READINESS FOR DIGITAL TRANSFORMATION IN COOPERATIVES IN THE NORTHEAST OF VIETNAM

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ARTICLE INFO	ABSTRACT
	The purpose of this study was to investigate the levels and determinants of readiness for digital transformation among 317 cooperatives operating in the Northeast region of Vietnam in 2022, as well as their need for digital transformation. The majority of the cooperatives surveyed were found to be at the highest and high levels of readiness for digital transformation, with 76% and 13.6% at Levels 5 and 4, respectively. The study utilized a two-stage least squares regression method to identify influential factors affecting the cooperatives' readiness for digital transformation. Results indicated that characteristics of cooperative directors (such as age, education, number of social accounts, and use of e-wallets) and surveyed cooperatives (such as age, social accounts, computer literacy of members and workers, bank accounts, and participation in e-commerce trading floors) significantly impacted their readiness for digital transformation. External supportive services were found to be crucial in improving the cooperatives' readiness for digital transformation, with training on digital transformation, digital hardware, digital transformation consultations, and financial support being particularly essential.

SỰ SẴN SÀNG CHUYỂN ĐỔI SỐ TẠI CÁC HỢP TÁC XÃ TRÊN ĐỊA BÀN ĐÔNG BẮC VIỆT NAM

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THÔNG TIN BÀI BÁO	TÓM TẮT
	Mục đích của nghiên cứu này là đánh giá mức độ và các yếu tố quyết định mức độ sẵn sàng chuyển đổi số của 317 hợp tác xã đang hoạt động ở khu vực Đông Bắc Việt Nam vào năm 2022, cũng như nhu cầu để chuyển đổi số của các hợp tác xã này. Phần lớn các hợp tác xã được khảo sát đều ở mức sẵn sàng cao nhất và cao cho chuyển đổi số, với tỷ lệ tương ứng là 76% và 13,6% ở Cấp độ 5 và 4. Nghiên cứu sử dụng phương pháp hồi quy bình phương nhỏ nhất hai giai đoạn để xác định các yếu tố ảnh hưởng đến mức độ sẵn sàng chuyển đổi số của các hợp tác xã. Kết quả chỉ ra rằng các đặc điểm của giám đốc hợp tác xã (như độ tuổi, trình độ học vấn, số tài khoản xã hội và việc sử dụng ví điện tử) và các hợp tác xã được khảo sát (như độ tuổi, tài khoản xã hội, trình độ tin học của thành viên và người lao động, tài khoản ngân hàng và sự tham gia vào sàn giao dịch thương mại điện tử) đã tác động đáng kể đến sự sẵn sàng chuyển đổi số của các hợp tác xã. Các dịch vụ hỗ trợ bên ngoài được cho là rất quan trọng trong việc cải thiện mức độ sẵn sàng chuyển đổi số của các hợp tác xã, trong đó đào tạo về chuyển đổi số, phần cứng, tư vấn chuyển đổi số và hỗ trợ tài chính là đặc biệt cần thiết.

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1. Introduction

Owing to its benefits such as increasing labour productivity, creating added value and improving social benefits, digital transformation is an irreversible process [1]. Cooperatives are emerging as an effective collective economic model in developing countries like Vietnam. It allows for breaking through the barriers of the household economic model such as production scale, mobilizing resources and improves efficiency and competitiveness [2] - [5]. Previous studies in the international context focused mainly on digital transformation in enterprises and those that examined the process in cooperatives are rare [4], [6] - [8]. Despite the considerable effort of the authors, there has not been a study on digital transformation in cooperatives in Vietnam. The current study endeavoured to fill such research gaps by investigating the level of readiness for digital transformation in cooperatives operating in Vietnam in 2022. In addition, it examined the determinants of the level of readiness for digital transformation. It also explored the cooperatives' need to accelerate the process of digital transformation.

2. Research design and methodology

2.1. Research design

Google Forms was used to design questionnaires. The links to questionnaires were then distributed using email, Facebook, Zalo, Viber, and WhatsApp to survey. The surveys were conducted between the 29th of September and the 29th of October 2022. Due to resource limitations, the study focused on surveying cooperatives located in the Northeast of Vietnam. Approximately, 2,000 cooperatives were randomly selected from the lists provided by the provincial cooperative alliance. Only 317 cooperatives fully completed the survey or provided reliable information. To explore the cooperatives' need for digital transformation, in-depth interviews with 45 cooperative directors were conducted over the phone.

