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Research Article

Digital Capacity Education for Young Farmers in the Northeast Region, Vietnam: A Study of Agricultural Product Consumption

*¹Dao Thi Huong, ¹Nguyen Minh Hue, ¹Cao Thi Phuong Thao, ¹Hoang Thi Thu Hang

About Article

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About Author

¹ Thai Nguyen University of Economics and Business Administration, Vietnam

Contact @ Dao Thi Huong
dthuong2020@tueba.edu.vn

ABSTRACT

Young farmers are agricultural workers aged from 18 to under 35, residing in rural areas and actively engaged in agricultural production. They play a crucial role in promoting the sustainable development of the agricultural sector. In the current context, young farmers are living in a dynamic market economy, which provides them with numerous opportunities for personal development in areas such as ideology, creativity, scientific knowledge, innovation, entrepreneurship, and individual passions. Findings from a study of 400 young farmers in provinces of Northeast Vietnam reveal that their digital competence remains low, with an average overall score of 2.08. Specifically, the sub-competencies include: information search and management (2.49), digital communication and collaboration (2.34), digital content creation (1.92), digital safety (1.80), and problem-solving in digital environments (1.88). This study provides a granular diagnosis of digital competency gaps, serving as a foundational basis for designing targeted, context-specific educational interventions for this demographic. These results highlight a need for local authorities, management agencies, and young farmers themselves to recognize the current level of digital competence in the context of agricultural product marketing. This serves as an empirical basis for proposing targeted solutions to improve digital capabilities in the near future.

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1. INTRODUCTION

Digital transformation in agriculture is not only an inevitable trend but also an important lever to modernize the agricultural sector, increase added value and develop sustainably. However, for digital transformation to be successful, there needs to be synchronous investment in infrastructure, human resource training and support policies from the state to reduce the digital gap and create conditions for farmers to access new technologies. Although digital transformation has brought many opportunities, it has also caused negative impacts on farmers in consuming agricultural products. They are easily dependent on high-cost intermediary digital platforms and face fierce competition on e-commerce platforms; the risk of fraud and fraudulent transactions increases due to limited security knowledge. In addition, farmers are at risk of losing control of their data to platform businesses. Limited digital skills make it difficult for them to optimize online sales activities, while protection policies are still incomplete. If they do not adapt in time, farmers are easily eliminated from the digital supply chain.

In the context of global digital transformation, many empirical studies have shown that digital competence is a key factor determining people's ability to participate effectively in the digital society. In Europe, Vuorikari *et al.* (2022) used the DigComp 2.2 framework to assess adult digital competence in 27 EU countries, and the results showed that many citizens are weak in advanced competence groups such as information security and problem solving in the digital environment (Vuorikari *et al.*, 2022). The OECD (2021) warned that the digital competence gap is widening among population groups, especially rural workers and the elderly, leading to the risk of being excluded from the digital economy (OECD, 2021). UNESCO (2021) proposed integrating digital competence education into sustainable development policies, emphasizing the role of responsible digital citizens (UNESCO, 2021).

In Vietnam, national policies on digital transformation such as Decision 749/QĐ-TTg have emphasized the goal of universalizing basic digital skills for all people (Prime Minister, 2020). The Ministry of Information and Communications has developed a set of provincial and commune-level digital transformation indexes, including criteria for assessing the level of use of online public services, electronic payment accounts and digital skills (Ministry of Information and Communications, 2022). Some local studies in Thai Nguyen (Nguyen & Le, 2021), Bac Giang (Tran, 2022), Long An (Pham, 2020) ... indicate that people, especially young farmers, still lack the skills to use digital tools for production, consumption and protection of personal information. Empirical data also shows that disadvantaged groups such as rural women and the elderly often face barriers in terms of awareness, equipment and digital learning capabilities. The need to improve young farmers' digital capacity in conjunction with practical implementation is increasingly evident in community support policies. The research results not only contribute to supplementing the scientific basis for the technology acceptance theory but also provide practical implications for state management agencies on agriculture and farmers in the process of policy development to enhance digital capacity education for people in the context

of strong digital transformation as today.

