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The impact of digital literacy on income growth among ecuadorian workers

ABSTRACT

This study examines the impact of digital literacy on the income growth of Ecuadorian workers, analyzing how digital literacy and the adoption of digital technologies influence labor income, and identifying the potential for reducing economic inequalities through improved digital skills. Using data from the 2023 National Employment, Unemployment, and Underemployment Survey (ENEMDU) conducted by the Ecuadorian Institute of Statistics and Censuses (INEC), this research employs an Ordinary Least Squares (OLS) regression model to estimate the effects. The results confirm that digital literacy and digital adoption significantly increase income levels. These findings are consistent with existing literature, highlighting the critical role of digital skills in enhancing employability and productivity. By promoting digital literacy, Ecuador can enhance economic opportunities, reduce inequality, and foster inclusive growth. The study emphasizes the need for comprehensive policies that support digital education and infrastructure development, ensuring that all citizens can fully participate in the digital economy. These insights aim to inform policymakers and stakeholders, contributing to a more equitable and prosperous society.

Keywords: digital literacy, digital adoption, income growth, economic inequality

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El impacto de la alfabetización digital en el crecimiento de los ingresos entre los trabajadores ecuatorianos

RESUMEN

Este estudio examina el impacto de la alfabetización digital en el crecimiento de los ingresos de los trabajadores ecuatorianos, analizando cómo la alfabetización digital y la adopción de tecnologías digitales influyen en los ingresos laborales, e identificando el potencial de reducir las desigualdades económicas mediante la mejora de las habilidades digitales. Utilizando datos de la Encuesta Nacional de Empleo, Desempleo y Subempleo (ENEMDU) de 2023, realizada por el Instituto Nacional de Estadísticas y Censos (INEC), esta investigación emplea un modelo de regresión de Mínimos Cuadrados Ordinarios (MCO) para estimar los efectos. Los resultados confirman que la alfabetización digital y la adopción digital incrementan significativamente los niveles de ingresos. Estos hallazgos son consistentes con la literatura existente, destacando el papel positivo de las habilidades digitales en la mejora de la empleabilidad y la productividad. Al promover la alfabetización digital, Ecuador puede mejorar las oportunidades económicas, reducir la desigualdad y fomentar un crecimiento inclusivo. El estudio enfatiza la necesidad de políticas integrales que apoyen la educación digital y el desarrollo de infraestructuras, asegurando que todos los ciudadanos puedan participar plenamente en la economía digital. Estos conocimientos buscan informar a los responsables de la formulación de políticas y a las partes interesadas, contribuyendo a una sociedad más equitativa y próspera.

Palabras clave: alfabetización digital, adopción digital, crecimiento de los ingresos, desigualdad económica

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O impacto da literacia digital no crescimento do rendimento dos trabalhadores equatorianos

RESUMO

Este estudo examina o impacto da literacia digital no crescimento do rendimento dos trabalhadores equatorianos, analisando como a literacia digital e a adopção de tecnologias digitais influenciam o rendimento do trabalho e identificando o potencial para reduzir as desigualdades económicas através da melhoria das competências digitais. Recorrendo aos dados do Inquérito Nacional ao Emprego, Desemprego e Subemprego (ENEMDU) de 2023, realizado pelo Instituto Nacional de Estatística e Censos (INEC), este inquérito utiliza um modelo de regressão de Mínimos Quadrados Ordinários (MQO) para estimar os efeitos. Os resultados confirmam que a literacia digital e a adopção digital aumentam significativamente os níveis de rendimento. Estas conclusões são consistentes com a literatura existente, destacando o papel positivo das competências digitais na melhoria da empregabilidade e da produtividade. Ao promover a literacia digital, o Equador pode melhorar as oportunidades económicas, reduzir a desigualdade e promover o crescimento inclusivo. O estudo sublinha a necessidade de políticas abrangentes que apoiem a educação digital e o desenvolvimento de infra-estruturas, garantindo que todos os cidadãos possam participar plenamente na economia digital. Estas ideias procuram informar os decisores políticos e as partes interessadas, contribuindo para uma sociedade mais equitativa e próspera.

