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Digital Literacy Survey and Promotion Strategies of Rural E-commerce under the Perspective of Digital Economy—Taking Yiwu as an Example

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ABSTRACT

Digital technology and the e-commerce industry are deeply integrated, and the pace of digital transformation of various industries is accelerated. In this context, digital transformation has given rise to the growth of e-commerce operated by rural residents. In addition, as a digital depression, digital literacy has become one of the most important influences on rural e-commerce practitioners' future survival and development. Their digital literacy evaluation indicators were designed through a literature survey, expert survey method, and other methods. Moreover, the questionnaire on the digital literacy level is prepared according to the derived indicators, and the survey data of 436 rural e-commerce practitioners in Yiwu are statistically analyzed. Finally, the path of enhancement is given.

Keywords: e-commerce; rural residents; digital literacy

INTRODUCTION

The development of digital technology has been accompanied by a deep integration with other industries, creating considerable employment opportunities. According to the data of the White Paper on Digital Economy Index of Chinese Cities (2018), the recruitment of digital talents in developed e-commerce cities, such as Shanghai, Hangzhou, Nanjing, and Suzhou, has a gap of varying degrees (China City Digital Economy Index, 2018*)*. Moreover, a labor shortage of digitally skilled talents exists. In November 2021, the Central Office of Internet Information Technology issued an "Outline of the Action Program for Enhancing the Digital Literacy and Skills of the Entire Population." This program points out that digital literacy and skills should be enhanced to comply with the requirements of the digital era. Enhancing the digital literacy and skills of the entire population is a fundamental, strategic, and pioneering work to build a strong network country and digital China (Central Cyber Security and Informatization Committee, 2021).

As an important form of expression derived from the digital economy (Bukht & Heeks, 2018), e-commerce has greatly promoted rural e-commerce development in the information age. Reviewing its development history, e-commerce can be traced back to the "Golden Farmer Project" and the "Village Phone Project" in 1994. In 2005, China ushered in the first online retailer for agricultural products "Yiguo Fresh," marking the beginning of rural e-commerce development. In 2015, the development model of rural e-commerce had gradually taken shape (Zhang, 2020) and entered the stage of scale and specialization (Liu & Shen, 2019).

At this stage, the infrastructure of rural e-commerce has been improved, but the main problem is the lack of talent, which restricts the pace of rural revitalization (He, 2021). To make up for this shortcoming, China has issued the "Outline of Digital Rural Development Strategy," "Action Plan for Digital Rural Development (2022–2025)," "Key Points for Enhancing Digital Literacy and Skills of the Whole Population," and "Key Points for Digital Rural Development." They have respectively put forward the requirements for the improvement of farmers' digital literacy to improve the digital

literacy of farmers (Xinhua News Agency, 2019a); to strengthen the training of farmers' digital literacy and enhance farmers' ability to master digital technology (Xinhua News Agency, 2019b); improve the application level of farmers' digital "new farming tools" (Xinhua News Agency, 2019c) and improve farmers' digital literacy and skills (Cyberspace Administration of China, 2022).

Therefore, notably, as one of the main subjects of the digital economy, rural residents are indispensable for digital literacy. Hence, improving rural e-commerce digital literacy has not only been an objective requirement for the development of social and economic transformation but also a necessary condition for preserving the future development of China's e-economy.

The study closely focuses on the issue of rural e-commerce digital literacy. First, the study sets up evaluation indexes through the literature survey method and field expert survey method. This study takes rural e-commerce groups in Yiwu as the research object and investigates their digital status quo through questionnaires. Finally, this study gives the enhancement path according to the status quo.

RESEARCH STATUS

The study of domestic-related literature showed that domestic scholars have studied the connotation, development, current situation, and digital literacy of rural residents and e-commerce practitioners from different perspectives. They have also achieved certain results, which play a certain theoretical guidance for this study. However, no systematic and authoritative digital literacy evaluation model and skills framework research exists for rural e-commerce practitioners in China. Moreover, the literature on rural e-commerce practitioners' digital literacy investigation and enhancement paths is relatively rare.

