

Factors Affecting the Use of ICT in Resolving Work of Community Officers in Vietnam

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Abstract

In general, using information and communication technology (ICT) to support problem-solving is becoming increasingly common across various industries, sectors, and regions. However, there have been few analyses on the factors affecting ICT problem-solving among officers working at People's Committees of mountainous communes. Using survey data, exploratory factor analysis (EFA), and multivariable linear regression, this study examined the factors that influence the use of ICT in resolving works among community officers at People's Committees in the Northwest mountainous region of Vietnam. The results showed that three factors with statistical significance affecting the dependent variable are computer skills, gender, and occupation of community officers. Therefore, it is recommended that officers participate in ICT training courses or engage in regular self-study to improve their computer skills and qualifications. Both men and women should also prioritize the use of ICT equipment. The study also found that officers in managerial positions were more likely to use ICT for problem-solving than their counterparts. However, some factors that affect the use of ICT were not identified in this study, leaving room for further research.

Keywords: Community Officers, Exploratory Factor Analysis, Information and Communication Technology, Mountainous Area, Vietnam

JEL Classification Code: J24, J45, O18, L15

1. Introduction

The industrial revolution 4.0 is strongly taking place around the world and in Vietnam, where the improvement and use of technology in the workplace are highly diverse in many different industries and fields (Kwong, 2018). Industrial revolution 4.0 and the digital transformation trend will increase production flexibility, mass fine-tuning, better quality, and higher productivity (Ulewicz & Nový, 2017).

This will allow companies more opportunities to produce featured products with faster time to market and better quality (Stasiak-Betlejewska et al., 2018).

In the industrial revolution, 4.0 in general and the orientation of digital transformation in particular, information and communication technology (ICT) is an important and indispensable component for life, production, and business activities. The Information Technology Law of the National Assembly of Viet Nam (2016) defined that "Information Technology is a collection of scientific methods, technologies and modern technical tools for production, transmission, collection, processing, storing and exchanging digital information" and "Application of information technology is the use of information technology in the fields of socio-economic, foreign affairs, national defense, security, and other activities to improve their productivity, quality and efficiency" (National Assembly of Viet Nam, 2006). Accordingly, it can be understood that an ICT system includes the technique of hardware, software, data, computer networks, and telecommunications, which are used to process information and apply ICT in enterprises' production and business activities (Ngan, 2019).

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In recent years, the Vietnamese government has made significant investments in ICT infrastructure and promoted the use of technology in public service delivery. Despite these efforts, there is still a significant gap in the adoption and use of ICT by community officers, especially in the Northwest Mountainous Region, where access to technology and connectivity is limited.

Adopting ICT in this context may face challenges such as limited resources, insufficient technical expertise, educational background, and computer time. On the other hand, ICT can offer several opportunities, such as improved coordination and communication, enhanced efficiency, and increased service quality for community officers and the people they serve.

Therefore, this study is aimed to provide insights into the barriers and facilitators of ICT use in the work of community officers. It could inform policy and practice in promoting the effective use of technology in public service delivery and analyze factors affecting the use of ICT in resolving the works of community officers in the Northwest mountainous region of Vietnam. This paper may give useful knowledge on the interplay between technology and public administration in developing countries.

The rest of the paper is structured as follows: Section 2 presents previous studies on the factors affecting the use of ICT, section 3 introduces the methodology, and section 4 is data and variables. The results and discussion will be indicated in section 5, and finally conclusion in section 6.

2. Literature Review

Studies have shown that ICT is one of the most important factors in the development of all countries in the world, and ICT is considered the foundation for those countries' development (Ghaderi et al., 2017). ICT plays an important role in organizations. ICT use is considered to increase the organization's capacity by reducing operation costs (Benamati & Lederer, 2008). ICT has also revolutionized foreign language training (Van Long, 2016).

Duc and Van Nguyen's (2021) study indicated two key points. Firstly, the use of information technology positively impacts labor productivity in Vietnamese manufacturing firms, whether through the implementation of hardware applications, ICT services, ICT software solutions, or the development of employees' ICT skills. ICT hardware and services significantly impact these applications, followed by software solutions and employees' ICT skills. Secondly, firms with higher production technology tend to use ICT more extensively, leading to a greater impact on labor productivity. This study recommends that the Vietnamese government encourage the adoption of ICT and digital

transformation in businesses to increase labor productivity and support economic restructuring.