So can young farmers in the northeast region of Vietnam adapt to the digital transformation context when their digital capacity needs to be improved in the near future? We need to clarify the current state of their digital capacity including: information search and management, digital communication and collaboration, digital content creation, digital safety, and problem-solving in digital environments. From there, help the government orient solutions suitable to the digital capacity characteristics of young farmers in the northeast region of Vietnam.

2. LITERATURE REVIEW

2.1. Concept of digital competence

According to Ferrari (2012) – Joint Research Centre (JRC) of the European Commission: “Digital competence is the confident, critical and creative use of digital technologies to achieve goals related to learning, work, leisure activities and active participation in society” (Ferrari, 2012).

UNESCO (2018) defines: “Digital competence is the ability to access, manage, understand, integrate, communicate, evaluate and create information securely and appropriately through digital technologies to effectively carry out personal, social and professional activities” (UNESCO, 2018).

Nguyen Thi Phuong Hoa (2020): “Digital capacity is the ability to effectively apply digital technologies in searching, processing, communicating information, creating digital content and solving problems arising in the digital environment, while ensuring information security and digital ethics during use” (Hoa, 2020).

Do Van Hung *et al.* (2021): “Digital capacity is a set of skills and abilities necessary for individuals to access, use, manage and create information on digital platforms to serve the purposes of learning, working and communicating in modern society” (Hoa & Hung, 2021).

Thus, it can be understood that: Digital competence is the ability to confidently, effectively, responsibly and safely use digital technologies to access, manage, analyze, create and share information, as well as solve problems in modern learning, work and social life contexts.

2.2. Digital Literacy Education

European Commission - DigCompEdu (2017): “Digital Literacy Education focuses on developing digital competencies for both teachers and learners, in which teachers need to master digital tools to support teaching, personalize learning and evaluate effectiveness” (Redecker, 2017).

UNESCO (2018) “Digital Literacy Education aims to equip learners with the ability to exploit, create, share, communicate and solve digital problems, while promoting responsibility and citizenship in the digital space” (UNESCO, 2018).

Nguyen Thi Phuong Hoa (2020): “Digital Literacy Education is a teaching process that aims to develop learners' skills in using digital technology, managing information, creating digital content and ensuring personal safety in the online environment” (Hoa, 2020).

Thus: Digital Competence Education is the process of organizing educational activities to comprehensively develop knowledge,



skills, attitudes and responsible behaviors of learners in using digital technology effectively, safely, creatively and ethically in the contexts of learning, working and social life.

Although there are some studies that have mentioned the digital capacity of farmers, there is no model or method that is suitable for all contexts, countries, localities, regions. In addition, studies that evaluate the digital capacity of young farmers in agricultural consumption by region have hardly been mentioned in previous analyses. This study will fill the research gap with empirical evidence in the Northeast region, Vietnam.

2.3. Components of digital competence

Based on the European Commission's DigComp 2.1 framework (Carretero *et al.*, 2017), digital competence is structured into 5 basic competence groups as follows:

- *Information retrieval and management*: Ability to search, evaluate, manage and store information from digital sources.
- *Communication and collaboration in the digital environment*: Ability to communicate, share information, participate in digital networks and cooperate effectively through digital platforms.
- *Digital content creation*: Ability to produce, edit, integrate and share digital content, including understanding and respecting intellectual property rights.
- *Digital safety*: Ability to protect devices, personal data, health and the environment in online activities.
- *Problem solving*: Ability to handle technical problems, adapt to technological changes, be creative and innovative in the digital environment.

3. METHODOLOGY

Desk research was conducted to build a theoretical basis and review the literature. This process included a literature review, analysis of previous research works and identification of research gaps. The sources of documents included books, scientific articles, theses, conference reports and specialized documents related to farmers' digital capacity in product consumption in the context of digital transformation. Through this process, the study identified key concepts and built a theoretical framework for research on digital capacity education for young farmers in agricultural product consumption in the Northeast region of Vietnam in the context of digital transformation.