The index of the readiness for digital transformation used in the current study was adapted from the ICT Development Index (IDI) issued by the International Telecommunication Union [9] and that issued by the Ministry of Information and Communications [10]. The major advantage of the IDI is that it is internationally recognised. However, it cannot be used to access the level of readiness for the digital transformation of a single organisation such as a cooperative. In contrast, the index developed by the Ministry of Information and Communications [10] (MICI) can be applied to examine the level of readiness for digital transformation in a single organisation such as an enterprise or a cooperative. However, a number of criteria are not sufficiently detailed. The index in the current study was compiled from scores given in six pillars, which form the readiness for digital transformation. Each pillar can have several components and each component may have multiple criteria. Each criterion was scored on a scale ranging from zero to five. Details are presented in Table 1.

Table 1. *Index of the readiness for digital transformation*

No.	Pillars	Components	Criteria	Maximum scores					
				Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
1	Digital experience for customers	2	13	0	13	26	39	52	65
2	Digital strategy	1	1	0	5	10	15	20	25
3	Digital infrastructure and technology	2	16	0	16	32	48	64	80
4	Digital operation	2	13	0	13	26	39	52	65
5	Digital transformation of enterprise culture	2	10	0	10	20	30	40	50
6	Data and information property	1	7	0	7	14	21	28	35
	Total	**10**	**60**	**0**	**64**	**128**	**192**	**256**	**320**

Note: Levels 0 and 5 = the lowest and highest level of readiness for digital transformation, respectively.

(Source: Adapted by the authors from [9] - [12])

The level of readiness for digital transformation in cooperatives can be influenced by both internal and external factors. The internal factors include the characteristics of the director and the cooperative itself. The external influential factors include policies and other environmental factors.

2.2. Methodology and regression model

A multiple regression model was used to examine the readiness for digital transformation in the cooperative as shown in Equation 1 [13].

$$Y_i = \alpha + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \beta_{3i}X_{3i} + \varepsilon \tag{1}$$

where Y_i represents the index/scores of the readiness for digital transformation. The scores were calculated from ten components of the six pillars as previously addressed. The higher the scores/index is, the more ready for digital transformation the cooperative is. X_{1i} represents the cooperative director's demographic characteristics. X_{2i} represents the cooperative's characteristics and X_{3i} represents external factors that can influence the cooperative's readiness for digital transformation. The director's demographic characteristics are believed to have an impact on the cooperative, including digital transformation. In the current study, they included the age (years), gender (1 = male), ethnicity (1 = Kinh, 0 = others), education (1 = tertiary education or above), and residency (1 = urban) [14] - [16]. The cooperative director's history of using digital devices or services was also examined in the current study. These included years in using smart devices such as a phone, tablet or computer (years), tenure (years), social accounts (accounts), using a bank account (1 = yes), using   ATM (automated teller machine, 1 = yes), using an e-wallet (1 = yes) [17] - [19]. It has been proven that characteristics of the organisation such as the cooperative also play an important role in digital transformation. In the current study, these included the age (years) [12], the number of members, the number of full-time workers [12], registered capital (VND - Vietnamese Dong). Currently, the exchange rate between US dollar and VND is 24,964,404 [20]), annual income (VND million), sector (1 = production, 2 = trade, 3 = construction and 4 = services), cooperative exported its products (1 = yes), digital channels/platforms used (channels/platforms), members with tertiary education or above (%), workers with tertiary education or above (%), workers and members who used a smart device such as phone, tablet or computer (%), used a bank account or an e-wallet (1 = yes), joined an e-commerce trading floor (1 = yes) [14]. External support is believed to help accelerate the digital transformation in organisations such as cooperatives. In the current study, it included the number of external services. It is expected that the more external supportive services that the cooperative receives, the more ready for the digital transformation it will be [21].

Since the data are cross-sectional, the two-stage least squares (2SLS) regression specification is a better option (than the ordinary least squares or also known as OLS) to address the problems caused by endogeneity and heterogeneity, which are common in social science studies [12], [21] - [24]. Particularly, in the first stage, it uses instrumental variables that are not correlated with the error terms to generate the values of the problematic independent variables. In the second stage, it uses the values to estimate a linear regression model of the dependent variable [25].

3. Results and Discussion

3.1. The level of readiness for digital transformation in cooperatives

Figure 1 shows that a majority of the surveyed cooperatives were ready for digital transformation. Particularly, almost 80% of the cooperatives were at the levels 5 or 4 (the highest and second highest level) of readiness for digital transformation.

