Digitalization and Inclusive Growth: Examining the Effects on Female Labor Market Outcomes in ESCAP Member Countries

การเปลี่ยนแปลงสู่เทคโนโลยีดิจิทัลและการเติบโตอย่างครอบคลุม: การทดสอบผลกระทบต่อตลาดแรงงานสตรีในประเทศสมาชิกคณะกรรมการเศรษฐกิจและสังคมแห่งเอเชียและแปซิฟิก

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Abstract

This study investigates the impact of digitalization on female labor market outcomes across 60 ESCAP member countries from 1999 to 2023. Using panel data regression analysis, this study examines the effects of internet usage, ICT goods exports, and ICT service exports on female labor force participation. The findings reveal a complex relationship between digitalization and women's employment. Internet usage and ICT service exports generally show positive relationship with female labor market participation, while ICT goods exports demonstrate negative relationships. The study also highlights the significant roles of economic growth, trade openness, education, and women's political representation in shaping female labor market outcomes. The results suggest that while digitalization offers career opportunities for women, its benefits are not uniformly distributed. These findings highlight the need for targeted policies such as promoting women's participation in ICT services and addressing barriers in ICT goods manufacturing. The study contributes to the literature by revealing the complex and multifaceted impacts of different aspects of digitalization on female labor market outcomes across diverse economies, offering insights for policymakers seeking to harness digital technologies for inclusive growth and gender equality in the evolving digital economy.

Keywords: *Digitalization, Inclusive Growth, Female Labor Market Participation, Digital Divide*

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บทคัดย่อ

        การศึกษานี้ทดสอบผลกระทบของการเปลี่ยนแปลงสู่เทคโนโลยีดิจิทัลต่อตลาดแรงงานสตรี มีจำนวนผู้หญิงใน 60 ประเทศสมาชิกของคณะกรรมการเศรษฐกิจและสังคมแห่งเอเชียและแปซิฟิกระหว่างปี พ.ศ. 2542-2566 โดยใช้การวิเคราะห์การถดถอยข้อมูลแบบพาแนล โดยการศึกษานี้ทดสอบผลกระทบของการใช้อินเทอร์เน็ต การส่งออกสินค้าเทคโนโลยีสารสนเทศ และการส่งออกบริการเทคโนโลยีสารสนเทศต่อการมีส่วนร่วมในตลาดแรงงานของสตรี ผลการวิจัยแสดงให้เห็นถึงความสัมพันธ์ที่ซับซ้อนระหว่างการเปลี่ยนแปลงสู่เทคโนโลยีดิจิทัลและการจ้างงานของสตรี การใช้อินเทอร์เน็ตและการส่งออกบริการเทคโนโลยีสารสนเทศ แสดงความสัมพันธ์เชิงบวกกับการมีส่วนร่วมในตลาดแรงงานของสตรี ในขณะที่การส่งออกสินค้าเทคโนโลยีสารสนเทศแสดงความสัมพันธ์เชิงลบ การศึกษานี้ยังเน้นบทบาทสำคัญของการเติบโตทางเศรษฐกิจ การเปิดการค้า การศึกษา และการมีส่วนร่วมทางการเมืองของสตรีต่อตลาดแรงงานของสตรี ผลการวิจัยชี้ให้เห็นว่าในขณะที่การเปลี่ยนแปลงทางเทคโนโลยีดิจิทัลเปิดโอกาสในการทำงานของผู้หญิงแต่อาจจะไม่ทั่วถึง และชี้ให้เห็นถึงความจำเป็นในการกำหนดนโยบายเฉพาะเจาะจง เช่น การส่งเสริมการมีส่วนร่วมของผู้หญิงในบริการเทคโนโลยีสารสนเทศ และการลดอุปสรรคในการผลิตสินค้าเทคโนโลยีสารสนเทศ อีกทั้งยังมีส่วนช่วยเพิ่มเติมองค์ความรู้ด้วยการเปิดเผยผลกระทบที่ซับซ้อนและหลากหลายของการเปลี่ยนแปลงสู่ดิจิทัลในมุมต่างๆ ต่อตลาดแรงงานของสตรี โดยนำเสนอข้อมูลเชิงลึกสำหรับผู้กำหนดนโยบายที่ต้องการใช้ประโยชน์จากเทคโนโลยีดิจิทัลเพื่อการเติบโตอย่างครอบคลุมและความเท่าเทียมทางเพศ