Quantitative research was conducted through a survey of young farmers in the Northeast region including four provinces: Tuyen Quang, Thai Nguyen, Lang Son, Cao Bang (according to Resolution No. 202/2025/QH15 dated June 12, 2025 of the National Assembly on the arrangement of provincial-level administrative units). The number of young farmers aged 18 to under 35 in the Northeast region as of June 15, 2025 is 1,202,072 people, applying Slovin's sampling formula:

$$n = N / (1 + \varepsilon^2 N)$$

Where,

n is the sample to be surveyed.

N : Total number of samples (1,202,072 samples)

ε : standard error (take the approximate value of 0.05).

Applying the above formula, $n = 399.8$ is rounded to 400 people. The research sample is designed according to the 5-level Likert scale from Good (5 points), Fair (4 points), Average (3 points),

Weak (2 points), Poor (1 point).

How to build a questionnaire:

Step 1: Determine the measurement objectives. Clarify the objectives of the questionnaire to assess the level of digital competence of young farmers surveyed,

Step 2: Build the structure of the questionnaire. Based on the digital competence components in DigComp 2.1 (including 5 areas and 21 specific competencies). Each competency is transformed into a group of observed variables (items).

Step 3: Design the scale. Use a 5-level Likert scale (from "poor" to "good").

Step 4: Refer to secondary sources. Inherit and adjust the scale from previous studies that have applied DigComp 2.1.

We conduct surveys via the following google form link: <https://docs.google.com/forms/d/1TydgRPvLall68TH41pAvWDv6x8hTK0TrqJYJCwmnyg/edit>

Data processing method: Using SPSS software version 22.0 to calculate the average score. The result of calculating the score range with $k = (5-1)/5 = 0.8$, so the criteria in the range from 1-1.80 are classified as poor, the range from 1.81-2.60 is classified as weak; the range from 2.61-3.40 is classified as average; The range from 3.41-4.20 is considered fair and the range from 4.21-5.00 is considered good.

4. RESULTS AND DISCUSSION

4.1. Assessment results on information search and management capacity

The survey results show that the information search and management capacity of young farmers in the Northeast region, Vietnam is only ranked at 2.49 points (weak). In which, the highest component score is the criterion "Searching for market information, agricultural product prices on the Internet" at 2.98 points (average). When investigating the shared reason, it is because the database of agricultural product information sources does not know what type of information to exploit? What is the specific method of implementing through information transmission tools? The official websites of the province are not updated promptly due to limitations in telecommunications infrastructure and support from local authorities.

The assessment result of the criterion "Storing and organizing information related to products and customers" reached 2.15 points, the lowest level (weak level), which shows that the information management work of young farmers is still very limited. They themselves have not really grasped how to store information to become a valuable reference data set for agricultural products according to the time series. In addition, the work of classifying customers has not been done such as grouping into current customers, potential customers, customer geographic scope, customer personal information data (gender, income, interests, habits, purchase frequency, purchase reason, price level, etc.) The current limitation in young farmers' ability to search for and manage information stems from a lack of basic digital skills and information literacy. They mainly search for information through popular social networks, lacking the ability to assess reliability and organize scientific data. Formal training in information search and management skills in agriculture is limited, while technological infrastructure and specialized data sources are not yet popularized. In addition,