Compared with domestic research, foreign frameworks are more comprehensive and rich in cases and contexts. Foreign countries focus on assessing farmers' digital literacy in specific areas, using questionnaires or interviews or quantitative analysis to study the level of farmers' digital literacy and its impact. The farmers' digital literacy framework and assessment index system proposed qualitatively in China lack a theoretical basis or simple level, or the interpretation lacks practical contextual description.

In addition, the research level is broader, as most of them are not geographically specific; therefore, the research on the local characteristics of Yiwu is still to be developed. Moreover, most of the current situation of digital literacy for rural e-commerce lacks field evidence, and the perspective of some of the research is yet to be in-depth. Tables 1 and 2 show the number of Chinese and foreign literature searched according to specific terms.

TABLE 1. Presentation of Chinese literature retrieval results

Search term	Search results (unit: articles)
"Digital Literacy"	951
"Rural" + "Digital Literacy"	81
"E-commerce" + "Digital Literacy"	3

TABLE 2. Search results of foreign literature in the recent five years

Search term	Search results (unit: articles)
Digital literacy	12734
Rural area +digital literacy	3500
E-commerce workers + digital literacy	564

DESIGN OF THE DIGITAL LITERACY EVALUATION INDEX

The preliminary indicators of digital literacy are collected through the existing literature at home and abroad. Then, the evaluation indicators of digital literacy suitable for rural e-commerce in China are determined by field expert surveys. At present, the authoritative research framework for digital literacy abroad is the Digcomp series of the European Union. Since the first version was released in 2013, the research series has been updated with three versions, and the latest version is Digcomp2.1 (Carretero, Vuroikari & Punie, 2017). According to the existing information at home and abroad, the theoretical framework of digital literacy evaluation of rural e-commerce is initially determined through analysis, comparison, and screening. Second, 15 experts from higher vocational colleges, enterprises, and digital fields were identified. After consulting and researching the 15 experts through the field expert method, six first-level evaluation indicators and 16 second-level indicators of digital literacy of rural e-commerce were finally determined, as shown in Table 3.

TABLE 3. Evaluation index of digital literacy of rural e-commerce

Primary index	Secondary index
Digital technology domain	Technical cognition
	Technology use
Digital information domain	Information search
	Information evaluation and processing
Digital security domain	Equipment safety
	Data security
	Secret protection
Professional content creation domain	Digital content creation
	Digital professional quality
Online communication domain	Digital professional learning
	Digital thinking
	Digital communication
Problem-solving capacity domain	Digital collaboration
	Hardware equipment problem handling ability
	Software system problem-handling ability
	Operation ability of digital advanced equipment

SURVEY DESIGN

The questionnaire on the digital literacy status of rural e-commerce is edited based on the evaluation index obtained by the research. The questionnaire is divided into two parts: demographic factors and the status quo of digital literacy. Among them, demographic factors include gender, age, education level, income, working years, and jobs.

DEMOGRAPHY OF THE RESPONDENTS

This study takes rural e-commerce practitioners in Yiwu as the research object and sends online questionnaire links to them on the platform of WeChat and QQ from June 5, 2023, to June 20, 2023.

After that, a total of 482 questionnaires were obtained, 46 invalid questionnaires were eliminated after screening, 436 valid questionnaires were finally obtained, and the effective rate of questionnaire recovery was 91.5%. Table 4 shows the sample details.