คำสำคัญ: *การเปลี่ยนแปลงสู่ดิจิทัล การเติบโตอย่างครอบคลุม การมีส่วนร่วมในตลาดแรงงานของสตรี*
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Introduction

        Women's participation in labor markets has become increasingly critical for economic development and gender equality in the digital age. In ESCAP member countries, significant disparities persist in female labor force participation, ranging from under 20.00% in countries like Afghanistan to over 80.00% in Cambodia as of 2023. Despite overall progress, the regional average female labor force participation rate remains at 45.00%, substantially below the male participation rate of 75.00% (World Bank, 2024). Figure 1 illustrates these regional patterns in female labor market participation across countries.
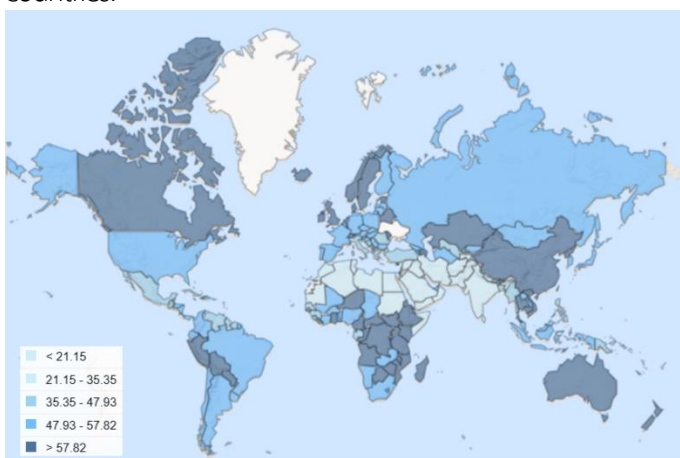

Figure 1 The female labor force participation rates across countries in 2023 (%)
Source: World Bank (2024)

The rapid advancement of digital technologies has profoundly transformed global economies and labor markets in recent decades. This digital revolution, often referred to as the Fourth Industrial Revolution, has created new opportunities and challenges across various sectors. By 2025, it is projected that 85 million jobs may be displaced by a shift in the division of labor between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labor between humans, machines, and algorithms (World Economic Forum, 2020). The International Telecommunication Union (ITU) reports that internet usage has grown from just 6.50% of the global population in 2000 to 51.00% in 2019, highlighting the pervasive nature of digitalization (International Telecommunication Union [ITU], 2019).

While digitalization has the potential to drive economic growth and improve productivity, its impact on women's labor market outcomes requires particular attention. Digital technologies could create an economic value of $13 trillion by 2030, with specific opportunities for women's economic empowerment (McKinsey Global Institute, 2019). Lu, Xiao, and Wang (2023) found that digital economy can enhance female employment through promoting gender equality perspectives, increasing digital technology usage, and boosting labor demand for female-preference occupations. E-commerce platforms enable women entrepreneurs to reach broader markets, while remote work provides flexible opportunities that can accommodate women's caregiving responsibilities. Digital financial services enhance women's economic inclusion by providing secure access to financial accounts and payment systems. (McAdam, 2022; United Nations Development Programme [UNDP], 2023).

However, women face distinct challenges in accessing these digital opportunities. The Organization for Economic Co-operation and Development (OECD) found that women are 26.00% less likely than men to have smartphone access and 33.00% less likely to use the internet for job-seeking (Organization for Economic Co-operation and Development [OECD], 2018). This gender-specific digital divide limits women's participation in the digital economy. Women's overrepresentation in low-paying jobs affects their ability to afford digital devices and services (World Bank, 2023). Even when women have access, they often face gaps in digital literacy that limit their ability to leverage digital opportunities (Smile Foundation, 2024).

While some research points to positive effects, such as increased labor force participation and new job opportunities, other studies highlight potential negative consequences, including the widening of existing gender gaps. This complexity underscores the need for a more comprehensive investigation into how digitalization impacts gender equality in the labor market. Given the importance of ensuring that technological progress contributes to inclusive growth, this study aims to provide a thorough analysis of the relationship between digitalization and female labor market outcomes.

