

THE ROLE OF DIGITAL SKILLS IN THE SELF-EMPLOYMENT INTENTIONS OF YOUNG RURAL LABOR

Manh Hung Hoang^{*}, Nhu Trang Nguyen^{**}, Manh Dung Tran^{*},
Phi Truong Dang^{***}, Van Khoi Pham^{*}, Thi Hoa Loan Vo^{*}

^{*} National Economics University, Hanoi, Vietnam

^{**} Corresponding author, Hanoi Architectural University, Hanoi, Vietnam

Contact details: Hanoi Architectural University, Km. 10, Nguyentrai Road, Thanhxuan District, Hanoi, Vietnam

^{***} Thai Nguyen University of Economics and Business Administration, Thai Nguyen, Vietnam



Abstract

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This research primarily focuses on assessing the impact of digital skills on the future career decisions of young rural laborers, a group typically at a disadvantage concerning skills and professional qualifications when compared to their urban counterparts. To conduct this study, a probit probability regression model was employed, and data was collected through a survey involving 398 young rural laborers from the Northern Midlands and Mountains region of Vietnam. The findings of this study unequivocally illustrate the multifaceted influence of specific digital skills on decisions related to self-employment. Digital operational skills and digital creative skills were found to be associated with the choice of formal, wage-earning employment, whereas digital social skills correlated with a higher likelihood of pursuing self-employment. This highlights the imperative need to establish specific and diverse policies to cater to the distinct requirements of various labor market segments. Furthermore, in light of the currently limited digital skill levels, laborers should place particular emphasis on enhancing their skill sets to ensure their ability to seek or maintain employment with competitive incomes or to prepare for entrepreneurial opportunities. It is equally important to scrutinize social safety policies designed for self-employed laborers to guarantee the sustainability of the self-employment model.

Keywords: Digital Skills, Intentions, Self-Employment, Youth Labor, Rural Areas, Northern Midlands and Mountains Region

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1. INTRODUCTION

Our world is undergoing a profound digital transformation (Organisation for Economic Co-operation and Development [OECD], 2015). Advancements in machine learning, robotics, and artificial intelligence

are certain to drive automation, alter labor demands, and spur job transitions (Brynjolfsson & McAfee, 2012). The rise of the digital economy is enabling the restructuring of the labor market and job reconfiguration. New jobs will demand new capabilities and skill sets. The integration of necessary skills to

function in modern societies is becoming increasingly complex and will continue to evolve as the nature of work changes. Social inequality has the potential to worsen among industries, regions, or professions as the digital divide between those who can keep up with technological advancements and those who cannot grow (OECD, 2015). According to the World Economic Forum (WEF, 2020), 85 million jobs will be replaced by automation in the next 5 years. Bork (2018) suggests that most factories will close basic-level employment opportunities. In the coming years, 12% of digital skills are projected to replace one-third of current skills (Frey & Osborne, 2017).

The industrial revolution is gaining momentum in the Asia-Pacific region, particularly in Vietnam, a country witnessing rapid improvements and technological adoption in the workplace at an unprecedented pace (International Labour Organization [ILO], 2018). In the next 10 years, Vietnam will have to confront labor displacement as a result of digital technology adoption, leading to changes in production models, business culture, organizational structures, and more. It is estimated that 70% of jobs in Vietnam have a probability of being replaced (Chang et al., 2016). Future jobs at risk of being displaced are those with basic and low-skill requirements. The labor group most vulnerable includes individuals from rural areas, as jobs in factories and industrial zones are gradually replaced by machinery. Faced with this reality, workers need to prepare for their future in the face of potential job loss due to automation and technology. Job transition will be an inevitable trend in the future. Addressing employment for those who cannot find jobs or lose their jobs due to technological displacement is an issue that requires special attention from government authorities. Entrepreneurship or self-employment can be a lifeline for rural laborers in this context.