Another research revealed that the emergence of ICT and social networks had caused a shift in how customers perceive information related to a company's product or services (Chi et al., 2022). Kusuma et al. (2020) discovered that small and medium enterprise owners and managers could take proactive measures to encourage the adoption of ICT in their organizations. Afroz et al. (2020) found that the inclusion of ICT has a positive and significant impact on population health in both the short and long term.

However, there are few studies to analyze the factors affecting the use of ICT in solving the regular work of officers at the People's Committees of mountainous communes. Manager characteristics such as ICT use mindset, ICT knowledge and organization characteristics such as business size, organization structure, organization culture and other general external factors such as political, economic, social, and infrastructure are also mentioned in the study of factors affecting the use of IT in agricultural cooperatives in Thailand (Chiochan et al., 2000). However, the detailed results of this research have not been published or evaluated specifically yet. The study on the factors affecting teachers' use of ICT in education showed that their positive attitude in using ICT is important to improve teaching quality (Player-Koro, 2012).

In Vietnam, through the available documents, we have not found any research so far on finding and analyzing factors affecting the use of ICT in resolving works among officers and employees who are working in public administration areas, especially in the People's Committees of mountainous communes in the Northwest, Vietnam.

According to the research of Isleem (2003) and Van Nghiem (2013), the author proposes a model of factors affecting the use of ICT in solving daily works of community officers who are working at the People's Committees in the Northwest mountainous communes, Vietnam (Figure 1).

Computer skills refer to the proficiency and expertise of community officers in using ICT tools and technology. This includes technical skills, such as fixing computer problems and using software, and cognitive skills, such as using ICT to solve problems and make decisions.

***H1:** The level of computer skills significantly impacts the use of ICT in resolving works, as those with higher computer skills are more likely to use ICT effectively and efficiently.*

ICT access conditions refer to the availability and accessibility of ICT resources, such as computers, internet

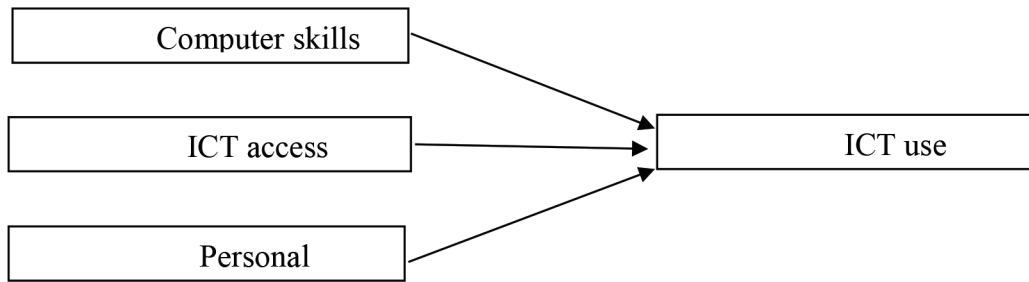


Figure 1: Model of Factors Affecting the Use of ICT in Problem-Solving

access, software, and infrastructure and support systems. ICT access conditions are an important factor in promoting the use of ICT in resolving works.

H2: *Community officers with better ICT access conditions will use ICT more effectively and efficiently in resolving work than those with poor ICT access conditions.*

3. Research Methodology

Data is collected by face-to-face interviews and will be analyzed in our study through 5 steps. First, general descriptive statistics will be conducted to generalize the characteristics of the research sample. Second, Cronbach's Alpha test will be used to check the scale's reliability. Using this test, the research can keep the reliable variables and remove the inappropriate ones. Cronbach's Alpha test will ensure when the Test Scale > 0.6, the Item-rest correlation of each variable must be > 0.3, and the Alpha coefficient of each variable must be smaller than the Total Test Scale. Third, exploratory factor analysis (EFA) will reduce the observed variables into more significant factors. EFA analysis will show whether or not the actual number of factors suits the theory. EFA uses the principal factor analysis method with Promax rotation and the stop value of Eigenvalue at 1; the scale is achieved when the total variance extracted is $\geq 50\%$ and $KMO > 0.5$. Fourth, the Pearson correlation coefficient test will be performed to check the linear relationship between the independent and dependent variables before going through the regression step. Finally, multivariable linear regression analysis is conducted to determine the influence of the independent variables on the dependent variable, thereby helping us test the research hypotheses.