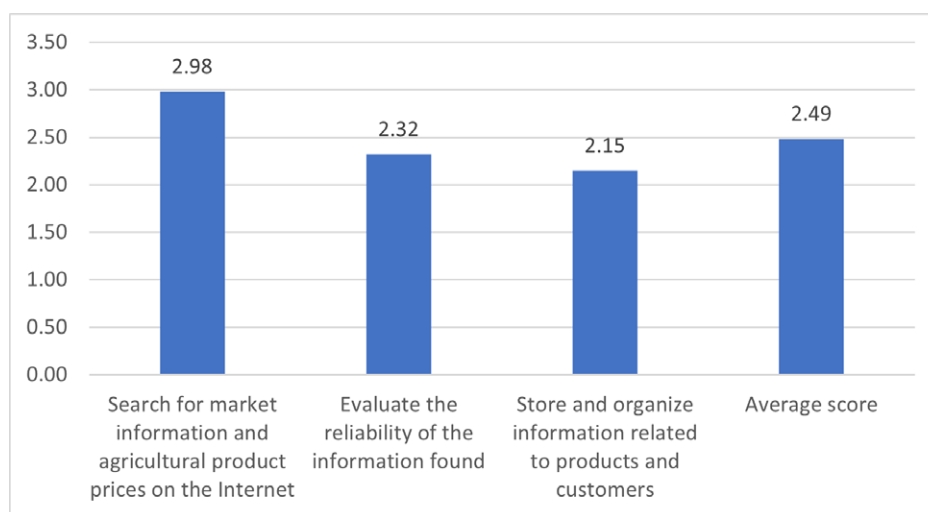


Figure 1. Survey results on the current status of information search and management capacity of young farmers in the Northeast region, Vietnam

Source: Survey

inadequate awareness of the importance of digital information makes young farmers susceptible to emotional and unselective information.

4.2. Assessment results on communication and collaboration capacity in the digital environment

Figure 2 shows that the communication and collaboration

capacity in the digital environment of young farmers in the Northeast region, Vietnam is only ranked at 2.37 points (weak). In this capacity component, the highest assessment criterion is “Using social networks (Facebook, Zalo, ...) to promote agricultural products” with 2.67 points, and the criterion “Implementing cooperation through the digital technology environment” only reaches 1.98 points.

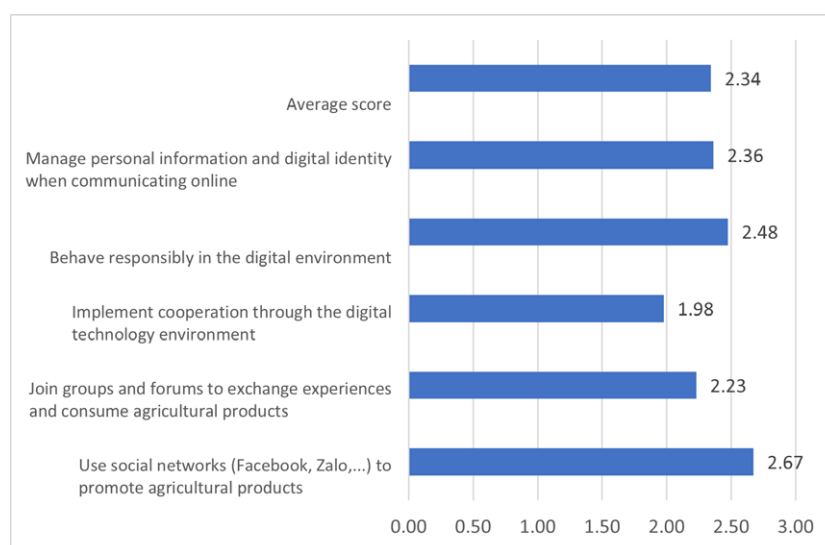


Figure 2. Survey results on the current status of communication and collaboration capacity in the digital environment of young farmers in the Northeast region, Vietnam

Source: Survey

Through research, some causes were identified as:

Causes from the individual side of young farmers lacking basic digital skills. Many young farmers are proficient in using smartphones but lack basic knowledge about digital communication methods (email, professional forums, community management applications); Only use social networks such as Facebook, Zalo at a personal level, not optimized for the purpose of connection - collaboration -

business.

Causes from technology - tools: (i) Limitations in digital infrastructure in rural areas: Unstable Internet, low speed, poor coverage causing difficulties in video call communication, sharing large data; Lack of synchronization of devices: many people use cheap phones with low capacity, unable to install complex apps such as Zoom, Google Meet, Drive... (ii) Lack of specialized communication tools for farmers: Existing



digital platforms (such as Zalo, Facebook) are not specifically designed for agricultural collaboration activities; Agricultural e-commerce applications or group platforms often lack two-way interaction.