Palavras-chave: literacia digital, adopção digital, crescimento do rendimento, desigualdade económica
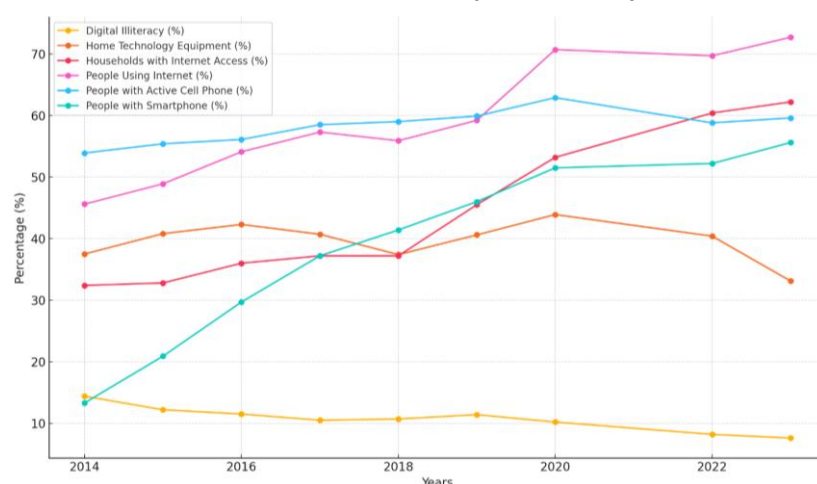
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INTRODUCTION

The rapid evolution of digital technologies has fundamentally transformed economies and labor markets worldwide, with significant implications for developing countries like Ecuador. The growing digital economy offers unprecedented opportunities for economic development, productivity enhancement, and improved living standards. However, it also poses challenges, particularly regarding digital literacy and the integration of digital skills into the workforce. In this context, understanding the impact of digital literacy on income is critical for shaping effective policies that promote inclusion and economic growth.

Digital transformation in Ecuador has been marked by notable progress and persistent challenges. The rate of digital literacy has improved over the years, as shown in Figure 1, which illustrates the evolution of ICT indicators from 2014 to 2023. According to data from the Ecuadorian Institute of Statistics and Censuses (INEC, 2023), the percentage of households with internet access and individuals using the internet has steadily increased, reflecting broader access to digital technologies. Despite this progress, digital illiteracy remains a significant barrier, especially in rural areas where access to digital tools and the internet is more limited. The same figure shows a clear decrease in digital illiteracy, from approximately 12% in 2014 to around 6% in 2023. This trend highlights ongoing efforts to enhance digital skills among the Ecuadorian population. Concurrently, the percentage of people with smartphones has increased dramatically, reaching nearly 70% in 2023. The rise in smartphone usage underscores the important role of mobile technology in bridging the digital divide and improving digital literacy (CITEC, 2022).

Figure 1. *Evolution of ICT indicators in Ecuador (2014-2023)*

Note. INEC (2023). https://www.ecuadorencifras.gob.ec/tecnologias-de-la-informacion-y-comunicacion-tic/

The digital economy in Ecuador is characterized by a growing reliance on digital technologies across various sectors. The digitalization of businesses in Ecuador has been primarily driven by the fintech, marketing tech, e-commerce, and software as a service (SaaS) sectors. These industries have seen significant growth and investment, contributing to the overall digital ecosystem (Granda & Campoverde, 2022). However, the benefits of digitalization are not evenly distributed. There is a notable disparity in digital literacy and access to digital tools between urban and rural populations. Urban areas tend to have better infrastructure and access to digital technologies, leading to higher rates of digital literacy and greater economic opportunities. In contrast, rural

areas often face challenges such as limited internet connectivity and fewer educational resources, exacerbating the digital divide.

Digital literacy is increasingly recognized as a key determinant of economic success in the modern labor market. The ability to effectively use digital technologies is linked to higher levels of employability and income. Studies have shown that digital skills are essential for accessing better job opportunities and improving productivity (Liu & Zhou, 2023). For instance, digital literacy enhances individuals' ability to perform complex tasks, participate in online education, and adapt to new technological advancements. In Ecuador, promoting digital literacy can play a vital role in reducing income inequality and fostering inclusive economic growth (Granda y Campoverde, 2022; Shreeti, 2024).