Dien Bien Dong is a mountainous and highland district of Dien Bien province, Vietnam. It comprises 13 communes and one town, 246 villages and residential groups. The population by 2019 is 67,180 people, including 6 ethnic groups, mainly Mong, Thai, Kho Mu... As a district with complicated terrain, difficult transportation conditions, limited education level, poor infrastructure, undeveloped

economy. Agricultural products are the main economic sector, accounting for 58,3% (Dien Bien Portal, 2021). Many regions in this district have low education levels. To assess the level of ICT use in solving problems of community officers, we conducted a direct survey with all officers in five communes, including Muong Luan, Chieng So, Luan Gioi, Hang Lia, and Sa Dung, with a prepared questionnaire. The content of the questionnaire focused on 4 main issues, including personal information, the use of ICT in doing daily work, computer skills and conditions for accessing ICT facilities in the organization. The questionnaire uses the Likert scale tool with 5 levels. The survey results are used to evaluate and test the scale model, research model, and research hypothesis.

Table 1 shows that most administrators are men in the commune offices, with college education or higher; 87% of the respondents hold a managerial position at the Commune People's Committees with a working average of 9.3 years and an average number of using the computer is over 7 years. The number of people with the ability and skills to edit, receive, process and transfer documents using ICT equipment is quite good. The number of computers for officers and employees in the communes is relatively secure when the assessment level is 3.42.

4. Results and Discussion

4.1. Scale Test

4.1.1. Dependent variable

For the dependent variable, the level of ICT use (Apply), Table 2 provides a total Cronbach's Alpha value of 0.75, all factors have correlation coefficients greater than 0.3, and Cronbach's Alpha coefficients are all less than 0.75.

After conducting the KMO and Bartlett's Test of the dependent variable, the result of the KMO coefficient test is 0.79, which satisfies the condition $0.5 < KMO < 1$. It shows that the exploratory factor analysis is appropriate for the actual data. The p -value = $0.000 < 0.05$. Therefore these factors

Table 1: Descriptive Statistics of the Variables used in the Model

Variables	Variables Description	Average	Max	Min
ICT use				
Apply1	Drafting documents (such as reports, announcements, decisions, ...)	4.41	3	5
Apply2	Receiving, processing, and transferring documents by IT equipment	4.37	3	5
Apply3	Managing documents on the computer	3.18	2	4
Apply4	Exploiting and using documents on computers	3.14	1	4
Apply5	Using ICT proficiency	2.54	1	4
Apply6	Using internet proficiency	2.56	2	3
Apply7	Organizing online seminars, online meetings, etc.	1.55	1	3
Apply8	Responding to emails from colleagues, leaders, partners, etc.	3.59	2	5
Computer Skills				
Skill1	Troubleshooting simple computer problems	2.77	1	4
Skill2	Use word processing software (such as MS Word or similar software).	3.87	2	5
Skill3	Use spreadsheet software (such as MS Excel or similar software).	3.96	3	5
Skill4	Using Email: Read, send and other functions	3.39	1	5
Skill5	Searching and retrieving information from the Internet	3.92	1	5
Skill6	Managing items (folders), files (files) such as: create new, move, rename,...	3.81	3	4
Skill7	Specialized software to support work suitable for each individual's expertise (such as document storage software, check attendance, payment software, human resource management software, document management software ...)	3.62	1	5
ICT Access Conditions				
Con1	Computers for officers and employees	3.42	3	5
Con2	Internet connections	2.67	1	5
Con3	Specialized software on computers at the office	2.57	1	5
Con4	Projector in the Meeting room	2.80	1	4
Personal Characteristics				
Gender	Gender (Female = 0, Male = 1)	0.65	0	1
Edu	Education level (High School = 12, Technical School = 13, College = 14, University = 15, Postgraduate = 16)	14.35	13	15
Married	Marital status (Single = 0, Married = 1)	0.85	0	1
Job	Occupation (Manager = 0, Other = 1)	0.78	0	1
Working time	Years of working at a Community office	9.30	1	26
Year of used	Time of using computer	7.38	2	15

are correlated and affect the ICT use of officers working at People's Committees in mountainous communes. This result shows that the research data is suitable for performing EFA. With Principal Component factor extraction and the Varimax rotation method, one dependent variable was extracted from 08 observed factors with a variance of 37.50%, Eigenvalue value is 2.99 (>1). Factor loading coefficients of the observed variables are all greater than 0.5. Hence, the scale

is satisfaction. The dependent variable will be the average value of the 08 given factors.