Causes from digital culture - psychology: Fear of digital communication, fear of being judged: Digital communication often requires writing, speaking clearly and logically, which many young farmers lack confidence in, many people are afraid to speak in groups, afraid of spelling mistakes, afraid of "revealing ignorance" so they rarely participate in online exchanges; Traditional communication culture is still dominant, direct communication, meeting at markets, farmers' associations... are still preferred over online communication, the mentality of "seeing is believing" is still common in rural areas, affecting trust in digital interactions.

Causes from education and training factors: Lack of specialized training programs on digital skills for farmers: Most current training courses focus on farming techniques or commercialization, with little training in digital communication and collaboration skills (such as writing emails, participating in professional forums, livestreaming sales, responding to

customers, etc.). Lack of trusted instructors: Young farmers rarely receive direct guidance or mentoring from technology experts or digital media consultants.

Policy makers need to increase the integration of digital communication and collaboration into agricultural training and extension programs. Practical training courses should be developed to help young farmers become familiar with digital platforms, online teamwork skills, and digital etiquette. At the same time, digital learning community networks should be developed to create an environment for exchanging and sharing knowledge and production experiences. Policies to support digital infrastructure and encourage public-private partnerships in digital skills training should also be promoted. These measures will contribute to improving the capacity for effective connection and cooperation for young farmers in the digital age.

4.3. Assessment results on digital content creation capacity

The survey results show that the digital content creation capacity of young farmers in the Northeast region of Vietnam is only ranked at 1.94 points (poor).

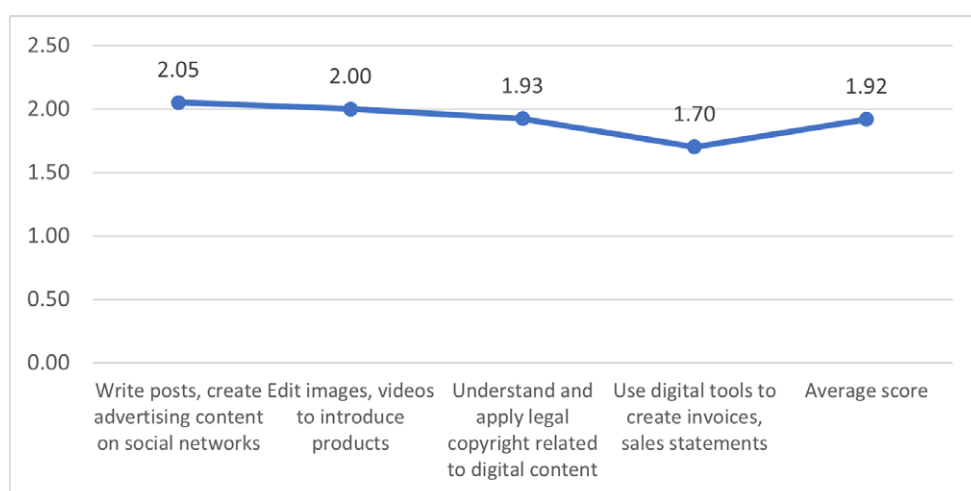


Figure 3. Survey results on the current status of digital content creation capacity of young farmers in the Northeast region, Vietnam

Source: Survey

The results show that the criterion "Writing posts, creating advertising content on social networks" reached 2.05 points (weak level), a number of young farmers know how to write personal posts to introduce agricultural products, introduce prices, and purchase locations for customers on social networks (zalo, facebook), some have created their own agricultural product pages to attract their own customer groups. However, the lack of writing skills, content creation techniques, and accompanying images is still limited. The reason is that young farmers only present the production process, price, and product type, lacking marketing content structure such as AIDA (Attention - Attracting attention; Interest - Arousing interest; Desire - Creating desire; Action - Promoting action); Not knowing how to use attractive keywords, calls to action, and attractive headline formats; Not knowing how to exploit "buyer insights" such as: clean desires, reasonable prices,