This finding is relatively higher than that reported in a recent survey, which indicated that more than 50% of cooperatives did not have a digital transformation orientation [26].
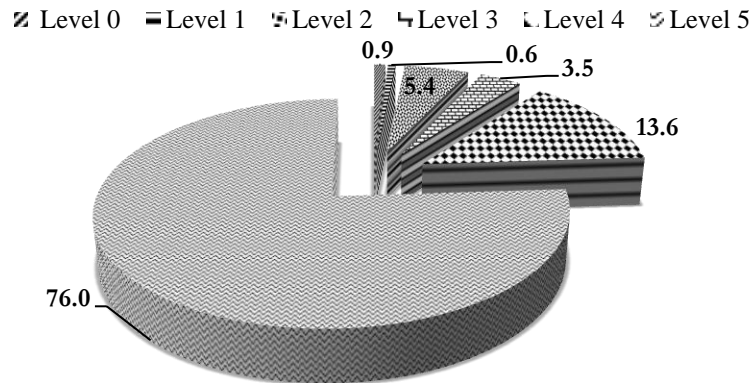
Level 0   Level 1   Level 2   Level 3   Level 4   Level 5

Figure 1. *The level of readiness for digital transformation in cooperatives (measured in percentage)*
(Source: Illustrated by the authors using the surveyed data)
Note: *Levels 0 and 5 represent the lowest and highest levels of readiness for digital transformation, respectively.*

3.2. Determinants of the readiness for digital transformation in cooperatives

As previously addressed, the determinants of the readiness for digital transformation in cooperatives were examined by applying the two-stage least square regression model. Results are presented in Table 2.

Table 2. *Determinants of the readiness for digital transformation in cooperatives (2SLS regression)*

The Readiness for Digital Transformation (scores)	Coef.[1]	S. E.[2]	*p-value*
Cooperative director's age (X_1, years)	0.418	0.251	0.097
Cooperative director's gender (X_2, 1 = male)	-0.539	6.405	0.933
Cooperative director's ethnicity (X_3, 1 = Kinh)	1.798	14.277	0.900
Cooperative director's education (X_4, 1 = tertiary/above)	11.044	6.336	0.082
Cooperative director's residency (X_5, 1 = urban)	8.100	6.667	0.225
Cooperative age (X_7, years)	1.130	0.512	0.028
Cooperative director's social accounts (X_8, accounts)	1.104	0.468	0.019
Cooperative director had a bank account (X_9, 1 = yes)	3.245	6.823	0.635
Cooperative director used ATM (X_{10}, 1 = yes)	0.161	6.681	0.981
Cooperative director used an e-wallet (X_{11}, 1 = yes)	19.972	6.331	0.002
Cooperative members (X_{13}, persons)	-0.001	0.017	0.961
Cooperative full-time workers (X_{14}, workers)	0.063	0.453	0.889
Cooperative annual income (X_{15}, VND million)	0.009	0.012	0.469
Cooperative sector (X_{17}, 1 = production, 0 = trade/construction/services)	7.634	2.846	0.008
Cooperative exported its products (X_{18}, 1 = yes)	6.628	6.494	0.308
Support that cooperative received (X_{19}, number of supports)	2.886	0.967	0.003
Cooperative's social accounts (X_{20}, accounts)	3.174	1.052	0.003
Percentage of cooperative members with tertiary education or above (X_{21}, %)	2.229	1.825	0.223
Percentage of cooperative members who used a smartphone (X_{23}, %)	0.814	1.823	0.655
Percentage of cooperative members and workers who could use a computer for work (X_{25}, %)	3.336	1.919	0.083
Cooperative used a bank account (X_{26}, 1 = yes)	3.245	6.823	0.058
Cooperative used an e-wallet (X_{27}, 1 = yes)	9.048	6.350	0.155
Cooperative participated in an e-commerce trading floor (X_{28}, 1 = yes)	12.110	6.228	0.053
Constant	85.200	21.276	0.000

(Source: Estimated by the authors using the surveyed data)
Note: [1]*Coefficient and* [2]*Standard Errors.*

Literature shows that the organisation's leader has a significant impact on accelerating the digital transformation of the organisation. Therefore, the cooperative director's demographic

characteristics were examined. The results show that a one-year increase in the cooperative director's age was associated with an increase in the level of readiness for digital transformation by approximately 0.4 scores ($p < 0.1$). However, this association is believed to follow the law of diminishing returns. The cooperative director's education could help improve the level of readiness for digital transformation. Particularly, a cooperative led by a director with tertiary education or above had a higher level of readiness for digital transformation by approximately 11 scores ($p < 0.1$). This finding was in agreement with that reported by Martín Martín, Maya Garcia [27]. In addition, one social account (of the cooperative director) increase was associated with an increase in the level of readiness for digital transformation by approximately 1.1 scores ($p < 0.05$). Also, a cooperative led by a director who used an e-wallet had a higher level of readiness for digital transformation by almost 20 scores ($p < 0.01$).