The Northern Midlands and Mountains areas of Vietnam constitute an economically significant geographical region, with a total population of 13,021 million people, of which 6,6 million are of working age. This region is characterized by its diverse ethnic composition, with a high proportion of ethnic minorities residing there. The labor forces in this area is predominantly low-skilled and with limited educational attainment. Given the current wave of digital transformation and technological advancement, the labor force in this region, particularly young rural laborers, faces a significant risk of unemployment and job scarcity. Workers need to plan for skill enhancement to meet the demands of the evolving job market or transition to alternative forms of employment.

The necessity of researching the impact of digital skills on rural labor employment cannot be overstated and has garnered the attention of numerous researchers, as evidenced by recent studies such as Zhang et al. (2023), and Wen et al. (2023). However, among these studies, significant differences in outcomes can be observed when applied to different research contexts. This underscores the complexity and multifaceted nature of the issue. Another noteworthy point is the apparent gap in research focusing on the role of digital skills in the self-employment intentions of young rural labor, a group of labor resources at risk of unemployment or job scarcity due to the continuous technological

advancements that are reshaping traditional work practices. Furthermore, for the current and future labor market, young labor plays a crucial role as they are in the early stages of entering the workforce. With their rapid learning capabilities, they can become an indispensable part of the technological transformation process. This study also highlights a significant difference from other studies in that it not only focuses on determining the presence or absence of digital skills but also places emphasis on the specific level of digital skills possessed by young rural labor in the Northern Midlands and Mountains areas of North Vietnam. Assessing the level of proficiency can provide a more detailed insight into how digital skills truly influence the job choices of young rural labor, which can help shape more appropriate policies and training strategies for this demographic.

This study is structured as follows. Section 2 presents the theories and the hypothesis. Section 3 illustrates the methods used to investigate and analyze the factors influencing the intention to create self-employment opportunities for rural youth in the Northern Midlands and Mountains North region of Vietnam. Section 4 provides the estimated experimental results and discussions. Section 5 concludes the paper and offers recommendations.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1. Career choice theory

2.1.1. The theory of risk and uncertainty

According to Knight (1964), a worker's choice of employment is contingent upon the level of uncertainty and risk within the economy. Different jobs entail varying degrees of uncertainty and risk, and workers will decide to work against the level of risk they are willing to bear. He contends that skills and knowledge can be considered integral components of a worker's capacity to navigate risk and manage uncertainty, potentially influencing their vocational and occupational selections. Klein's (1997) research centers on how uncertainty and economic fluctuations can influence the entrepreneurial process and career selection. Adedokun (2019) and Omoniyi and Thulani (2021) substantiate Knight's (1964) viewpoint by underscoring the significance of acquiring practical skills, enabling individuals to secure employment and engage in self-employment.

2.1.2. Theory of entrepreneurship and innovation

Schumpeter (1983) particularly emphasizes the role of creativity and innovative products in the employment choices of laborers. According to him, workers can seek creative opportunities by engaging in entrepreneurship or working for innovative companies. New technologies and the creation of innovative products or services can attract skilled workers. Although not explicitly addressing the skill factor in career selection, it can be seen that workers with specific skills and knowledge can play a crucial role in fostering innovation and economic development. Basu et al. (2008) explore the relationship between entrepreneurship and the labor market. This study

employs Schumpeter's theory to explain why some workers choose to work for start-ups, while others opt for large corporations or entrepreneurship.