organic certification, traceability...; Mostly learning through word of mouth or from friends, no formal course on content marketing in agriculture. The lowest rated criterion is "Using digital tools to create invoices, sales statements" with 1.70 points (poor level). These major problems come from reasons such as: Not knowing how to use applications such as Excel, Google Sheets, digital accounting software (MISA, So Thu Chi, KiotViet, iInvoice...); Confusing between sales invoices - statements - delivery notes, not knowing the legal role of each type of document; Almost no IT skills, some cooperatives still use simple revenue and expenditure books; Manual business habits, only preferring handwriting, not having the habit of keeping track of digital books...

Policy makers should focus on incorporating "creating and sharing digital content" into training programs and fostering digital skills for young farmers. Practical training courses on



filming, shooting, editing and promoting agricultural products on digital platforms should be organized. At the same time, local agricultural content creation support centers should be built to help farmers access digital communication tools and technologies. Policies should also encourage cooperation with technology enterprises and social networking platforms to enhance community digital creativity. These solutions will help young farmers proactively promote their products, increase value and position in the digital supply chain.

4.4. Assessment results on digital security capacity

Figure 3 shows that the overall assessment score of digital security capacity of young farmers in the Northeast region of Vietnam is only 1.80 points, ranked as poor. However, there are different criteria that are assessed differently: The criterion with the highest assessment level in this capacity component is “Know how to use devices to protect health when working in a digital environment” with 2.01 points and there are two criteria “Securing social network accounts and personal devices” with 1.64 points (weak level) and “Recognizing and preventing risks such as fraud, viruses on the internet” with 1.72 points (weak level).

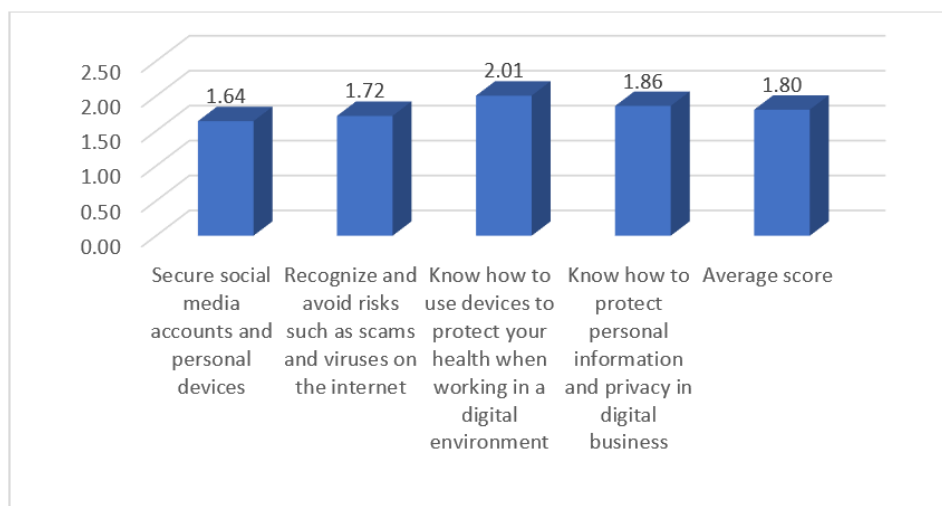


Figure 4. Survey results on the current state of digital security capacity of young farmers in the Northeast region, Vietnam

Source: Survey

When investigating the cause, it was found that young farmers lack full awareness of risks in the digital environment: Unable to distinguish common forms of digital risks such as financial fraud (phishing), account hijacking, falsifying transaction information, personal data theft..., receiving “trap” advertisements via messages, links from Facebook, Zalo, TikTok shop... and accidentally clicking on malicious links; Not understanding digital privacy: willing to share personal information such as ID card, phone number, OTP code, bank account... with strangers because they “met online”; not knowing how to configure privacy settings on Facebook, Zalo, Gmail, leading to personal information disclosure; Lack of skills to prevent and handle digital incidents: not knowing how to detect and avoid common scams (“You won a prize”, “Verify bank account”, “Wrong transfer” ... then provide OTP code or access fake links); Not knowing how to recover accounts when losing control: When Facebook or Zalo is hijacked, not knowing how to use recovery email, verify identity, report to the platform; not knowing two-factor authentication, creating strong passwords, managing cloud accounts (Google Drive, iCloud ...),...; not forming security habits: using the same password for all accounts; saving passwords in notebooks, sending via Zalo to others; posting personal photos, public bank