Objectives of this study

This study aims to provide a comprehensive analysis of the relationship between digitalization and female labor market outcomes. The primary objectives of this research are

1．To analyze the impact of digitalization on female labor market outcomes, focusing on labor force participation, employment-to-population ratios, and unemployment rates.

2．To analyze the effects of various aspects of digitalization, including internet usage, ICT goods exports, ICT service exports.

3. To investigate the role of economic, social, factors, institutional and political in shaping female labor market outcomes.

4. Develop policy recommendations for leveraging digitalization to enhance female labor market participation.

Literature review

The relationship between digital access and female labor force participation operates through several important mechanisms. First, internet access reduces information asymmetries in the labor market by providing women with better access to job opportunities and improving job search efficiency. Dettling (2016) conducted a comprehensive study in the United States and found that high-speed internet access led to a 4.10 percentage point increase in married women's labor force participation. This increase was primarily driven by reduced job search costs and improved job matching efficiency. The positive effect was particularly strong for educated women who could better leverage online resources for professional networking and job searching.

Digital technologies also enable flexible work arrangements, which have proven particularly beneficial for women's employment. Given that women often bear primary caregiving responsibilities, the ability to work remotely or with flexible schedules can significantly increase their labor market participation. Klonner and Nolen (2010) demonstrated this relationship and found that mobile network expansion significantly increased female employment in rural areas by enabling work-from-home opportunities and providing greater scheduling flexibility.

The impact of ICT sectors on female employment varies significantly between different sub-sectors. The ICT services sector generally shows positive effects on female employment for several reasons. First, these jobs typically have lower physical demands compared to traditional sectors. Second, they place greater emphasis on cognitive skills where gender gaps are typically smaller. Third, they often offer more flexible work arrangements. United Nations Conference on Trade and Development [UNCTAD] (2018) found that countries with larger ICT service sectors tend to have higher female labor force participation rates, supporting this positive relationship.

However, the relationship between ICT manufacturing and female employment is more complex. While the sector can create new manufacturing jobs, these positions often require technical skills in areas where women are traditionally underrepresented. Human capital development, particularly education and digital literacy, plays a crucial role in determining women's ability to leverage digital opportunities. Faridi, Chaudhry, and Anwar (2009) demonstrated that higher education levels significantly increase the probability of female labor force participation. Their research suggests that digital skills training specifically targeted at women can help bridge the gender digital divide and enhance employment opportunities. Institutional support also plays an important

role in shaping the relationship between digitalization and female employment. Heath, Schwindt-Bayer, and Taylor-Robinson (2005) and Mirziyoyeva and Salahodjaev (2023) found that countries with higher female political representation tend to implement more inclusive digital economy policies. Their research indicates that good governance and low corruption levels create an enabling environment for women's economic participation by ensuring fair access to digital opportunities and reducing discrimination.

Digitalization's impact on female labor markets varies across ESCAP regions. In East Asia, China's e-commerce boosted female entrepreneurship (McKinsey Global Institute, 2019). Southeast Asia shows mixed results, with Vietnam's e-commerce employing more women (Kim, Abdullah, Thuy, & Boey, 2020), while the Lampung Province, Indonesia successfully empowered women in the creative economy sector by leveraging digital technology and social media platforms, earning the 2020 APE award for gender mainstreaming, while digital transformation enabled women to balance entrepreneurship with their domestic responsibilities (Setiawati, Mubasit, & Hidayat, 2023; Sofa & Eschachasthi, 2024). South Asia presents contrasts in IT employment and digital financial services access (Islam, 2020; Chaudhary, 2021). Central Asian digital initiatives increased female labor participation (Ye & Cai, 2024; Yin, Zhang, & Choi, 2023). The Pacific region faces infrastructure challenges, affecting women's opportunities differently in island nations and Australia (Alam, Ali, Erdiaw-Kwasie, Murray, & Wiesner, 2022).

Based on this literature review, this study can propose a conceptual framework that identifies three primary channels through which digitalization affects female labor market outcomes. The first channel operates through digital access, which improves information access and subsequently enhances labor market participation. The second channel works through ICT sectors, which create new job opportunities in both services and manufacturing. The third channel functions through digital skills development, which improves employability and leads to better labor market outcomes. Besides, several key moderating factors influence these relationships, for example education and skills development, institutional quality, economic development and social norms.