2.1.3. Disadvantaged choices

Disadvantaged choices refer to how workers facing difficulties or disadvantages make decisions regarding employment or career choices. Disadvantaged choices are discussed in Light (1979) and Bandura (1997). Light (1979) delves into labor market choices based on opportunity costs, categorizing labor opportunity costs, categorizing labor into groups with low opportunity costs and those with high opportunity costs. This distinction in opportunity costs significantly influences individuals' careers. The group with low opportunity costs typically includes individuals facing unfavorable labor markets conditions such as low income, unemployment, discrimination, urban overpopulation, immigrants, women, or inexperienced young adults. Members of this group tend to gravitate towards becoming small business owners or pursuing self-employment to escape from inequality and seek higher income. While the high opportunity cost group consists of individuals with advantages in the labor market (such as higher education and skills, and extensive experience). These individuals tend to lean towards careers as large business owners or positions within established companies when they perceive greater opportunities for expected income and future benefits. In the social cognitive career theory proposed by Bandura (1997), the focus lies on the interplay between social and individual factors in influencing career decisions and job choices. According to Bandura (1997), individuals facing disadvantaged circumstances may experience external pressures that lead to the creation of career choice models. In addition, personal knowledge, skills, and resources play a substantial role in shaping career decisions and the ability to put them into action.

2.2. Digital skills

According to Ferrari (2012), digital literacy encompasses a combination of skills, including information skills, communication skills, content creation skills, safety skills, and problem-solving skills. Helsper and Eynon (2013) asserts that digital skills encompass four main categories: technical, social, critical, and creative skills. Meanwhile, van Deursen and van Dijk (2010) assess digital skills based on five skill categories: operational, mobile, creative, social, and safety skills. The research team believes that the approach, according to van Deursen and van Dijk (2010), provides the most comprehensive assessment. Therefore, in this study, digital skills will be evaluated based on these five categories.

Digital skills have become increasingly crucial for employment and business acumen in today's digital economy. Numerous studies have highlighted the significant impact of digital skills on labor choices and opportunities, especially among vulnerable groups. Zhang et al. (2023) observe that digital skills have expanded job prospects for rural laborers in China, enabling them to find non-agricultural employment and reducing informal employment. Similarly, Bulgina and Sloka (2022) discover that

vocational students, labor users, and managers in Latvia consider digital skills as important for employment as soft skills. Nevertheless, the influence of digital skills appears to be contingent on the existing skill levels of the labor force. Wen et al. (2023) note that digital skills have promoted entrepreneurship among low-skilled workers, rather than their highly-skilled counterparts. Bejaković (2020) argues that digital literacy is the key to employment opportunities and socioeconomic engagement, particularly for disadvantaged groups such as women with low educational levels. Prieto and Vanlendu (2016) find that digital skills alone do not improve the position of low-skilled women in the labor market; there is also a need for increased job opportunities and gender equality. The impact of digital skills also varies depending on the level of development in each country. Shapiro and Mandelman (2021) has observe that the adoption of digital technology by businesses reduces the self-employment rate in developing countries but does not necessarily lower the unemployment rate. The authors argue that this occurs because technology adoption lowers costs for companies that pay wages when participating in the labor market. Graham et al. (2017) conduct research on digital laborers in sub-Saharan Africa and Southeast Asia, finding that while digital work brings benefits, it also poses risks such as a lack of bargaining power, economic exclusion, and a lack of job security or advancement. In conclusion, although digital skills and digital work promise numerous opportunities, their impact depends on the existing skills of the labor force, gender, and the economic context of the country.

2.3. Research hypothesis

In the research context, rural labor in the Northern Midlands and Mountains area is characterized by a high proportion of ethnic minorities and low labor skills. These workers face a significant risk of unemployment or underemployment in the midst of the country's digital transformation. The choice of entrepreneurship or self-employment may serve as a lifeline for rural labor in the Northern Midlands and Mountains regions. Additionally, digital skills can facilitate rural labor's access to the job market, making it easier to engage in entrepreneurial activities or self-employment. Therefore, this research proposes the hypothesis:

H1: Digital skills have a positive impact on the choice of self-employment by rural youth labor in the Northern Midlands and Mountains regions of Vietnam.