As Ecuador continues its path towards a more digitalized economy, the importance of digital literacy cannot be underestimated. Improving digital skills among the population is essential for unlocking economic opportunities, reducing inequality, and fostering sustainable growth (World Bank, 2024). This is particularly relevant for low-income populations, who can benefit the most from improving their digital skills (Asongu, 2023). Empirical evidence suggests that digital literacy has a significant impact on income levels, highlighting the need for comprehensive policies that promote digital education and infrastructure development (Liu & Zhou, 2023). By addressing the digital divide and enhancing digital competencies, Ecuador can ensure that its citizens are well-equipped to thrive in the digital age and contribute to the country's economic prosperity (Shreeti, 2024).

Promoting digital skills development programs is essential to mitigate the negative effects of digitalization in the labor market. World Bank (2024) underscores the importance of these skills not only for economic inclusion but also for access to better job opportunities. In Ecuador, fostering digital literacy can be a key policy to boost economic development and reduce inequality. Additionally, Asongu (2023) highlights that information technology and adult literacy are fundamental for reducing inequality in developing countries.

The implementation of policies that promote digital literacy could be a determining factor in improving the competitiveness of the Ecuadorian labor market. Research such as that by Shreeti (2024) suggests that digital skills can reduce income inequality by increasing economic opportunities for low-income individuals. Therefore, digital literacy not only has the potential to improve individual incomes but also to contribute to the overall economic development of the country. Furthermore, Ferrari et al., (2013) study on digital literacy and its multiple dimensions emphasizes the importance of developing digital skills across all sectors of the population to ensure inclusive economic growth.

Additionally, digital literacy can play a vital role in integrating different demographic groups into the labor market. This is especially relevant in a context where the digital divide remains a significant barrier for many communities. Digital skills training must be accessible and tailored to the specific needs of various groups, including women, youth, and low-income individuals. This accessibility can be facilitated through the implementation of inclusive educational policies and continuous training programs adapted to the current labor market needs.

To this end, this study aims to examine the effect of digital literacy on the income growth of Ecuadorian workers, analyzing how digital literacy and the adoption of digital technologies influence labor income, and identifying the potential for reducing economic inequalities through improved digital skills. The findings will inform policymakers and stakeholders about the critical role of digital skills in driving economic growth and inclusion, ultimately contributing to a more equitable and prosperous society.

Theoretical framework and research hypothesis

Digital literacy and labor market

Digital literacy has become an important component of the modern economy, significantly affecting the structure of the labor market. Various studies have emphasized

the importance of digital skills in improving employability and income. The transition from an economy based on traditional skills to one centered on digital competencies presents new challenges and opportunities for workers (Liu & Zhou, 2023). According to Csordás (2020), Nguyen (2022) and Shreeti (2024), greater digital competence is correlated with increased participation in online courses and higher demand for ICT specialists, reinforcing the idea that improving digital literacy can provide better economic opportunities and increase income. Bode et al. (2016) and Falck et al. (2021) also underscore the role of digital skills in enhancing worker productivity and economic outcomes.

One of the relevant theories in this context is that of skill-biased technical change, which suggests that technology can be designed to complement the skills of workers at different levels. This theory, developed by Acemoglu (2002), posits that the adoption of technologies aimed at skilled workers increases their productivity and, consequently, their income. In contrast, less skilled workers may see their job opportunities diminish due to automation and digitalization. Consistently, Imasheva et al., (2022) and Consoli et al. (2023) argues that the technology skills gap can widen further with the rapid adoption of new technologies, increasing wage disparities. Additionally, Czernich et al., (2011) demostrate how broadband infraestructure can boost economic growth, indirectly emphasizing the importance of digitall skills.

Recent studies have shown that digital literacy not only enhances individuals' ability to obtain and retain employment but also has a direct impact on their income. Liu and Zhou (2023) found that digital skills are significant determinants of income growth in rural areas of China. Similarly, in Ecuador, digital literacy could play a crucial role in mitigating economic inequalities and promoting financial inclusion (Shreeti, 2024). Furthermore, Bashir & Miyamoto (2020) highlights the importance of these skills for economic inclusion and access to better job opportunities.

Mechanisms of Impact of Digital Literacy

The mismatch between emerging technologies and labor skills is a phenomenon that can widen wage disparities. Workers who lack the digital skills necessary to adapt to new technologies may face higher rates of unemployment or underemployment. Yang et al. (2023) argue that the development of the digital economy can widen the wage gap between highly skilled workers and those with fewer skills, due to differences in their ability to adapt to technology. The research by Guess and Munger (2022) reinforces this argument by showing how variability in digital literacy can influence political behavior and the distribution of misinformation.