Methodology

This study employs a quantitative approach to examine the impact of digitalization on female labor market outcomes across ESCAP member countries. This study utilizes panel data regression analysis to investigate this relationship while controlling for various socio-economic factors. The dataset comprises an unbalanced panel of 60 ESCAP member countries over the period 1999-2023. The data is sourced from World Development Indicators and the International Telecommunication Union's ICT Statistics.

Variables

This study examines three key dependent variables to provide a comprehensive view of female labor market outcomes. The first measure, female labor force participation as a percentage of total labor force, captures the overall magnitude of women's engagement in the labor market,

reflecting women's economic opportunities. The second measure, the ratio of female to male labor force participation, reveals gender equality in the labor market by comparing participation rates between genders, helping identify gender gaps in labor market access. The third measure, female unemployment rate as a percentage of female labor force, indicates challenges women face in finding employment despite their willingness to work, reflecting barriers to labor market entry.

To mitigate omitted variable bias and account for key factors affecting female labor market outcomes identified in previous research, this study incorporates several control variables. Economic growth, measured by GDP per capita growth, controls for overall economic conditions affecting employment opportunities. Trade openness, measured as trade percentage of GDP, accounts for international economic integration's impact on labor markets. Female secondary school enrollment reflects human capital development, which is crucial for labor market access. The proportion of women in national parliaments captures women's political representation, which may influence labor policies. Control of corruption accounts for institutional quality affecting labor market functioning. The age dependency ratio controls for demographic factors that might affect women's ability to participate in the labor force. Finally, the inflation rate controls for macroeconomic stability affecting employment conditions.

Empirical model

This study employs panel data regression analysis using four models to examine the effects of digitalization on female labor market outcomes.   For each outcome, this study estimates three types of models, 1) Pooled Ordinary Least Squares (OLS) 2) Fixed Effects (FE) Model 2) Random Effects (RE) Model. The specific regression equation for each model is as follows.

$$
\begin{aligned}
Y_{it} = \ &\beta_0 + \beta_1 Internet_{it} + \beta_2 ICTgoods_{it} + \beta_3 ICTservices_{it} + \beta_4 GDPgrowth_{it} \\
&+ \beta_5 Trade_{it} + \beta_6 Inflation_{it} + \beta_7 Education_{it} + \beta_8 Corruption_{it} \\
&+ \beta_9 Age\ Dependency_{it} + \beta_{10} Woman\ Politics_{it} + \gamma_i + \varepsilon_{it}
\end{aligned}
$$

Where Y_{it} denotes each of the four dependent variables for country i at time t

Female Labor force denotes labor force, female (% of total labor force)

Ratio Female to Male denotes ratio of female to male labor force participation rate (%)

Female Unemployment Rate denotes unemployment, female (% of female labor force)

$Internet_{it}$ denotes individuals using the internet (% of population) for country i, time t

$ICTgoods_{it}$ denotes ICT goods exports (% of total goods exports) for country i, time t

$ICTservices_{it}$ denotes ICT service exports (% of service exports) for country i, time t

$GDPgrowth_{it}$ denotes GDP per capita growth (annual %) for country i, time t

$Trade_{it}$ denotes proportion of trade (% of GDP) for country i, time t

$Inflation_{it}$ denotes annual inflation (%) for country i, time t

$Education_{it}$ denotes female school enrollment in secondary level (%) for country i, time t

$Corruption_{it}$ denotes control of corruption (percentile rank) for country i, time t

$Age\ Dependency_{it}$ denotes age dependency ratio (% of working-age population) for country i, time t

$Woman\ Politics_{it}$ denotes proportion of seats held by women in national parliaments (%) for country i , time t

γ_i denotes country-specific effects (omitted in pooled OLS)

ε_{it} denotes the error term.

Results

Table 1 presents the descriptive statistics for the variables under study, including measures of central tendency (mean) and dispersion (standard deviation, minimum, and maximum values).