3. RESEARCH METHODOLOGY

3.1. Data collection

3.1.1. Research areas

The Northern Midlands and Mountains North region is one of the seven key economic regions in Vietnam, covering the largest land area compared to other regions. This region is characterized by a significant population of ethnic minorities who live and work there. The workforce is predominantly involved in various sectors, including agriculture, mining and

mineral processing, hydroelectric power, and tourism. The research specifically focuses on three provinces — Lao Cai, Bac Kan, and Thai Nguyen — which represent the diverse landscapes of highland, lowland, and midland areas within this region. This region exhibits a diverse population of ethnic groups and a dynamic economic structure, with notable economic activities related to border trade, tourism, mineral exploitation, and the production and assembly of electronic products, all while continuing to maintain agricultural production.

3.1.2. Sample size

According to Nguyen (2014), a minimum of 100 observations is needed for statistical calculations. Therefore, surveys were conducted to ensure the necessary sample size for performing statistical analyses. To assess the intention of choosing the form of employment (self-employment/wage employment), the research team selected a sample size of 400 observations, evenly distributed between 50% wage-employed labor and 50% self-employed individuals.

The data was collected from July 2022 to September 2022. The survey questionnaires were directly distributed to the selected labor groups. After data cleaning, a total of 398 survey responses met the criteria for inclusion in the analysis within the model.

3.1.3. Description of the observed data

The data was collected through a questionnaire survey, and the collected information included the personal characteristics of the surveyed individuals as well as factors influencing their intention to engage in self-employment. The survey was conducted using a simple random sampling method. The description of the surveyed sample is presented in Table 1.

Table 1. Description of the sample surveyed

Indicators	Mean	Std. dev.	Min	Max
Lao Cai province (%)	31.66	0.465	0	1
Bac Can province (%)	32.91	0.469	0	1
Thai Nguyen province (%)	35.43	0.478	0	1
Male labor	57.28	0.4952	0	1
Age (years)	23.65	3.8492	16	30
Kinh groups (%)	42.6	0.4951	0	1
Educated (%)	45.22	0.4983	0	1
Member of social-political organizations (%)	88.44	0.3201	0	1
Have self-employment intention (%)	51.25	0.5004	0	1

The surveyed sample consists of 398 youth labors located in the three selected provinces, including Thai Nguyen (35.43%), Bac Can (32.91%) and Lao Cai (31.66%). Of which, 57.28% of youth labors are male, and 42.6% of surveyed labors are Kinh ethnic group. 45.22% of the surveyed youth labors obtain high school education and above, and 88.44% of them are members of social-political organizations at communal and village levels. In the sample, 51.25% of youth labors have intention to do self-employment.

3.2. Research approach

3.2.1. Data analysis model

With the collected data, a Probit regression model is employed to determine whether there is an influence of digital skills on the intention to choose self-employment among laborers and to measure the extent of that influence, if present.

$$P_i = \text{Pro}(Y = 1|X_{1i}) = \Phi(\alpha + X_{1i}\beta_{1i} + u) \quad (1)$$

In this model, Y represents the dependent variable reflecting the intention to engage in self-employment among rural youth labor in the Northern Midlands and Mountains regions. X_i comprises the independent variables and control variables, including gender, age, ethnicity, marital status, family history, education level, health, attitude, policies, financial capital, and digital skills.

To estimate the impacts of digital skills on self-employment intention, the marginal effect should be calculated, and it accounts for a partial change in the probability. The marginal effect associated with continuous explanatory variables X on the probability $P = (Y_i = 1|X)$, holding the other variables constant, can be derived as follows.

$$\frac{\partial P_i}{\partial X_{ik}} = \varphi(X_i'\beta_k) \beta_k \quad (2)$$

where, φ represents the probability density function of a standard normal variable.

The marginal effect on dummy variables should be estimated differently from continuous variables. Discrete changes in the predicted probabilities constitute an alternative to the marginal effect when evaluating the influence of a dummy variable (Greene, 2011). Such an effect can be derived from the following:

$$\Delta = \varphi(\overline{X}_{\beta,d} = 1) - \varphi(\overline{X}_{\beta,d} = 0) \quad (3)$$

The marginal effects provide insights into how the explanatory variables shift the probability of the frequency of a farmer's decision (Greene, 2011). The marginal effects are calculated for each variable while holding other variables constant at their sample mean values.