The characteristics of the cooperative were found to influence its readiness for digital transformation. Particularly, a one-year increase in the cooperative age was associated with an increase in the level of readiness for digital transformation by approximately 1.1 scores ($p < 0.05$). The results show that a cooperative in the production sector had a higher level of readiness for digital transformation by almost 8 scores ($p < 0.01$). The number of the social accounts that the cooperative owned appeared to help increase the level of readiness for digital transformation. For example, one social account (of the cooperative) increase was associated with an increase in the level of readiness for digital transformation by almost 3.2 scores ($p < 0.01$). Computer literacy of cooperative members and workers played an important role in the improvement of the readiness for digital transformation. For example, a 1% increase in the number of cooperative members and workers who could use a computer for work was associated with an increase in the level of readiness for digital transformation by approximately 3.3 scores ($p < 0.1$). As expected, bank accounts could help improve the level of readiness for digital transformation. Particularly, a cooperative that used a bank account had a higher level of readiness for digital transformation by approximately 3.2 scores ($p < 0.1$). As anticipated, participating in the e-commerce trading floor could help increase the level of readiness for digital transformation. For example, a cooperative that joined an e-commerce trading floor had a higher level of readiness for digital transformation by approximately 12 scores ($p < 0.1$).

External support was essential for cooperatives to accelerate their digital transformation process. There were 11 supportive services to help cooperatives and enterprises to accelerate the process of digital transformation [28]. As expected, the more support a cooperative received, the more ready for digital transformation it would be. For example, one additional supportive service the cooperative received was associated with an increase in the level of readiness for digital transformation by almost 9 scores ($p < 0.01$). This finding was similar to that reported by Ghobakhloo and Iranmanesh [21].

3.3. Cooperatives' need for digital transformation

The selected cooperative directors were asked about the cooperatives' need for digital transformation. Results are illustrated in Figure 2.
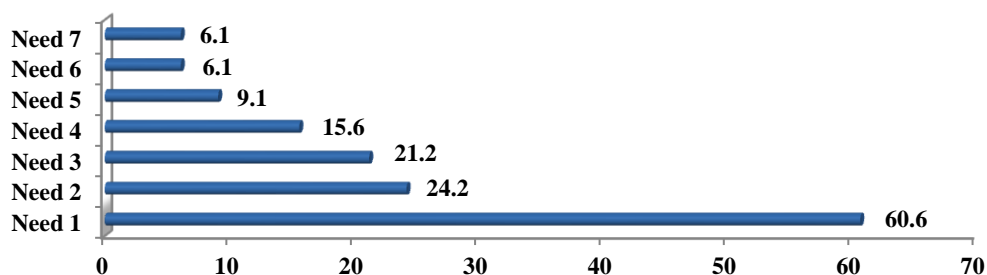

Figure 2. *Cooperatives' need for digital transformation (measured in %)*
(Source: Illustrated by the authors using the surveyed data)

Note: *Need 1 = training on digital transformation, Need 2 = digital hardware, Need 3 = consultations on digital transformation, Need 4 = financial aid, Need 5 = applications for management, Need 6 = access to digital services and Need 7 = human resources.*

The results show that training on digital transformation appeared to be the most important need (Need 1). Digital transformation is not new in the international context, but it is new in Vietnam, especially in cooperatives. Therefore, training is essential. The second constraint that the surveyed cooperatives faced is digital hardware such as smart devices and or machinery (Need 2). A number of cooperative directors admitted that consultations on digital transformation were essential for digital transformation in their cooperatives (Need 3). Currently, most external support was non-financial, but financial aid for digital transformation appeared to be important (Need 4). A minority of the surveyed cooperatives needed support with management software (Need 5), access to digital services (Need 6) or human resources in digital transformation (Need 7).

4. Conclusion

The results showed that a majority of the surveyed cooperatives were at the highest and high levels of the readiness for digital transformation. Particularly, 76% and 13.6% of them were at Levels 5 and 4, respectively. Results generated from the two-stage least squares regressions showed that characteristics of the cooperative directors such as age, education, the number of social accounts and the use of e-wallets significantly affected the readiness for digital transformation in their cooperatives. In addition, the characteristics of the surveyed cooperatives significantly influenced the readiness for digital transformation in the cooperatives. The characteristics included age, social accounts, computer literacy of cooperative members and workers, bank accounts and participation in e-commerce trading floors. Also, external supportive services really helped improve the readiness for digital transformation in the cooperatives. The cooperatives' need for digital transformation was explored. Training on digital transformation was the most important need. Respondents also indicated that digital hardware, digital transformation consultations and financial support were essential for digital transformation in their cooperatives. To accelerate the process of digital transformation in the cooperatives, on the one hand, the government, cooperative union and relevant parties should comprehensively consider their needs. On the other hand, the cooperative should actively use all resources to train their staff and workers in digital transformation. Due to resource limitations, the current study could not collect data in a wider area and a longer time period. Future studies can fill these gaps.

Acknowledgement

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