The reallocation of factors in the digital economy often results in job reallocation, where workers displaced by automation face significant challenges in finding suitable new employment. This phenomenon, known as the displacement effect, can intensify job mismatch, negatively affecting workers with lower digital skills (Acemoglu & Restrepo, 2019). Additionally, Consoli et al., (2023) study on income inequality within European regions suggests that a lack of digital skills can exacerbate economic disparities between regions.

The ability of workers to acquire and improve their digital skills is vital for their adaptability in the digital labor market. Csordás (2020) and Li et al. (2022) have noted that higher digital competence is correlated with greater participation in online courses and increased demand for ICT specialists. This reinforces the idea that improving digital literacy can provide better economic opportunities and increase incomes in Ecuador. Furthermore, Shreeti (2024) suggests that digital skills can reduce income inequality by increasing economic opportunities for low-income individuals.

Policies and Perspectives for Promoting Digital Literacy

Promoting digital skills development programs is essential to mitigate the negative effects of digitalization in the labor market. Bashir & Miyamoto (2020) underscores the importance of these skills not only for economic inclusion but also for access to better job

opportunities. In Ecuador, fostering digital literacy can be a key policy to boost economic development and reduce inequality. Additionally, Asongu et al., (2023) highlights that information technology and adult literacy are fundamental for reducing inequality in developing countries.

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Additionally, digital literacy can play a vital role in integrating different demographic groups into the labor market. This is especially relevant in a context where the digital divide remains a significant barrier for many communities. Digital skills training must be accessible and tailored to the specific needs of various groups, including women, youth, and low-income individuals. This accessibility can be facilitated through the implementation of inclusive educational policies and continuous training programs adapted to the current labor market needs.

Information technology and adult literacy are not only essential for social equity but also for economic competitiveness in a globalized world. Asongu et al., (2023) points out that developing countries must invest in technological infrastructure and educational programs that integrate basic and advanced digital skills. These investments can create a virtuous cycle of development, where a better-trained workforce attracts greater investments and fosters sustainable economic growth.

In the context of the digital economy, promoting digital literacy in Ecuador will not only enhance individual economic opportunities but will also significantly contribute to reducing inequality and fostering the country's economic development. Empirical evidence supports the need for public policies that focus their efforts on digital education, ensuring that all citizens have the necessary skills to fully participate in the digital economy.

Based on the above theoretical analysis, this paper proposes the following hypotheses:

Hypothesis 1: Digital literacy significantly increases the income of Ecuadorian workers.

Hypothesis 2: Digital adoption significantly increases the income of Ecuadorian workers.

Hypothesis 3: The positive impact of digital literacy on income remains significant even after controlling for individual characteristics, household characteristics, and regional characteristics.

MATERIALS AND METHODS

Model Setting

To estimate the impact of digital literacy on the income of Ecuadorian workers, the dependent variable is considered to be income, which is a continuous variable. According to the existing literature, the ordinary least squares (OLS) method is used as the benchmark regression model (Chen et al., 2022; Liu & Zhou, 2023; Yuan et al., 2022).

$$ln(income) = \alpha + \beta \cdot ln(Digital\ literacy) + \gamma \cdot X_i + \varepsilon_i \qquad [1]$$

Where i denotes different workers' households; $income$ denotes the total income of worker household i. Here, the logarithmic form of total income in the estimation, $Digital\ literacy$ denotes the digital literacy of workers household i and is also in logarithmic form, which is the focus variable of interest in this study; X_i denotes the

control variables, including individual characteristics and working characteristics; α es the constant term; ε_i is the random disturbance term.

Data sources and variable selection

Source of data

The data used in this study comes from the 2023 National Employment, Unemployment, and Underemployment Survey (ENEMDU), conducted by the INEC. This survey includes both individual and household-level data, focusing on employment status, labor market characteristics, economic activity of Ecuadorians, and sources of income. Additionally, the ENEMDU questionnaire contains an ICT module that includes questions related to internet access, mobile phone usage, and computer usage. It also covers aspects related to the internet, telephony, mass media, multimedia applications, and virtual reality.