Table 1 Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
Female Labor force (% of total labor force)	41.10	8.51	6.54	52.85
Ratio Female to Male (%)	70.63	19.50	6.99	106.52
Female Employment Ratio (%)	47.86	14.43	3.42	81.86
Female Unemployment Rate (% of female labor force)	6.28	4.39	0.15	29.19
Internet (% of population)	34.19	31.23	0.00	98.08
ICT goods (% of total goods exports)	8.15	12.94	0.00	61.18
ICT services (% of service exports)	6.50	7.98	0.00	52.09
GDP growth (%)	2.79	5.80	-55.19	65.39
Trade (% of GDP)	94.40	66.72	18.13	442.62
Inflation (%)	6.37	9.86	-22.09	127.97
Education (%)	82.63	25.41	0.00	151.54
Corruption (percentile)	47.96	29.93	0.47	100.00
Age Dependency (%)	56.44	14.22	24.85	109.45
Woman Politics	14.49	10.25	0.00	50.42

To assess potential multicollinearity among the independent variables, a correlation analysis was conducted. Table 2 presents the correlation matrix for the independent variables in this study. All correlations are below 0.80, indicating no severe multicollinearity among the variables.

Table 2 Correlation matrix

	Internet	ICT goods	ICT services	GDP growth	Trade	Inflation	Education	Corruption	Age Dependency	Woman Politics
Internet	1.00									
ICT goods	0.17	1.00								
ICT services	-0.22	-0.08	1.00							
GDP growth	-0.36	0.07	0.04	1.00						
Trade	0.16	0.46	-0.21	0.06	1.00					
Inflation	-0.35	-0.25	0.06	0.28	-0.14	1.00				
Education	0.70	0.14	-0.30	-0.25	0.14	-0.24	1.00			
Corruption	0.66	0.20	-0.13	-0.22	0.22	-0.47	0.63	1.00		
Age Dependency	-0.45	-0.33	0.15	-0.08	-0.36	0.09	-0.45	-0.22	1.00	
Woman Politics	0.48	0.02	0.02	-0.19	0.03	-0.10	0.35	0.33	-0.07	1.00

Table 3 presents fixed effects regression results for female labor force participation, with the Hausman test (χ^2 = 22.22, p = 0.010) supporting the fixed effects specification. Futheremore, the Modified Wald test for heteroskedasticity (χ^2 = 1245.34, p < 0.000) and the Wooldridge test for autocorrelation (F = 42.89, p < 0.000) indicates the presence of first-order serial correlation in our panel data. This finding, along with the heteroskedasticity detected by the Modified Wald test, justifies the use of clustered standard errors at the country level to obtain robust estimates that account for both issues.

Internet usage demonstrates a significant positive effect (coefficient = 0.010, p < 0.050) on female labor force participation, suggesting that increased digital connectivity enhances women's labor market engagement. ICT goods exports show a significant negative relationship (coefficient = -0.047, p < 0.050), while ICT service exports exhibit a positive effect (coefficient = 0.065, p < 0.010), indicating sector-specific impacts of digital transformation on female employment.

Table 3 Determinants of female labor force participation

Female Labor force (% of total labor force)	Pooled-OLS Coefficient	Fixed Effects Coefficient	Random Effects Coefficient
Internet (% of population)	0.010 (0.020)	0.010 (0.010)**	0.011 (0.010)**
ICT goods (% of total goods exports)	-0.112 (0.030)***	-0.047 (0.010)**	-0.046 (0.010)**
ICT services (% of service exports)	-0.246 (0.030)***	0.065 (0.010)***	0.059 (0.010)***
GDP growth (%)	0.192 (0.080)**	0.034 (0.020)**	0.034 (0.020)**
Trade (% of GDP)	0.014 (0.010)***	-0.007 (0.010)	-0.005 (0.010)
Inflation (%)	-0.274 (0.060)***	0.004 (0.010)	0.004 (0.010)

Table 3 Determinants of female labor force participation (Cont.)

