand in female labor absorption. Finally, the coefficient for job training institutions is 1,062.91, which suggests that the establishment of one additional training center increases female labor absorption by 1,062.91 thousand individuals.

Discussion

The findings reveal that ICT development does not exert a significant influence on female labor absorption. The uneven distribution of ICT infrastructure across regions has resulted in limited access for women to fully utilize these technologies. This suggests that while advances in information and communication technology may generate new job opportunities and offer greater work flexibility, their impact has not been strong enough to substantially increase women's labor market participation. Ningsih (2024) highlights that technology carries considerable potential to enhance worker productivity, but its benefits must be supported by relevant skill development. Similarly, Listari et al. (2024) emphasize that ICT growth can reduce youth unemployment, although its effectiveness depends on the readiness of human resources. Hence, strengthening digital literacy and providing technology-based training are crucial for enabling women workers to capitalize on emerging opportunities.

Provincial minimum wages are found to negatively affect female employment absorption. The rise in minimum wages may elevate labor costs and trigger inflationary pressures, which ultimately discourages firms from expanding their workforce, and in some cases, even leads to downsizing (Putri & Widaningrum, 2019). This finding suggests that higher minimum wage policies may hinder job creation, particularly for women, who are often concentrated in lower-skilled positions compared to men (Hidayat & Shidiqie, 2023).

Average years of schooling demonstrate a positive relationship with female labor absorption. Investments in education yield substantial returns in terms of increasing women's participation in the labor market. Higher educational attainment improves skills and productivity, making women more competitive and attractive to employers (Al Faizah et al., 2022). This finding aligns with Becker's human capital theory, as cited in Wujarso (2022), and is reinforced by international evidence such as Rahayu (2024), who found that educational advancement among women significantly enhances their labor force participation in developing economies.

Investment, however, does not display a significant effect on women's employment absorption. Nugraha et al. (2024) similarly report that, despite its role in stimulating macroeconomic growth, investment has a limited impact on female labor absorption. Structural factors such as women's restricted access to job-related training, the dominance of capital-intensive sectors, and persistent traditional views regarding gender roles remain key barriers. In several regions, cultural norms continue to confine women to domestic responsibilities, restricting their involvement in formal labor markets. Adriyanto et al. (2020) further argue that these structural and social constraints

slow down women's integration into the workforce, even when economic opportunities from rising investment are available.

The growth of the labor force can stimulate female employment absorption since it reflects a broader supply of human resources to address labor market demands. An increasing number of women participating in the workforce is often accompanied by the expansion of their skills and competencies, thereby enhancing their competitiveness in employment opportunities (Wiasih & Karmini, 2021). Moreover, the rising involvement of women in the labor market provides positive signals for firms to adjust recruitment strategies and create more accommodating workplace environments. According to Rachmadani et al. (2023), improvements in human capital quality significantly enlarge the chances for women to secure decent-paying jobs. Hence, the expansion of female labor force participation not only broadens labor supply but also contributes to the overall increase in women's labor force participation rates across various economic sectors.

Job training institutions also play a crucial role in enhancing women's employment prospects, as they provide essential skills and preparedness for workforce entry. Well-structured training programs aligned with industrial demands open wider opportunities for women, especially in fields requiring specific expertise. Additionally, training institutions frequently act as intermediaries between job seekers and employers, streamlining the job placement process. Muslihatinningsih & Subagiarta (2020) highlight that improving workforce quality through training promotes efficiency and productivity, which in turn strengthens women's attractiveness to employers. Consequently, such institutions not only enrich women's competencies but also reinforce their bargaining position within an increasingly competitive labor market.

CONCLUSION AND SUGGESTIONS

This research investigates the determinants of labor absorption in Indonesia or more specifically, Central Java Province by examining the roles of the Information and Communication Technology Development Index, provincial minimum wage, average years of schooling, investment, female labor force participation, and vocational training institutions. Applying a panel data regression with the Fixed Effect Model (FEM), the analysis reveals that provincial minimum wages, educational attainment, women's labor force involvement, and vocational training centers significantly influence labor absorption. In contrast, both the ICT Development Index and investment show no significant impact.

The study is limited by the restricted time frame of the dataset and the absence of qualitative dimensions, such as local policies and social norms, which may be explored in future research. These findings suggest that policymakers should focus on fair wage regulations, strengthening education quality, expanding women's employment opportunities, and enhancing the contribution of vocational training institutions to sustainably increase labor absorption.

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