4.1.2. Independent Variable

We chose the relevant variables by doing two steps. The first test results show that the total Cronbach's Alpha coefficient is 0.73, but there are 03 factors with a correlation

Table 2: Cronbach's Alpha Coefficient of the Dependent Variable

Number	Variables	Variable Correlation Coefficient	Cronbach's Alpha
1	Apply1	0.52	0.71
2	Apply2	0.38	0.73
3	Apply3	0.41	0.73
4	Apply4	0.47	0.72
5	Apply5	0.58	0.70
6	Apply6	0.41	0.73
7	Apply7	0.44	0.72
8	Apply8	0.41	0.73
Total Cronbach's Alpha			0.75

Table 3: Cronbach's Alpha Coefficient of Independent Variables

Number	Variables	Variable Correlation Coefficient	Cronbach's Alpha
1	Skill 1	0.40	0.82
2	Skill 2	0.53	0.82
3	Skill 3	0.61	0.81
4	Skill 4	0.62	0.80
5	Skill 5	0.46	0.82
6	Con 1	0.67	0.80
7	Con 2	0.64	0.80
8	Con 3	0.75	0.78
Total Cronbach's Alpha			0.83

coefficient less than 0.3 or an alpha coefficient greater than 0.73, namely Skill 6, Skill 7 and Con 4. By removing them, the second test results in Table 3 show that the total Cronbach's Alpha coefficient is 0.83, all factors have correlation coefficients greater than 0.3, and the Cronbach's Alpha coefficients are less than 0.83.

With Principal Component factor extraction and the Varimax rotation method, Table 4 shows that 02 independent variables were extracted from 08 observed factors with a variance of 80.75%. Eigenvalue value is 2.46 (>1). Factor loading coefficients of the observed variables are greater than 0.5, and the scale is satisfaction. This shows that the two extracted variables will explain 80.75% of the ICT use of officers and employees at the commune committee. The remaining 19.25% is due to other factors that have not been considered.

Table 4: Characteristic Matrix Results of Independent Variables

Number	Variables	Variable 1	Variable 2
1	Skill 1		0.91
2	Skill 2	0.54	
3	Skill 3	0.76	
4	Skill 4		0.91
5	Skill 5		0.95
6	Con 1	0.96	
7	Con 2	0.98	
8	Con 3	0.96	

The test coefficient $KMO = 0.62$ satisfies the $0.5 < KMO < 1$, showing that the exploratory factor analysis is appropriate for our data. The p -value = $0.000 < 0.05$ (significance level) shows that the data is suitable and reliable for performing the EFA method.

Based on the above analysis results, the independent variable was combined into 02 variables, computer skills (Skill) variable including Skill 1, Skill 4, Skill 4 and Conditions variable on accessing ICT (Condition) including Skill 2, Skill 3, Con 1, Con 2, Con 3. The value of the independent variables will be the average value of the component factors after analysis by the EFA method.

4.2. Regression Coefficient Test

Regression analysis was conducted to find the relationship between the independent and dependent variables (Apply). In this study, the multivariable linear regression model was determined as follows:

$$\begin{aligned} \text{Apply} = & \beta_0 + \beta_1 \text{Condition} + \beta_2 \text{Skill} + \beta_3 \text{Gender} \\ & + \beta_4 \text{Edu} + \beta_5 \text{Married} + \beta_6 \text{Job} \\ & + \beta_7 \text{Working Time} + \beta_8 \text{Year of used} \end{aligned}$$

Based on calculating the values of the Apply, Condition and Skill variables by the factor scoring method (Factor Score) and conducting regression of the variables, the results are shown in Table 5.

Table 5 shows that the R^2 value = 0.591 , which means 59.1% of ICT use in officers' daily work at Commune People's Committees is influenced by individual characteristics, computer use skills and infrastructure conditions. This shows that several other factors have not been included in the model and is the gap for future research. Table 5 also shows that the variance inflation factors (VIF) are all less than 10. Thus, the independent variables are not correlated, and there is no

multicollinearity among them with the significance level. < 0.01 , it can be concluded that the given model is consistent with the research data. In other words, the independent variables are linearly correlated with the dependent variable at a 99% confidence level.

The results in Table 5 have shown that there are 03 significant variables at a high level of 5% and 1%. The Computer skill variable (Skill) coefficient positively impacts the ICT use of officers at the People's Committee's communes in the Dien Bien Dong district at a 1% significant statistic level. The results show strong evidence to accept hypothesis H1, indicating a significant relationship between computer skills and the use of ICT in resolving the work of community officers. Therefore, we can conclude that community officers with better computer skills are more likely to use ICT effectively to resolve work-related problems. This means that if officers have increased ability to use word processing software and spreadsheet software, it will also increase the level and ability to use technology equipment in working. This result is consistent with Peeraer and Petegem's (2010) study when it was shown that the higher the teacher's ICT use skills, the better the ability to apply ICT in teaching activities.