3.2.2. Dependent variable

The dependent variable in the research model is the *intention to engage in self-employment* among rural laborers in the Northern Midlands and Mountains regions of Vietnam. The *intention to engage in self-employment* is coded as 1 if the laborer expresses a desire to be self-employed in the future and 0 otherwise.

3.2.3. Independent variables

The independent variables include individual factors related to rural laborers (education level, health, digital skills, attitude, financial mobilization ability) and external environmental factors (membership in political and social organizations, government support policies).

- Education (*Edu*) can have varied effects on entrepreneurship. Mahama and Bashiru (2014) argue that the likelihood of entrepreneurship decreases with higher years of education, whereas Lucas (1978) suggests that higher education levels are beneficial for self-employment. In this study, the education level of rural laborers is categorized into two levels: trained (comprising those with at least a secondary education) is assigned a value of 1, and untrained is assigned a value of 0 if they haven't received such training.

- Health, as indicated by Rees and Shah (1986) and Gorgievski et al. (2010), suggests that laborers with poor health or disabilities tend to choose self-employment or transition to self-employment to reduce stress levels and time constraints. Health is categorized into three levels: poor health is assigned a value of 0, normal health is assigned a value of 1, and good health is assigned a value of 2. These health levels are based on the regulations set by the Ministry of Health of Vietnam (2020). Poor health includes individuals in health groups C and D, normal health encompasses individuals in groups B1 and B2, and good health includes those in the excellent health group A.

- Membership in political organizations (*So-org*). Participation in local political organizations makes it easier to obtain information and guidance for rural laborers during the process of self-employment (Ho, 2015; Ngo, 2012). Laborers who participate in political organizations receive a value of 1, while those who do not participate receive a value of 0.

- Family has history of self-employment (*Tradition*). The history of self-employment in one's family, where parents have a history of self-employment, can influence the choice of the laborer. *Tradition* = 1 if the laborer's parents have a history of self-employment and *Tradition* = 0 otherwise. The *Tradition* variable is inherited from the studies of Simoes et al. (2015) and Caliendo and Künn (2015).

- Finance (*FI*). Self-employment activities require significant initial investment. Good financial capital means that the laborer has capital for self-employment or collateral assets, increasing the likelihood of obtaining external capital (Simoes et al., 2015; Caliendo & Künn, 2015). The finance variable is measured on a 5-level Likert scale with 3 items indicating the ability to have financial autonomy and access to capital for self-employment.

- Attitude towards risk (*AT*). Having an adverse risk attitude negatively affects the choice of self-employment (Wang & Wong, 2004; Brown et al., 2011). In this study, the risk attitude factor is measured on a 5-level Likert scale.

- Government support policies (*PO*). Utilizing community factors and policy reform will strongly influence the non-agricultural self-employment of rural laborers in Nghe An province (Ho, 2015). The policy factor is assessed through the perceptions of laborers on a 5-level Likert scale.

- Digital skills. According to van Deursen and van Dijk (2010), digital skills are assessed based on 5 skills: operational skills, mobile skills, creative skills, social skills, and safety skills. These skills are evaluated on a 5-level Likert scale.

3.2.4. Moderating variables

The moderating variable includes factors such as gender, age, ethnicity, and marital status.

- Gender: This variable is measured as a binary variable (male laborers receive a value of 1, and female laborers receive a value of 0).

- Age of laborers (*Age*): This variable is divided into 3 groups: under 20 years old, from 20 to 35 years old, and over 35 years old. The age factor is found to have an impact on the probability of choosing self-employment by laborers and is inherited from studies by Simoes et al. (2015), Niefert (2010), Caliendo and Künn (2015).