account numbers ...; lack of protection from the agricultural digital ecosystem such as agricultural product sales platforms, farmer forums, e-commerce platforms ... do not have tools to warn of risks, verify sellers - buyers.

The current limitations in young farmers’ digital security capacity are mainly due to a lack of knowledge about information security and skills to prevent risks in the online environment. They often use digital devices and platforms without security settings, sharing personal information indiscriminately, leading to the risk of fraud or data loss. Training on digital security in agricultural extension and vocational training programs is still very limited. In addition, awareness of privacy and cybersecurity is not taken seriously. Lack of guidance and support tools makes young farmers vulnerable to exploitation in the digital environment.

4.5. Problem-solving ability assessment results

The problem-solving ability assessment results only reached 1.88 points, ranked as weak. In which the highest assessment criteria reached 2.07 points, which was “Identifying technical problems or needs for using digital technology” and the lowest score was “Handling technical problems when using equipment and software” which only reached 1.73 points, ranked as poor.



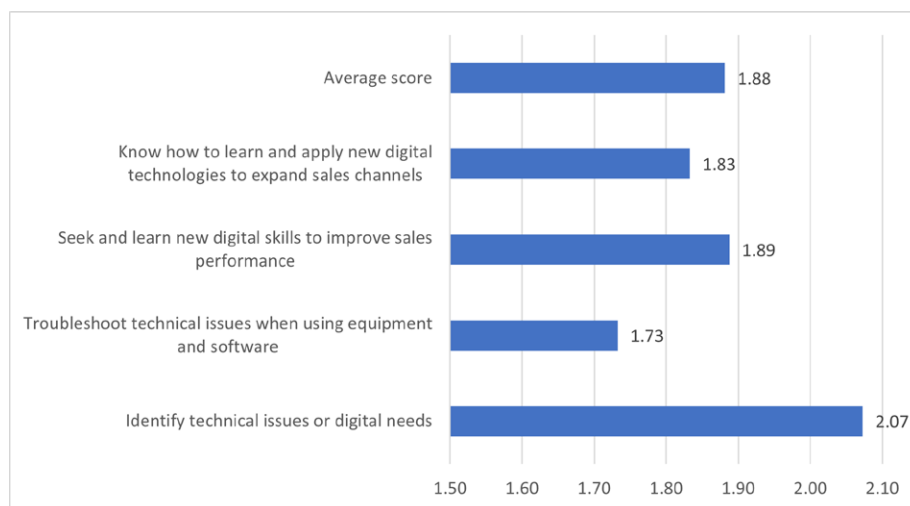


Figure 5. Survey results on the current status of problem-solving capacity of young farmers in the Northeast region, Vietnam

Source: Survey

Young farmers often encounter difficulties when: Not clearly distinguishing technical problems (eg app errors, wrong interface) from business problems (eg posts not reaching customers); Not having the habit and skills to analyze output data (eg: why are there few orders, posts have reduced interactions, products cannot be found...). For example: Facebook posts have low interactions, but farmers do not know if it is because the posting time is wrong, the image is blurry, the post does not have a call to action (CTA), or because the information is distorted. In addition, they encounter difficulties in choosing and using the appropriate digital tools to handle the situation, for example: Having difficulty choosing: selling via Zalo or Facebook? Using Shopee or Sendo? Using Google Forms or Excel to record orders?; Not knowing how to use tools to support order processing and customer care (chatbot, CRM software, basic inventory management); Not having the knowledge to switch channels in time when a platform has problems (for example, TikTok Shop is blocked, no replacement plan). Lack of ability to learn and adapt to new technology: When the platform changes its algorithm (for example, Facebook restricts reach, TikTok changes its policy), many people do not update how to fix it; Not knowing how to find learning resources (tutorial videos, support groups), or not having the habit of learning from mistakes; Some still have the mentality of “just need a good product, no need to learn any additional skills”, leading to stagnation in adaptation.