Variable selection

Explanatory Variable: Labor income. The primary research objective of this paper is to examine the effect of digital literacy on the income growth of Ecuadorian workers. Since digital literacy is an individual-level variable, household labor income is selected and measured logarithmically.

Core Explanatory Variable: Digital literacy. To evaluate the respondents' digital literacy and their ability to perform various ICT-related activities, two indices were designed. The first index, called the Digital Literacy Index, classified the various activities performed by the respondents and included in the questionnaire. These activities were defined at four levels of complexity: basic, intermediate, and high. The weighting of each level was adjusted so that the total sum was 100 points, as shown in Table 1.

Table 1.
Activity weighting according to complexity level

Level	Activity established in the ENEMDU questionnaire, ICT module	Weight (%)
Entry	Copy or move a file	5
	Copy and paste to duplicate or move information in a document	5
	Send emails with attachments	5
	Transfer files between a computer and other devices	5
Mid	Use arithmetic formulas	10
	Connect and install new devices	10
	Create presentations	10
High	Search, download, install and configure software	20
	Write a computer program in a specialized programming language	30

The Digital Literacy Index is calculated by summing the weighted points for all activities performed by the respondent. The formula for the index is:

$$Digital\ literacy\ _i = \sum_{i=1}^{n} w_i \cdot a_i \qquad [2]$$

In the formula, w represents the weight assigned to activity i, while a_i is a binary variable that takes the value of 1 if the respondent has performed activity i and 0 otherwise. The total number of activities considered is 9. The weighting is based on the technical complexity and the level of skills required to perform each activity. Basic activities, which are fundamental and easy to perform, were given a weight of 5 points each. Intermediate activities, which require more technical knowledge, were weighted at 10 points each. High-level activities, which involve a greater degree of specialization, were weighted at 20 and 30 points.

For the Digital Adoption Index, the following elements were determined: use of the Internet (mobile data, Wi-Fi) on their cell phone, use of social media on their cell phone, use of email on their cell phone, use of GPS on their cell phone, use of the camera (photo or video) on their cell phone, and use of video conferencing (classes/work) on their cell phone. The weighting of each of these elements was proportional and adjusted so that the total sum was 100 points.

Control variables: Several control variables related to the personal aspects of the respondent (such as gender, marital status, educational level, and current studies) and their work (hours worked, experience, and company size) were included.

Table 2 presents the key descriptive results of these variables.

Table 2.
Descriptive results

Variable type	Variable name	Measurement	Mean	SD
Dependent	Income	Monthly wage, taken as logarithm	799.025	733.790
Explanatory focus	Digital literacy	Digital literacy index	44.711	24.921
	Digital adoption	Digital adoption index	72.734	17.105
Control	Gender	Female = 0; Male=1	0.520	0.500
	Marital status	Married=1, Separated=2, Divorced=3, Widowed=4, Common-law union=5, Single=0	3.750	2.221
	Education level	None=1, Literacy center=2, Kindergarden=3, Primary school=4, Basic education=5, Secundary school=6, Middle education= 7, Non-university higher education=8, University higher education=9, Postgraduate=10	4.610	0.580
	Work in hours	Number of working hours per week	39.640	11.849
	Experience	Number of working years	9.070	9.345
	Company size	Up to 100 employees=1, More than 100 employees= 0	1.400	0.489
	Study	No= 0; Yes=1	0.110	0.316

Regression model estimation

The basic regression results of the effect of digital literacy on the income of Ecuadorian residents are shown in Table 3. First, the digital literacy variable (measured through Digital literacy and Digital adoption) is introduced alone in the model, and the results show that these variables significantly increase the income of Ecuadorian residents. Then, on this basis, three sets of control variables at the level of individual characteristics, household characteristics, and regional characteristics of Ecuadorian residents are separately added to the regression model; model (4) is the estimated result after adding all control variables. The results show that the digital literacy variables are significant and have a positive coefficient, indicating that digital literacy helps improve the income of Ecuadorian residents.

The findings from the regression analysis confirm all three hypotheses presented in this study. Hypothesis 1, which posits that digital literacy significantly increases the income of Ecuadorian workers, is supported by the positive and significant coefficients of the digital literacy variables. Hypothesis 2, suggesting that digital adoption significantly increases the income of Ecuadorian workers, is also validated by the data. Finally, Hypothesis 3, which asserts that the positive impact of digital literacy on income remains significant even after controlling for individual, household, and regional characteristics, is confirmed through the robustness of the regression models. These results underscore the critical role of digital literacy and digital adoption in enhancing the economic outcomes of workers in Ecuador.