TABLE 4. Demographic data of respondents

Demographic variable	Category	Frequency	Proportion
Gender	Man	194	44.50%
	Woman	242	55.50%
	Other	0	0.00%
Age	18-30	174	39.91%
	30-40	186	42.66%
	40+	76	17.43%
Occupation	Operator	47	10.78%
	Customer service	107	24.54%
	Storehouse	67	15.36%
	Live streamer	90	20.64%
	Art designing	39	8.94%
	Logistics	86	19.72%
Working experience	Within 2 years	185	42.43%
	2-5 years	134	30.73%
	5-8 years	70	16.10%%
	More than 8 years	47	10.78%
Level of education	High school and below	160	36.70%
	Universities and colleges	95	21.79%
	Undergraduate course	147	33.71%
	Graduate students and above	34	7.80%

TEST OF QUESTIONNAIRE ITEMS

The questionnaire consists of 25 questions and 6 fields, including the digital technology domain, digital information domain, digital security domain, professional content creation domain, online communication domain, and problem-handling ability. The questionnaire draws lessons from Likert's five-point scale (Huang, 2021) and gives a score of 1–5 from "completely disagree," "disagree," "neutral attitude," "agree," and "very agree," respectively. For the measurement of the questionnaire, as it is a self-made questionnaire, the exploratory factor analysis method should be used to test the items.

As for the reliability of the questionnaire, Cronbach's α coefficient of the questionnaire as a whole is 0.979, and the coefficients of the first-level indicators are between 0.912 and 0.940, which proves that the questionnaire has high reliability and high consistency among various options. The Kaiser–Meyer–Olkin value is 0.921, which indicates that the correlation among variables is good. Through factor rotation, some items with a load coefficient less than 0.4 are deleted, and finally, 25 items remain. The combined reliability of each domain item is greater than 0.7, and the average variance

extraction is also greater than 0.5. This result shows that the representativeness and convergence validity of the item are good. In terms of the content validity of the questionnaire, the content and general framework of the questionnaire were formed according to the relevant research results at home and abroad, combined with the needs of rural e-commerce and verified by relevant experts, so the content validity passed the test.

PRESENTATION OF SURVEY RESULTS

On the overall level of sample data of rural e-commerce, the average score of digital literacy of 436 practitioners is 3.79, and the standard deviation is 0.47554. Table 5 presents the descriptive analysis results of each level index.

Table 5 Descriptive statistical results of the first-level indicators of digital literacy

Primary constituent elements	Average statistics	Standard deviation statistics	Top score	Lowest points
A. Digital technology domain	3.71	0.63065	4.53	2.43
B. Digital information domain	3.94	0.31087	4.38	3.13
C. Digital security domain	4.14	0.16847	4.63	3.87
D. Professional content creation domain	4.31	0.25073	4.72	3.58
E. Online communication domain	3.72	0.36207	4.25	2.86
F. Problem-solving ability	2.92	0.29113	3.41	2.18

DIFFERENCE ANALYSIS

The difference analysis is used to explore the influence of different variables on digital literacy of rural e-commerce.

ANALYSIS OF GENDER DIFFERENCE

The average score of all men and women is 4.12 and 2.64, respectively. Men's digital literacy ability is generally higher than that of women. Using SPSS25.0 software, the t value is 3.73, and the p value is $0.025 < 0.05$, so a significant difference exists. This result shows that the level of digital literacy of rural e-commerce among different sexes has objective differences, and the digital literacy of men is mostly higher than that of women.

ANALYSIS OF AGE DIFFERENCE

Bringing the calculated mean square into the F test formula, we know that F = 0.24. According to the F distribution table, the critical value of F is 3.01 when the degree of freedom (DF) is 2,433. Considering that 0.24 is less than 3.01, it cannot be concluded that significant differences exist in digital literacy levels among different age groups.

ANALYSIS OF JOB DIFFERENCE

According to the digital literacy scores of different positions, the statistical data showed that (t = 2.345, p = 0.022 < 0.05). Table 6 shows the results, that is, a certain correlation exists between their digital literacy level and their posts. Moreover, from the average point of view, the positions of operation and anchor generally show high digital literacy, whereas the digital literacy of customer service and warehouse positions still has a lot of room for improvement.