Female Labor force (% of total labor force)	Pooled-OLS Coefficient	Fixed Effects Coefficient	Random Effects Coefficient
Education (%)	0.150 (0.020) ***	0.006 (0.010)	0.006 (0.010)
Corruption (percentile)	-0.052 (0.010) ***	-0.003 (0.010)	-0.001 (0.010)
Age Dependency (%)	-0.066 (0.030) *	-0.034 (0.020) **	-0.037 (0.020) **
Woman Politics	0.109 (0.030) ***	0.035 (0.010) **	0.034 (0.010) **
intercept	33.959 (2.970) ***	41.657 (1.280) ***	42.275 (1.670) ***
R-squared	0.459	0.223	0.008
LM test	χ^2 = 1752.57 Prob > χ^2 = 0.000	-	-
Hausmen Test	-	χ^2 = 22.22 Prob > χ^2 = 0.010	-
Modified Wald Test for Groupwise Heteroskedasticity	-	χ^2 = 1245.34 Prob > χ^2 = 0.000	-
Wooldridge Test for Autocorrelation	-	F-test 45.67 (0.000)	-

Note: *** indicates significance at the 1% level, ** indicates significance at the 5% level,

   * indicates significance at the 10% level

Table 4 shows that the LM test (χ^2 = 1538.99, p < 0.001) indicates that the random effects model is preferable to pooled OLS, while the Hausman test (χ^2 = 24.40, p = 0.010) suggests that the fixed effects model is more appropriate than the random effects model for this study. The fixed effects regression revealed several significant factors influencing the ratio of female to male labor force participation. Similar to the first model, diagnostic tests indicate the presence of heteroskedasticity (Modified Wald test: χ^2 = 1356.78, p < 0.000) and autocorrelation (Wooldridge test: F = 42.89, p < 0.000), hence this study employs the same robust estimation approach.

Positive relationships were found with internet usage, ICT service exports and the proportion of women in national parliaments, while negative associations were observed with ICT goods exports and trade as a percentage of GDP. The contrasting effects of ICT goods and services exports suggest that the nature of technological sectors may differently impact gender balance in the workforce. The strong positive relationship with women's political representation highlights the potential influence of gender-inclusive policies.

Table 4 Determinants of ratio of female to male labor force participation rate

Ratio Female to Male (%)	Pooled-OLS Coefficient	Fixed Effects Coefficient	Random Effects Coefficient
Internet (% of population)	0.024 (0.030)	0.018 (0.020)*	0.020 (0.020)**
ICT goods (% of total goods exports)	-0.212 (0.060)***	-0.186 (0.030)***	-0.177 (0.030)***
ICT services (% of service exports)	-0.584 (0.070)***	0.120 (0.030)***	0.107 (0.030)**
GDP growth (%)	0.448 (0.190)**	0.074 (0.040)*	0.072 (0.040)*
Trade (% of GDP)	0.048 (0.010)***	-0.028 (0.010)**	-0.023 (0.010)**
Inflation (%)	-0.643 (0.140)***	0.037 (0.030)	0.034 (0.030)
Education (%)	0.222 (0.040)***	0.004 (0.02)	0.003 (0.020)
Corruption (percentile)	-0.039 (0.030)	0.003 (0.020)	0.007 (0.020)
Age Dependency (%)	-0.138 (0.080)*	0.003 (0.040)	-0.007 (0.040)
Woman Politics	0.309 (0.080)***	0.117 (0.030)***	0.113 (0.030)***
intercept	56.084 (6.740)***	67.722 (2.970)***	69.774 (3.940)***
R-squared	0.440	0.236	0.007
LM test	χ^2 = 1538.99 Prob > $\overline{\chi}^2$ = 0.000	-	-
Hausmen Test	-	χ^2 = 24.40 Prob > $\overline{\chi}^2$ = 0.010	-
Modified Wald Test for Groupwise Heteroskedasticity	-	χ^2 = 1356.78 Prob > χ^2 = 0.000	-
Wooldridge Test for Autocorrelation	-	F-test 42.89 (0.000)	-

Note: *** indicates significance at the 1% level, ** indicates significance at the 5% level,
* indicates significance at the 10% level

Table 5 examines determinants of female unemployment, with the fixed effects model supported by the Hausman test (χ^2 = 32.05, p = 0.010). Diagnostic tests show heteroskedasticity (Modified Wald test: χ^2 = 1178.45, p < 0.000) and autocorrelation (Wooldridge test: F = 38.92, p < 0.000). ICT service exports associate with higher unemployment (coefficient = 0.083, p < 0.010), potentially reflecting skill mismatches in the digital service sector. Education significantly reduces female unemployment (coefficient = -0.019, p < 0.050), while women's political representation shows a strong negative association with unemployment (coefficient = -0.062, p < 0.010).