- Ethnicity of laborers (*Ethnic*): This variable is measured on a binary scale, with the two main ethnic groups in Vietnam being the Kinh (*Ethnic* = 1) and the ethnic minorities (*Ethnic* = 0). Each ethnic group has different customs and practices in production and daily life, which can influence the choice of self-employment by laborers. The ethnic variable is inherited from the study by Simoes et al. (2015).

- Marital status (*Mar*): If an individual is married, wealth has the potential to increase. This not only directly enhances the capacity for self-employment but also ensures that in times of financial difficulty, the assets of both parties (spouses) will allow activities to persist for a longer period (Budig, 2006). The other spouse may engage in business activities, becoming a worker pursuing the best interests of the enterprise (Lin et al., 2000). Marital status is coded as *Mar* = 1 if the individual is married and *Mar* = 0 otherwise.

4. RESULTS AND DISCUSSION

Before conducting regression model estimation, tests for suitability and the level of correlation between variables were performed. The results of the scale's reliability test indicate that out of the initial 37 items considered, 23 items with sufficient reliability have been included in the research model. The remaining 14 items were excluded because their Cronbach's alpha coefficient fell below 0.4 (see Table 2).

Table 2. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test

Indicators	Value
Determinant of the correlation matrix (Det)	0.000
<i>Bartlett's test of sphericity</i>	
Chi-square	8213.444
Degrees of freedom	253
p-value	0.000
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy	0.734

The results of the measurement scale's suitability test indicate that it is suitable for conducting an exploratory factor analysis (EFA) with a KMO value of 0.734, and Bartlett's test of sphericity produced a significant result with a Sig. value of 0.000, which is less than 0.01.

To ensure the stability of the model, the composite reliability and extracted variance were assessed through confirmatory factor analysis (CFA). The results indicate that the model is stable, with composite reliability values exceeding 0.7 for all variables and extracted variance exceeding 0.5.

The study performed a factor rotation to condense the items into composite variables. As a result, the items converged into five composite variables, specifically including attitude, financial variables, policy variables, and two main skill

variables following the rotation: safe creative skills (SC) and digital operation skills (DO).

To assess the potential multicollinearity among independent variables, the research conducted a Pearson correlation coefficient matrix analysis.

Table 3. Pearson correlation

	1	2	3	4	5	6	7	8	9	10	11	12
Gender	1											
Age	0.0578	1										
Ethnic	0.0357	-0.0185	1									
Mar	0.3167	0.0696	0.024	1								
Edu	-0.1849	0.1333	0.0467	-0.3152	1							
Health	-0.077	0.0815	-0.1037	-0.0179	-0.0034	1						
So-org	0.0215	-0.0655	0.1482	-0.0173	-0.0031	-0.0431	1					
Tradition	-0.0572	0.0313	-0.0087	-0.0227	-0.0047	0.0689	-0.0119	1				
SC	-0.0823	0.1387	-0.0558	-0.0116	0.1053	0.0362	-0.0718	0.0852	1			
DO	-0.0114	0.2575	-0.0783	-0.0658	0.0895	0.0865	-0.0021	0.0556	0.407	1		
AT	0.1216	-0.0785	0.0166	-0.002	0.163	0.0105	0.0462	0.049	-0.2063	-0.1892	1	
FI	-0.0633	-0.0446	0.0308	0.0007	-0.0464	-0.0714	-0.0026	0.0386	-0.1459	-0.0961	0.053	1
PO	-0.0107	0.2773	-0.0938	-0.0577	-0.0588	0.1722	-0.0413	-0.0552	0.1213	0.3182	-0.126	-0.1953

The independent variables with low correlations (< 0.7) among themselves (Table 3) indicate that there are no signs of strong intercorrelations among the independent variables. Therefore, these independent variables are exogenous and meet the necessary conditions for use in the regression analysis.

The results of the regression analysis of the factors influencing the intention to choose self-employment are as follows.