Table 6 Single factor variance analysis of digital literacy in different positions

Major in science	Average statistics	Standard deviation statistics	A. P	B. P	C.P	D.P	E. P	F. P
Art designing	2.98	0.33187	0.029	0.035		0.036	0.005	0.017
Customer service	3.10	0.26523		0.026	0.018	0.026	0.019	
Storehouse	3.77	0.24071	0.012		0.034		0.045	0.035
Live streamer	4.67	0.15042	0.026				0.016	0.003
Run	4.18	0.22405	0.039		0.037		0.015	0.048
Logistics	3.92	0.42203	0.043	0.039			0.001	0.005

Note: A refers to the digital technology domain of the first-level constituent elements; P is the p value of the result of variance analysis. A.P means the level of significant differences in the ability of personnel in this position. The blank space is hidden because the p value is greater than 0.05.

ANALYSIS OF THE DIFFERENCE IN WORKING YEARS

According to the data of working years, the overall SS = 366.24 was obtained through one-way analysis of variance (ANOVA). Then, the DF between groups (3) and within groups (432) and the mean sum values of components (0.20) and within groups (0.85) are obtained. F is 0.24, and p = 0.7863 > 0.05, so no significant difference exists, that is, no evident relationship exists between working years and digital literacy.

ANALYSIS OF THE DIFFERENCE OF ACADEMIC QUALIFICATIONS

According to the data on education level, the one-way ANOVA shows that the F value is 1.26, the DF is (10,425), and the calculated p value is 0.1009. This result is greater than the significance level of 0.05, so the original hypothesis that no significant difference exists between academic level and digital literacy level cannot be rejected.

CONCLUSION AND REASONS FOR THE INVESTIGATION

SUMMARY OF SURVEY RESULTS

In general, the overall score of digital literacy in rural e-commerce is between 3 and 4, indicating a certain level of digital literacy, but there is still much room for improvement. Among them, the level

in the field of professional content creation is the highest. This result indicates that the professionalism of rural e-commerce practitioners has passed. Moreover, the performance in the field of digital security is also good, indicating that most respondents have a certain sense of self-protection in the digital environment.

Compared with other fields, the level of rural e-commerce groups in the field of problem-solving is poor. This finding indicates that practitioners are not familiar with digital hardware and software equipment and cannot solve problems alone. The ability to operate digital equipment needs to be improved through training in the future. This case also shows that the digitalization of rural e-commerce professionalism at this stage is limited by its own digital problem-solving ability, so it cannot fully take advantage of e-commerce.

CAUSE ANALYSIS

Low average education level: According to the survey, the cultural background of most rural e-commerce practitioners is junior college or below, and some practitioners can only receive junior high school or even lower education. The e-commerce industry needs certain professional knowledge and skills. Hence, these practitioners cannot rely on their own knowledge level to master the required digital technology by themselves, thereby limiting their digital literacy development and ultimately affecting their career development.

Lack of professional experience and skills: The e-commerce industry has really flourished for a short time. Compared with the traditional sales model, e-commerce practitioners have relatively insufficient understanding and experience of their own industries. Moreover, most employees only use limited equipment and tools in their daily work, such as ordinary mobile phones and televisions. They lack the skills to use computers, the Internet, and digital products, and some employees are not even proficient in using back-office software and sales platforms. Their digital technology and knowledge reserves are also different. Some practitioners engaged in the traditional sales industry may not have received relevant digital training, and they are not familiar with the business model and operation mode of e-commerce, which makes it difficult for them to adapt to the working mode of e-commerce.

Learning habits and attitudes: For e-commerce practitioners, mastering digital technology and knowledge requires continuous learning and accumulation. Some practitioners may not have formed good learning habits and attitudes to keep pace with the times, and they are not aware that e-commerce itself is changing, so mastering and applying the new digital knowledge is difficult.

Contradiction between the low threshold of employment and the high threshold of professional quality inspection: Compared with traditional physical stores, the threshold of participating in e-commerce is relatively low. Moreover, men, women, and children can enter the business in a short time as long as they master the basic operations. Although the threshold for e-commerce is relatively low, the construction and operation of e-commerce involves some technical thresholds, such as web page (station) production, store maintenance, and data analysis, which require certain professional knowledge and skills. Some practitioners lack technical reserves in this field, which leads to the low digital literacy of the survey.