The positive relationship between ICT service exports and female unemployment, indicating potential challenges in women's integration into this expanding sector. In contrast, increased female representation in national parliaments is associated with decreased female unemployment, suggesting that gender diversity in political leadership may contribute to more favorable labor market for women. Additionally, the role of education significantly enhances women's employment prospects.

Table 5 Determinants of female unemployment

Unemployment (%)	Pooled-OLS Coefficient	Fixed Effects Coefficient	Random Effects Coefficient
Internet (% of population)	-0.021 (0.010) **	0.007 (0.010)	0.000 (0.010)
ICT goods (% of total goods exports)	-0.097 (0.010) ***	0.004 (0.020)	-0.022 (0.020)
ICT services (% of service exports)	0.077 (0.020) ***	0.083 (0.020) ***	0.081 (0.020)***
GDP growth (%)	0.012 (0.040)	-0.008 (0.020)	-0.007 (0.020)
Trade (% of GDP)	-0.007 (0.000) **	0.025 (0.010) ***	0.013 (0.000) **
Inflation (%)	0.143 (0.030)	0.008 (0.020)	0.021 (0.020)
Education (%)	0.032 (0.010) **	-0.019 (0.010) **	-0.006 (0.010)
Corruption (percentile)	0.033 (0.010) ***	-0.027 (0.010) **	-0.013 (0.010)
Age Dependency (%)	-0.051 (0.020) **	-0.081 (0.020) ***	-0.064 (0.020) ***
Woman Politics	-0.031 (0.020) *	-0.062 (0.020) ***	-0.051 (0.020) **
Intercept	5.597 (1.440) ***	11.219 (1.550) ***	9.660 (1.540) ***
R-squared	0.316	0.156	0.004
LM test	χ^2 = 1688.06 Prob > $\bar{\chi}^2$ = 0.000	-	-
Hausmen Test	-	χ^2 = 32.05 Prob > $\bar{\chi}^2$ = 0.010	-
Modified Wald Test for Groupwise Heteroskedasticity	-	χ^2 = 1178.45 Prob > χ^2 = 0.000	-
Wooldridge Test for Autocorrelation	-	F-test 38.92 (0.000)	-

Note: *** indicates significance at the 1% level, ** indicates significance at the 5% level,
* indicates significance at the 10% level

Discussion and policy implications

The results from this study align with previous research while offering new insights. The positive relationship between internet usage and female labor force participation corroborates findings by Dettling (2016) and Klonner & Nolen (2010), extending their observations to a broader global context. However, this study found contrasting effects of ICT exports: while ICT service exports positively relate to female labor force participation, supporting UNCTAD (2018) observations. The positive impact of GDP per capita growth on female labor force participation supports Faridi, Chaudhry, and Anwar (2009). Women's political representation align with Heath, Schwindt-Bayer, & Taylor-Robinson (2005), suggesting that increased female representation leads to more inclusive labor markets. The strong negative relationship between female secondary school enrollment and

unemployment rate reinforces Faridi, Chaudhry, and Anwar (2009) emphasized on education's crucial role in improving women's employment prospects.

These findings have several important implications for policy and research. Policymakers should prioritize expanding internet access and digital literacy programs, particularly targeting women, while continuing and strengthening efforts to increase women's political representation, Investment in education, particularly secondary education for girls, should remain a priority to improve women's employment prospects. The differing impacts of ICT goods and services exports suggest a need for sector-specific strategies to promote gender equality, aiming to increase women's participation in ICT services while addressing barriers in ICT goods manufacturing. Given the negative impact of the age dependency ratio on female labor force participation, policies supporting flexible work arrangements, affordable childcare, and eldercare services could help women balance work and caregiving responsibilities.

Further research can investigate the reasons behind the contrasting effects of ICT goods and services exports on female labor market outcomes. Studies on the mechanisms through which women's political representation influences labor market outcomes could provide valuable insights for policy design. Additionally, research on the intersection of trade policies, economic growth, and gender equality in the labor market could help in developing more inclusive economic strategies.

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