Table 4. Results of the probability of factors influencing the intention to choose self-employment

Self-employment intention	Coef.	Std. err.	P > z
<i>Gender</i>	0.0989	0.1614	0.5400
<i>Age</i>	-0.1365	0.1039	0.1890
<i>Ethnic</i>	-0.0278	0.2482	0.9110
<i>Mar</i>	0.1781	0.1793	0.3210
<i>Edu</i>	-0.0942	0.1659	0.5700
<i>Health</i>	-0.0112	0.1373	0.9350
<i>So-org</i>	-0.1922	0.2366	0.4170
<i>Tradition</i>	-0.2295	0.1551	0.1390
<i>DO</i>	-0.6346	0.0923	0.0000
<i>SC</i>	-0.3051	0.0984	0.0020
<i>FI</i>	0.3863	0.1028	0.0000
<i>AT</i>	0.1162	0.0839	0.1660
<i>PO</i>	-0.1104	0.1007	0.2730
<i>_cons</i>	0.4659	0.5471	0.394
Pseudo R ² : 31.90			
Obs.: 398			

The estimation results (Table 4) of the model indicate that *HI* is accepted. The digital skills factor has an impact on the intention of rural labor in the Northern Midlands and Mountains region of Vietnam to engage in self-employment. Moreover, the estimation model also indicates that the financial factor positively influences rural youth's choice of self-employment. Self-employment represents a form of entrepreneurship, thus highlighting the critical role of financial factors. Adequate financial resources can bolster laborers' confidence and simultaneously alleviate initial challenges associated with self-employment.

The estimated average marginal effects reveal the multidirectional extent and direction of the impact of digital skills on self-employment intentions (Table 5). Specifically, digital operational skills (*DO*) and safe creative skills (*SC*) have a significant inverse effect on the intention to choose self-employment for rural youth at

a 1% significance level. When digital operational skills (*DO*) increase by 1 point compared to the average, the self-employment intention of rural youth decreases by 25.24%. Similarly, when safe creative skills (*SC*) increase by 1 point compared to the average, the self-employment intention decreases by 12.14%.

Table 5. The average marginal effects of the factors on the choice of self-employment

Variable	Dy/dx	Std. err.	P > z
<i>Gender</i>	0.0393	0.06407	0.5400
<i>Age</i>	-0.0543	0.04133	0.1890
<i>Ethnic</i>	0.0111	0.09887	0.9110
<i>Mar</i>	0.0709	0.0713	0.3200
<i>Edu</i>	-0.0374	0.0659	0.5700
<i>Health</i>	0.0044	0.05464	0.9350
<i>So-org</i>	-0.0765	0.09395	0.4150
<i>Tradition</i>	-0.0909	0.06103	0.1360
<i>DO</i>	-0.2524	0.03653	0.0000
<i>SC</i>	-0.1214	0.03903	0.0020
<i>FI</i>	0.1537	0.03338	0.0000
<i>AT</i>	0.0462	0.04007	0.1660
<i>PO</i>	-0.0439	0.06407	0.2730

Note: Dy/dx is for discrete change of dummy variable from 0 to 1.

In comparison to previous studies, the results of this research offer a unique perspective on the impact of digital skills in rural contexts. While many earlier studies tended to employ binary scales (having or lacking digital skills), this study emphasizes quantifying the specific levels of digital skills. This approach provides us with a more in-depth understanding of how varying degrees of digital skills influence the employment choices of rural labor. This research aligns with Zhang et al. (2023), which demonstrated that digital skills can create employment opportunities. However, it also acknowledges the negative effects of entrepreneurship in developing countries, as reported by Shapiro and Mandelman (2021).

To assess the level of digital skills, the article calculates the average values of individual digital skill components on a Likert scale and compares the level of digital skills among rural youth labor in the Northern Midlands and Mountains region between two groups: those with an intention to choose self-employment and those without such an intention.