PROMOTION MEASURES

Provide training so that village committees and relevant villagers' self-governing organizations can regularly invite relevant experts to provide basic digital training courses covering aspects such as e-commerce platform operation, online promotion skills, and online customer service. These trainings can be conducted either online or offline to ensure that rural e-commerce practitioners have the right

learning path for basic digitalization knowledge. Utilizing the educational role of public libraries in rural and township governments, libraries dominate in digital literacy skills enhancement (Huo, 2022). Moreover, public libraries should sink their high-quality talents and digital resources into rural areas to benefit many people (Chen, Tian & Fan, 2022).

Establish an inter-village exchange and cooperation network: an official formal channel should be opened up for the exchange and cooperation among rural e-commerce practitioners. Moreover, rural e-commerce learning and exchange groups can be established to organize exchange activities, share successful experiences, and solve problems online or offline. In addition, we can hold regular seminars on village-to-village exchanges, cooperate through various channels, jointly carry out marketing promotion and resource integration, and give full play to the advantages of the block economy.

School-enterprise cooperation, resource replacement, and intellectual support. In industry–teaching integration, school–enterprise cooperation has always been an important way to train students in vocational education; fully mobilize high-quality rural e-commerce enterprises and schools to jointly invest in capital, technology, manpower, projects, resources, and others, for example, with the school to open the internship site for students in the rural areas, the outstanding graduates to start early, and other initiatives, to promote the virtuous cycle of the digital development of the rural e-commerce ecosystem. On the one hand, students' theoretical knowledge can be combined with the actual experience of e-commerce, which is conducive to the cultivation of composite talents with high digital technology and ability. On the other hand, it can also help rural e-commerce companies to absorb high-quality, experienced workers in the institutions earlier and promote the competitiveness of enterprises.

Providing policy support and incentive mechanism: Local governments can encourage rural e-commerce practitioners to actively improve their digital literacy by formulating relevant policies and incentive mechanisms. For example, the subsidy policy for digital education, the e-commerce innovation competition, and the digital training funds are carried out to encourage them to participate in activities to improve digital literacy. On this basis, rural e-commerce can also get certain economic returns.

CONCLUSION

At present, the digital literacy level of rural e-commerce still has much room for improvement. The implementation of the above measures can help rural e-commerce practitioners improve their digital literacy, strengthen their digital skills and application capabilities, promote the development of rural e-commerce, and improve economic benefits and farmers' income levels. In addition, it can promote the popularization and application of digital technology in rural areas, contributing to rural revitalization and digital village construction. The digital literacy framework for farmers' e-commerce practitioners proposed in this study contains primary and secondary indicators that point out the direction of their efforts to improve their digital literacy ability. This framework can also be used as a basic framework for governments, libraries, enterprises, and other organizations to carry out farmers' digital literacy improvement programs and digital literacy ability assessments. In practical application, the framework can be expanded according to specific needs. In addition, the framework provides directions for proposing the corresponding improvement suggestions for each literacy. Furthermore, this framework provides feasible paths for exploring ways to narrow the digital literacy gap between farmers and other groups.

In the long run, based on the digital literacy framework for farmers' e-commerce practitioners and the specific literacies proposed in this study, China can explore the formation of a synergistic mechanism for the construction and sharing of the government, public libraries, enterprises, and other

multiple actors, including a system of policymaking based on the specific needs and requirements for the enhancement of specific literacies. The objectives are to further improve farmers' digital general literacy, digital safety and ethics literacy, digital communication literacy, digital creativity literacy, and digital problem-solving literacy. China can explore the formation of a synergistic mechanism and category-based policymaking system for the government, public libraries, enterprises, and other multiple actors to build and share in response to specific literacy needs and requirements.

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