Policymakers need to promote the integration of digital problem-solving capacity development into agricultural training programs and rural digital transformation. Training courses should be organized to help young farmers practice critical thinking, data analysis and decision-making based on digital information. At the same time, practical learning models should be built through real-life situations, encouraging them to apply technology to solve production and market problems. Policies to support digital agricultural startups should also be expanded to create motivation for learning and innovation. These measures will help young farmers become proactive and effectively adapt to smart agriculture.

5. CONCLUSION

Research shows that the digital capacity of young farmers in the Northeast region of Vietnam in product consumption is still weak, not meeting the requirements of the digital transformation process in agriculture. Most young farmers only stop at basic use of social networks to post articles, lack skills to create attractive communication content, manage orders, and ensure information security. The ability to apply digital tools to create sales lists, electronic invoices, or resolve customer complaints in the digital environment is still limited. The main reasons come from the level of education, lack of practical training opportunities and unsynchronized support from the policy system. This situation poses an urgent need to improve the digital capacity of young farmers to promote effective and sustainable agricultural product consumption. Some proposed solutions:

Developing digital education programs suitable for the characteristics of young farmers: It is necessary to design specialized digital education programs for young farmers with easy-to-understand, practical content and linked to the needs of agricultural product consumption. The program should be based on the citizen digital competency framework (such as DigComp) but adjusted to suit the educational level, local culture and characteristics of agricultural production. Modules should focus on core skills such as: searching and processing digital information, communicating - promoting via social networks, creating simple media content, using sales tools, and information security.

Diversifying flexible teaching and learning methods: Instead of heavy theoretical classes, it is necessary to apply the “hands-on” method, combining learning through instructional videos, practical experiences, and simulation activities (for example: creating fanpages, writing advertisements, processing real orders). In addition, it is necessary to use mobile learning tools, microlearning platforms, and short videos (under 5 minutes) to suit the learning capacity and time of young farmers. Learning can take place in groups at cultural houses, cooperatives, or via personal smartphones.



Strengthening the application of digital technology in education: It is necessary to develop a digital learning platform specifically for farmers that integrates documents, video lectures, short tests, and discussion forums. The platforms should support offline learning, run well on phones, have a simple interface, and have instructions in pictures and local languages (if needed). In addition, it is necessary to take advantage of social networks such as Zalo, Facebook, and TikTok to disseminate knowledge, introduce good learning models, and create learning communities.

Mobilizing the community education ecosystem: Local authorities, youth unions, farmers' associations, universities, and social organizations need to coordinate to implement digital competency education in a sustainable manner. It is possible to form "community digital tutor" groups consisting of volunteer students or young local officials to directly guide farmers in learning technology. At the same time, organizing competitions and competitions on digital skills in agriculture helps increase interest and recognize learning progress.

Local authorities need to play a key role in designing and implementing training programs that are close to reality, easy to access and highly applicable. First of all, it is necessary to organize regular training courses at communes, villages or community learning centers, with a "hands-on" method, focusing on essential skills such as: using social networks to promote products, creating sales posts, using order management software, electronic invoices, as well as protecting personal information security. Courses should be taught by local technical staff in combination with young volunteers or students majoring in technology, marketing, e-commerce. In addition, localities need to build a model of "typical digital farmers" as a core to spread experiences, while maintaining study groups via Zalo and community fanpages to update new knowledge and solve practical problems. District and commune authorities should also coordinate with digital platform providers and technology enterprises to organize workshops, technology demonstrations and provide friendly and easy-to-understand learning materials. Integrating digital capacity training criteria into the new rural program, cooperative development and rural youth movements will help enhance the legitimacy and sustainability of training activities at the grassroots level.

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