Table 6. Levels of digital skills among rural youth labor in the Northern Midlands and Mountains region of Vietnam

No.	Digital skills	Mean (X _i)	Mean (X _i = 0)	Mean (X _i = 1)	T-test Mean X _i (0) - Mean X _i (1)
1	Digital operation skills (DO)	3.075	3.235	2.925	0.3105***
2	Safe creative skills (SC)	2.057	2.339	1.790	0.5489***

Note: *** $p < 0.01$.

The current levels of digital skills among rural youth labor in the Northern Midlands and Mountains region of Vietnam are currently at an average to slightly below-average level. Specifically, the group of laborers with an intention to choose self-employment has lowered digital skill proficiency compared to the other group. Low digital skill levels, corresponding to lower educational qualifications among rural youth labor in this region, serve as a significant barrier for both groups, whether they intend to choose self-employment or not, when it comes to finding and maintaining employment in an increasingly fast-paced and digital-dependent environment. Furthermore, low labor quality is a contributing factor to low labor productivity and sustainability in the self-employment sector in the face of rapid and widespread digital transformation.

5. CONCLUSION

The study highlights the increased risk of job displacement, particularly for those engaged in simple, low-skilled labor, in the context of the Fourth Industrial Revolution. Future employment trends suggest a shift towards the closure of basic, low-skilled positions such as office work, clerical jobs, manual assembly workers, manual laborers, and machine operators (Autor et al., 2003; Sumer, 2018). This risk is particularly elevated due to the relatively low ownership of digital skills among rural youth labor in the Northern Midlands and Mountains region of North Vietnam.

Preparing for labor force adaptation is imperative. The labor markets of the future will differ significantly from the traditional labor market in Vietnam today. Workers will need to either equip themselves with digital skills to secure suitable paying jobs or plan for self-employment opportunities. In the absence of these preparations, there is a high likelihood of job loss or limited employment prospects, posing a significant challenge to both the affected workers and the local government authorities.

The observation reveals that young laborers residing in rural areas often face challenges in job seeking due to their limited digital skills, thus leading them to opt for self-employment under conditions disadvantaged by digital proficiency. This underscores the imperative for policy initiatives aimed at providing training for rural laborers in the Northern Midlands and Mountains regions of Vietnam. Concurrently, it emphasizes the necessity of extending similar interventions to young rural laborers in analogous contexts.

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The study suggests that, to address this situation, from a management perspective, it is necessary to design and implement digital training and development programs. Awareness campaigns and education are crucial to ensure that laborers are prepared for both current and future employment opportunities. Government supports in the form of incentivizing policies, access to financing, and simplified legal procedures is also vital to create favorable conditions for self-employment. In addition, social safety nets and policies for self-employed workers need to be considered ensuring the sustainability of self-employment.

In the rapidly evolving landscape, it is essential for workers to take the initiative in learning about digital technology, applying it to their work, seeking new employment opportunities, and developing entrepreneurial skills. Collaboration and community networking also play a significant role in knowledge sharing and creating new opportunities within the community. These recommendations serve as a comprehensive approach to address the employment challenges in the face of the Fourth Industrial Revolution, particularly for rural youth labor in the Northern Midlands and Mountains region of North Vietnam.

The research findings are not exempt from limitations, primarily stemming from the cross-sectional data collected on a small sample scale within a specific economic region in Vietnam, focusing on rural youth labor. The study implies that broader research efforts targeting more diverse labor groups, such as older rural labor, may face limitations due to factors like reduced learning capacity for new knowledge, particularly in technology; a lower sensitivity to market dynamics; and difficulties in seeking employment in different companies due to age and health-related concerns. The measurement of digital skills using subjective Likert scale-based assessments has limitations in accurately reflecting the true level of digital skills possessed by laborers, given that perceptions may vary among individuals. The research results suggest the need to develop and standardize a set of indices for assessing the digital competence of laborers. This will allow for more accurate research and evaluation of the actual level of digital skills among the workforce, providing valuable insights for designing training programs, practical management, and development policies in different localities and contexts.

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