Contrary to the research hypothesis, the analysis results show that the ICT access condition variable coefficient (Condition) is insignificant at all levels. This variable has little impact on the ICT use of officers at the People's Committees. This can be explained by the infrastructure condition such as computers for officers, the internet connection or specialized software, which are fully equipped and ensured for the job requirements. Another possibility is that the sample used in this study may not accurately represent the larger population of community officers in Vietnam or that other confounding variables may be present that have not been accounted for in the analysis. In any case, the lack of significance for ICT access

Table 5: Regression Results

Independent Variable	Coefficient	Standard Error	t-test	VIF
Condition	0.015	0.059	0.26	2.17
Skill	0.136***	0.045	3.01	1.78
Gender	-0.152**	0.075	-2.02	1.37
Edu	-0.056	0.058	-0.95	1.54
Married	0.069	0.105	0.66	1.54
Job	-1.066***	0.121	-8.82	2.67
Working time	0.004	0.008	0.50	1.80
Year of used	-0.007	0.156	-0.42	1.64
Constant	4.349***	0.737	5.90	

$F = 17.37^{***}$; Coefficient $R^2 = 0.591$; Corrected R^2 coefficient = 0.558 ; ***Significant level 1%; **Significant level 5%; *Significant level 10%.

conditions in this study highlights the need for additional research to understand better the factors that impact ICT use in resolving work for community officers.

The coefficient of Gender has a negative impact on the dependent variable at the level of significance of 5%. It shows that in the People's Committees of mountainous communes, men have more ability to use ICT than women. Men use and apply ICT more than women in solving their daily work because they have the tendency and chance to use ICT equipment (OECD, 2010).

Table 5 also shows that the Occupation factor (Job) negatively affects the ICT use of officers at the Commune People's Committee at the significance level of 1%. This result indicates that administrators and staff at the Commune People's Committee management can increase the condition using ICT facilities. The ability to apply ICT in doing their work will also increase. This is understandable because managerial officers will have many conditions to access computers and other technological devices regularly. Therefore, their information, knowledge and skills in ICT are increasing.

5. Conclusion

Using survey data from officers who work at the People's Committees of mountainous communes in Dien Bien Dong district, Dien Bien province, we analyze the factors affecting the use of ICT in resolving administrative and office works at those places. The Cronbach's Alpha test was conducted to check the scale's reliability. Then, exploratory factor analysis (EFA) is used to reduce the observed variables into a more meaningful set of factors, including one dependent variable from the set of five factors and two independent variables from eight factors. Finally, multivariable linear regression analysis determines the influence of 08 independent variables on the dependent variable. Regression results have shown one variable with statistical significance in the same direction as the dependent variable, Computer skills, and 02 variables with statistical significance in the opposite direction with the dependent variable as Gender and Occupation of the officers working at the People's Committees of communes. Besides, the Conditions on access ICT variable have no statistical significance at all levels.

The computer skills of the officers working at the People's Committees of the mountainous communes positively influence ICT use. This means that the better the skills in using office computing, the more experience they have, and the better their ICT use capacity in regular work will be. This also means they must study and improve their computer skills and qualifications by participating in ICT courses or self-study regularly and continuously.

The gender of respondents has a negative impact on the use of ICT in solving their work. Men working at People's Committees of mountainous communes will

have better ICT use than women. This is explained by men's tendency and ability to learn and explore modern technology more than women. In addition, the professional characteristics of officers at the Commune People's Committees also have a negative impact on the use of ICT. If officers hold managerial positions at the People's Committees of communes, the level of ICT use in solving work also increases. Therefore, the People's Committees of communes should create conditions for officers, not only for those holding managerial positions but also for other ordinary officers and employees, to have more access to computers and other technological devices. In addition, officers should regularly take advantage of opportunities to increase the frequency of computer use in the committee and other places where computers are available. This will bring value and better services for the community and themselves while doing common work.

This is the first and maybe the only study to analyze the factors affecting the level of ICT use in solving works of officers working at the People's Committees of communes in the Northwest mountainous region of Vietnam. Selected factors included were consulted and tested before conducting the survey. However, because of the first study, it is impossible to fully include all factors, such as work efficiency, work motivation or average income of officers at the People's Committees of communes... Therefore, incorporating these additional elements into further research could help to build a more comprehensive and deep understanding of the factors that influence ICT use in this context and inform the development of effective strategies for promoting the effective use of ICT by community officers in Northwest mountainous region as well as in Vietnam.

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