Table 3.
Measuring the effect of digital literacy on Ecuadorian worker´s income

Variables	OLS (1)	OLS (2)	OLS (3)	OLS (4)
Digital literacy	0.153 ***	0.109 ***	0.085 ***	0.091 ***
	(0.016)	(0.017)	(0.012)	(0.012)
Digital adoption	0.158 ***	0.108 ***	0.071 ***	0.068 ***
	(0.018)	(0.016)	(0.014)	(0.014)
Gender		0.162 ***	0.114 ***	0.118 ***
		(0.022)	(0.018)	(0.018)
Marital status		-0.071 ***	-0.032 ***	-0.030 ***
		(0.005)	(0.004)	(0.004)
Education level		0.267 ***	0.247 ***	0.252 ***
		(0.021)	(0.017)	(0.017)
Work in hours			0.742 ***	0.728 ***
			(0.023)	(0.023)
Experience			0.119 ***	0.115 ***
			(0.009)	(0.009)
Company size			0.378 ***	0.381 ***
			(0.019)	(0.019)
Study				-0.171 ***
				(0.030)
Constant	5.265 ***	4.568 ***	1.340 ***	1.370 ***
	(0.080)	(0.105)	(0.118)	(0.000)
Observations	3911	3911	3911	3911
R-squared	0.067	0.165	0.477	0.482

Notes: *** represent significance at the 1% statistical level, respectively; robust standard errors are in brackets.

To ensure the reliability of the regression results, multicollinearity was tested using Variance Inflation Factor (VIF) values. All VIF values were found to be within the

accepted parameters, indicating no multicollinearity issues among the independent variables.

DISCUSSION

The results of this study confirm the hypothesis that digital literacy and digital literacy have a significant positive impact on the income of Ecuadorian residents. This finding is consistent with the existing literature that examines the effect of technology on labor markets and economic development. Digital literacy emerges as a factor to consider for improving income, as demonstrated by studies such as Liu and Zhou (2023), who find that digital skills significantly enhance income in rural areas of China, even though they may also widen the income gap within these areas. In Ecuador, improving digital literacy has the potential not only to increase income but also to mitigate economic inequalities, as suggested by Shreeti (2024) shows how digital skills can reduce income inequality by increasing economic opportunities for low-income individuals.

Moreover, Bashir & Miyamoto (2020) highlights that digital skills are essential for economic inclusion and access to better job opportunities, corroborating our findings that digital literacy positively contributes to workers' incomes. Digital skills development programs have proven effective in improving competencies and employability, underscoring the need to promote these skills among the Ecuadorian population to foster economic development. The impact of the digital economy on wage structure and the demand for skills is also evident. Studies such as those by Borghans and ter Weel (2005) and Levy (1989) show how computerization and the adoption of new technologies have changed the wage structure, benefiting workers with digital skills and contributing to greater specialization in the labor market. In this context, the acquisition of digital skills emerges as a key strategy for improving wage prospects and competitiveness in the Ecuadorian labor market.

The research by Yang et al. (2023) reinforces this perspective by demonstrating that the development of the digital economy can widen the wage gap between highly skilled and low-skilled workers. However, it also underscores the importance of digital skills for improving employment prospects and incomes, and for mitigating wage inequalities. This is consistent with Yoon et al., (2023) findings in South Korea, which show that digital skills significantly enhance job opportunities and incomes. Furthermore, studies such as those by Csordás (2020) and Li et al. (2022) indicate that higher digital competence is correlated with greater participation in online courses and increased demand for ICT specialists, reinforcing the idea that improving digital literacy can provide better economic opportunities and boost incomes in Ecuador. Additionally, research by Ramaswamy (2018) and Sorgner (2019) highlights that digital technologies can have both transformative and destructive effects on the labor market, emphasizing the need for digital skills to adapt to these changes and improve job opportunities.

Lastly, Yang (2023) shows that the digital economy has increased per capita consumption and changed consumption patterns, suggesting that digital literacy and the adoption of digital technologies can significantly impact consumption patterns and economic inclusion. In Ecuador, promoting these skills could be a key policy to drive economic development and reduce inequality. Therefore, our study's results align with existing literature that emphasizes the importance of digital literacy and technology adoption for improving incomes and economic efficiency. Encouraging these skills among the Ecuadorian population could be important for fostering economic development and reducing inequality, providing individuals with the necessary tools to thrive in an increasingly digitalized labor market.

CONCLUSIONS

This study underscores the critical role of digital literacy in shaping the economic outcomes of Ecuadorian workers. The findings provide compelling evidence that digital literacy and the adoption of digital technologies have a significant positive impact on income levels. These results are consistent with the broader literature that highlights the

transformative potential of digital skills in enhancing employability and economic productivity. Despite the significant findings, this study has some limitations. The main limitation lies in the cross-sectional nature of the study design, which prevents the evaluation of the long-term causal effects of digital literacy on income. Additionally, although the sample used is nationally representative, there may be underrepresentation of certain demographic groups or regions, which affects the generalizability of the results. Future research could address these limitations by conducting longitudinal studies that analyze how digital literacy affects income and economic mobility over time. It would also be valuable to explore, through qualitative methods, the specific barriers faced by different groups in acquiring digital skills. Comparing the effects of digital literacy in different countries or regions could help identify influential contextual factors. Finally, it would be beneficial to analyze the effectiveness of various policies and interventions in improving digital literacy and reducing economic inequalities, thus providing a comprehensive approach to fostering inclusive economic growth.

Firstly, digital literacy has been shown to significantly increase income, affirming Hypothesis 1. This effect is robust even after controlling for various individual, household, and regional characteristics, supporting Hypothesis 3. The study's regression analysis indicates that workers with higher digital literacy are better positioned to leverage digital tools and technologies, leading to improved job performance and higher wages. This aligns with previous research suggesting that digital skills are critical for accessing better job opportunities and improving productivity (Liu & Zhou, 2023; Yang et al., 2023). The positive impact of digital adoption on income, as demonstrated in Hypothesis 2, further emphasizes the importance of integrating digital technologies into everyday work practices. The Digital Adoption Index developed in this study highlights how the use of internet, social media, email, GPS, and video conferencing tools can enhance workers' efficiency and connectivity, thereby boosting their income potential.

Additionally, the study highlights significant disparities in digital literacy and access to digital tools between urban and rural populations in Ecuador. Urban areas benefit from better infrastructure and greater access to digital technologies, leading to higher rates of digital literacy and economic opportunities. In contrast, rural areas face challenges such as limited internet connectivity and fewer educational resources, exacerbating the digital divide. Addressing these disparities is crucial for ensuring inclusive economic growth and reducing income inequality. Promoting digital skills development programs is essential for mitigating the negative effects of digitalization in the labor market. The World Bank (2024) and Asongu (2023) highlight the importance of these skills not only for economic inclusion but also for access to better job opportunities. In Ecuador, fostering digital literacy can be a key policy to boost economic development and reduce inequality. Comprehensive policies that promote digital education and infrastructure development are necessary to address the digital divide and enhance digital competencies among the population.

The study's findings underscore the need for targeted interventions to improve digital literacy, particularly among low-income populations who stand to benefit the most from enhanced digital skills. By investing in digital education and training programs, policymakers can help equip workers with the necessary skills to thrive in the digital economy. This, in turn, can drive economic growth, reduce inequality, and contribute to a more equitable and prosperous society. Finally, digital literacy is a vital determinant of economic success in the modern labor market. Enhancing digital skills among the Ecuadorian workforce can unlock significant economic opportunities, improve income levels, and foster inclusive growth. The evidence presented in this study provides a strong rationale for implementing policies that promote digital literacy and technological adoption, ensuring that all citizens can fully participate in and benefit from the digital economy.

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The Impact of Digital Literacy on Income Growth Among Ecuadorian Workers

AUTHOR CONTRIBUTIONS

- **Carolina Uzcátegui Sánchez:** Supervision, Methodology, Exploratory Data Analysis, Writing - Original Draft, Writing - Review & Editing.
- **David Zaldumbide Peralvo:** Regression Analysis, Investigation, Writing - Review & Editing, Visualization.
- **María José Pérez Espinoza:** Conceptualization, Writing - Review & Editing.

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